ISSN : 2456-3307

D Y PATIL GROUP
Dr D Y Patil School of
Engineering, Lohegaon, Pune

TECHNO SCIENCE ACADEMY
The International Open Access Publisher

IJSRCSEIT

# An International Conference Innovation-2021

## Organised by

Computer Engineering Department,
Dr. D. Y. Patil School of Engineering,
Lohegaon, Pune, Maharashtra, India

Volume 8, Issue 3, May-June-2021

# INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH IN COMPUTER SCIENCE, ENGINEERING AND INFORMATION TECHNOLOGY

Impact Factor Value 2020 = 6.135

Email: editor@ijsrcseit.com

# An International Conference - Innovation-2021

**On**

**25th-26thJune 2021**

Organized by

D Y PATIL GROUP

Dr D Y Patil School of Engineering, Lohegaon, Pune

Computer Engineering Department,
Dr. D. Y. Patil School of Engineering,
Lohegaon, Pune, Maharashtra, India
www.dypic.in

In association with

IJSRCSEIT

**International Journal of Scientific Research in Computer Science, Engineering and Information Technology**

**ISSN : 2456-3307**

**Volume 8, Issue 3, May-June-2021**

**Published By**

Techno Science Academy
The International Open Access Publisher

**website : www.technoscienceacademy.com**

## Chief Patron

**Dr. Ajeenkya D Y Patil**
Chairman & Chancellor, Ajeenkya D Y Patil University, Lohegaon, Pune

## Patron

**Prof. Hrridaysh Deshpande**
Vice Chancellor,
Ajeenkya DY Patil University

**Dr. Sushant Patil**
Advisor,
Dr D Y Patil Technical Campus, Lohegaon, Pune

**Dr. Ashok Kasnale**
Principal,
Dr D Y Patil School of Engineering

**Dr. Farook Sayyad**
Dean Academics,
Dr D Y Patil School of Engineering

**Dr. Pankaj Agarkar**
HOD, Computer Engineering,
Dr D Y Patil School of Engineering

## Organizing Committee

**Prof Monika Dangore**
Convener
**Prof Pooja Shinde**
Co-Convener
**Prof Jayashree Chaudhari**
Coordinator
**Prof Yogesh Mali**
Coordinator

## About Dr. D. Y. Patil Group

A frontrunner in the education field, the Dr. D. Y. Patil Group is a name synonymous with world class quality education. The group strongly believes that world-class education is the stepping-stone to progress. With a long-standing commitment towards quality teaching and learning, the group has nurtured values that go into the making of successful careers. Equipped with state-of-the-art infrastructure, the group encourages its students to think, question, explore and apply their well-honed minds to scale newer heights of success. Dr. D. Y. Patil Group is a highly regarded educational organization having deemed universities to its credit, and running many educational institutions, in disciplines such as health care, management education, engineering and technology.

## Dr. D. Y. Patil School Of Engineering

Dr. D Y Patil School of Engineering is established in 2010. The institute is approved by the All India Council for Technical Education (AICTE), New Delhi, and recognized by Govt. of Maharashtra and is affiliated to Savitribai Phule Pune University, Pune. The institute offers Engineering programs (UG) in Civil Engg, Mechanical Engg., Electronics and Telecommunication Engg, Computer Engineering and AI & Data Science. The institute also offers PG courses in Mechanical and Computer Engineering. The institute is accredited by NAAC and has dedicated faculty members and is well equipped with equipment's in laboratories.

## Main Topics/Areas/Domains

Artificial Intelligence
Big Data
Computer Graphics
Cryptography & Network Security
Cyber Security
Data Mining and Business Intelligence
DSP/Image Processing/Pattern Recognition/Multimedia
Embedded System and Software
Mobile Computing and Wireless Communication
Natural Language Processing
Soft Computing (AI, Neural Networks, Fuzzy Systems)
Smart City Applications
Privacy, Security, and Trust in Cloud Services

**Dr. D. Y. Patil School of Engineering**

Dr Ajeenkya DY Patil Knowledge City Lohegaon, Pune

**Department of Computer Engineering**

**Association of Computer Engineering (ACE)**

***in association with***

**International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT)**

# Innovation 2021

## A Digital Conference

*Sponsored by*

TechnoScience Academy-The International Open Access Publisher

26th June 2021

## Conference Report

Computer Engineering Department of Dr D Y Patil School of Engineering, Lohegaon, Pune had organized a Digital Conference "Innovation 2021" on 26th June 2021. This Conference was organized in association with International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT) and was sponsored by Techno Science Academy-The International Open Access Publisher.

The Authors who won Best Paper Award in the Conference presented their papers through power point presentation. Dr. Sheshang D. Degadwala- Associate Editor IJSRSET acted as Session Chair for the Conference who made an active interaction with all the participants and shared his expertise. This conference was conducted under the state-of-art directions and guidelines of Dr Pankaj Agarkar – HOD Computer Engineering.

Dr Ashok Kasnale- Principal DYPSOE gave huge support and encouragement to the Conference. Dr Farook Sayyad- Dean Academics-DYPSOE motivated and encouraged the participants

The processing of the complete E-Conference and pre and post publication work was successfully done by Dr. Bhavesh Kataria - Executive Editor IJSRSET.

This E-Conference Conduction and Paper Publication Process were successfully controlled by Prof. Monika Dangore who acted as the Convener of the E-Conference. The Anchoring for the conference was beautifully done by Prof Pooja Shinde who also acted as the Co-Convener.

DYPSOE Computer Department Staff Members and Project Guides also gave their contribution in making this E-Conference successful.

**Winners of Best Papers Award (declared by IJSRCSEIT) :**

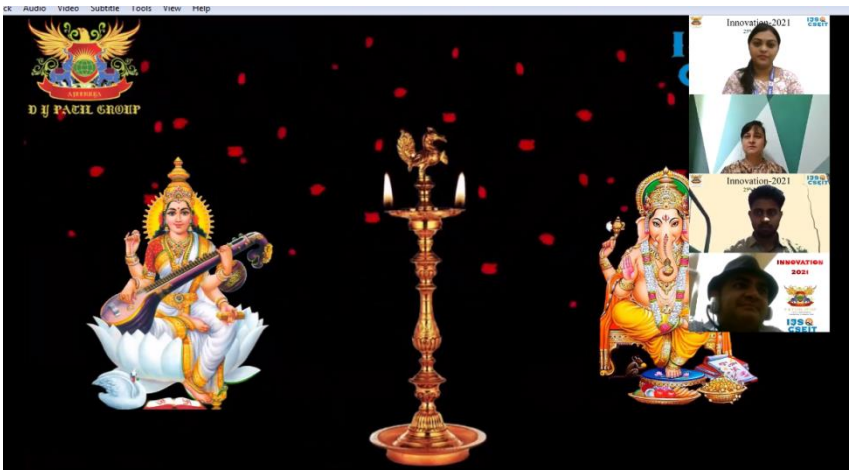
| Rank | Paper Title | Name of Authors | Institute |
|---|---|---|---|
| 1 | Generation of 3D Model from Images | Akash Chaudhari, Aditya Deo, Mahesh Badhe, Ritesh Patidar, Dr Sunil Rathod | Dr D Y Patil School of Engineering, Lohegaon, Pune |
| 2 | Smart Passenger | Akshay Mali,Prashant Gaikwad, Akash Kurund, Manthan Khariwal, Prof Varsha Babar | Dr D Y Patil School of Engineering & Technology, Lohegaon, Pune |
| 3 | Helmet Detection on Two Wheeler Riders using Machine Learning and Automatic Licence Plate Recognition for Identification | Vaibhav Shankar Kharade Rachana Jaykumar More Pratik Mangesh Mahendra Mahajan Prof Jayashree Chaudhari | Dr D Y Patil School of Engineering, Lohegaon, Pune |

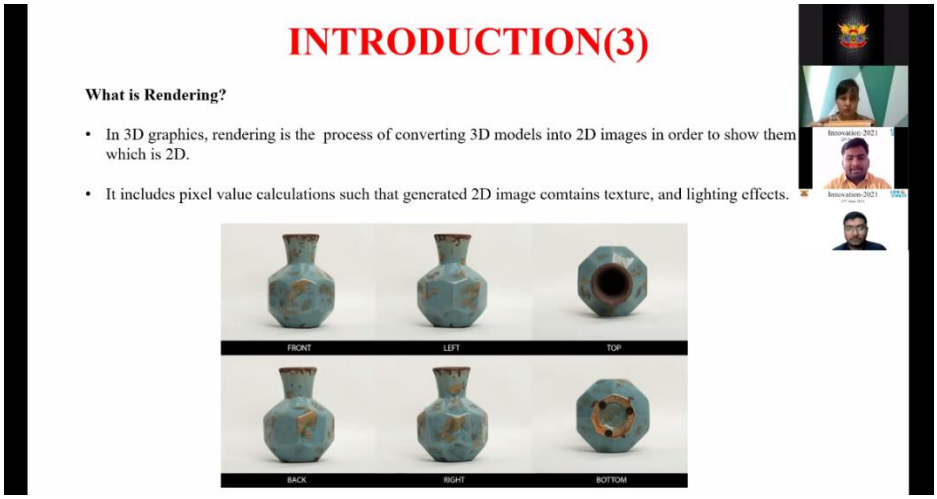
The Prize Distribution Ceremony of Winners of Best Paper Award was conducted on 30th June 2021 at Computer Engineering Department of DYPSOE. The winners were awarded with Best Paper Certificate and Cash Prizes sponsored by Techno Science Academy. Prof Bhagyashree Dhakulkar- HOD Computer from Dr D Y Patil School of Engineering & Technology was present for the event as Guest.

## Photos:

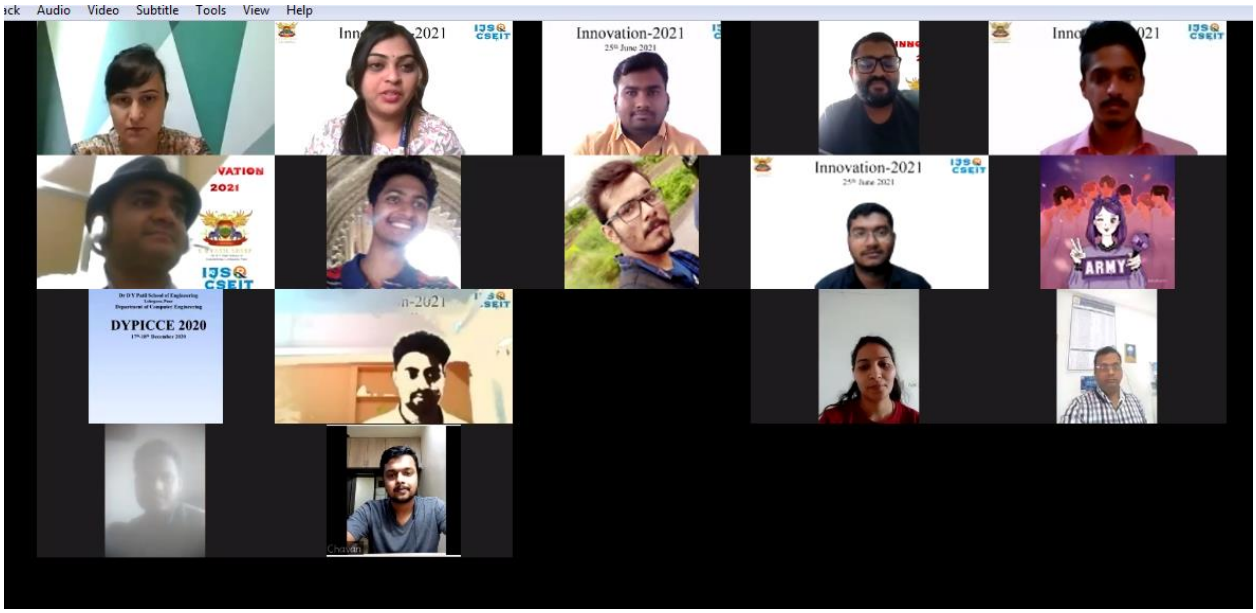

Edit & Create
Share
Dr D Y Patil School of Engineering
Lohegaon, Pune
Department of Computer Engineering
Presents
"Innovation-2021 E-Conference"
26th June 2021
In association with
International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT)
(Peer Reviewed Open Access International Journal, Indexed in Publons, Google Scholar)
Sponsored by Techno Science Academy- The International Open Access Publisher
Visit us at : https://www.dypic.in/
Conference Page : http://ijsrcseit.com/conference.php?n=Innovation-2021
Innovation-2021
INNOVATION 2021
28°C Light rain
ENG
12:36 PM
26-06-2021


INNOVATION
2021
Innovation-2021


D Y PATIL GROUP
Innovation-2021


INTRODUCTION(3)
What is Rendering?
• In 3D graphics, rendering is the process of converting 3D models into 2D images in order to show them which is 2D.
• It includes pixel value calculations such that generated 2D image comtains texture, and lighting effects.
FRONT
LEFT
TOP
BACK
RIGHT
BOTTOM


With and Without Helmet
BikeR WithoutHelmet: 98%
LicensePlate: 92%
BikeRid Helmet: 99
LicensePlate: 99%


Audio Video Subtitle Tools View Help
Innovation-2021
25th June 2021
DYPICCE 2020
ARMY


Innovation-2021
Unnamed Road, Charholi Budruk, Pune, Maharashtra 412105, India
Pune
Maharashtra
India
2021-06-30(Wed) 03:17(PM)
30°C
86°F


NVIDIA Corporation
GPU Education Center
Department of Computer Engineering
DEPARTMENT OF COMPUTER ENGG.
Centre of Excellence
Kingsbury Rd, Charholi Budruk, Maharashtra 412105, India
Charholi Budruk
Maharashtra
India
2021-06-30(Wed) 03:19(PM)
30°C
86°F

# CONTENTS

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Development of Symbolic Music Generation Technique Based on Deep Learning and AI

**Vincy Kaushik[1], Pravin Kumar Mishra[2]**
[1]Bharat Institute of Technology, Meerut, Uttar Pradesh, India
[2]Assistant Professor, Bharat Institute of Technology, Meerut, Uttar Pradesh, India

## ABSTRACT

In this work we propose MusPy, a Python open source toolkit for the creation of symbolic music. MusPy provides easy to use tools for key music generating components like dataset administration, data I/O, data preparation, and model assessment. We offer the statistical analysis of the eleven presently supported MusPy datasets to demonstrate their potential. Moreover, by training an autoregressive model on each dataset, we undertake a cross-data generalisation experience and measure the likelihood of the rest — a process made easy by a MusPy dataset management system. The results reveal a domain map that overlaps different frequently used data sets with more cross-gender examples in some data sets than in other. These results might serve as a reference for selecting data sets in future study, alongside the examination of data sets.

Keywords : Symbolic Music Generation, AI, Deep Learning, MIDI

## I. INTRODUCTION

As shown in Fig. 1, a pipeline for music creation typically consists of the following steps: data collection, data preprocessing, model building, model training, and model evaluation. While certain components must be customised for each model, others may be shared across many systems. Numerous data sets, representations, and metrics have been given in the literature, most notably for the creation of symbolic music[1]. This may save much time and effort and may result in increased repeatability when a basic toolkit implementing standard versions of such processes is used. However, such tools are challenging to develop for a number of reasons.

To begin, although a large number of symbolic music datasets are publicly available, organising these collections and preserving the many formats used to capture them is difficult. These formats are often used for a variety of reasons. Some are developed for replay capabilities (e.g., MIDI), while others are developed to support the Music Encoding Initiative (MEI)[4]. Others are developed to support research-oriented formats aimed at simplicity and readability (e.g., MuseData [5] and Humdrum [6]), such as Music XML[2] and LilyPond[3], as well as the Music Encoding Initiative. Often, researchers must write their own code for each preprocessing format. Frequently, researchers must write their own preparation code for each format. While researchers may develop their own data access and processing methods, issues of repeatability have

been highlighted in [7] for audio datasets because to a lack of coherence in the raw data.

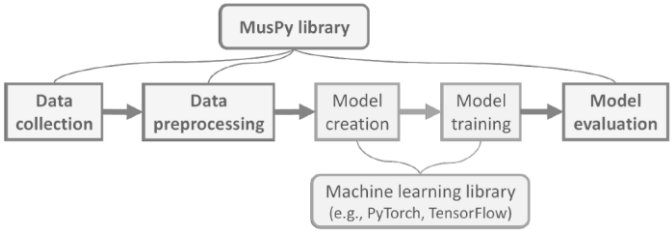



Fig. 1. An example of a method for learning music

Second, the structure and hierarchy of music can lead to diverse depictions of abstraction[8]. Further, in the context of a previous art, certain music performances were also offered as a sequence of pitch [9-12], events [13-16], notes [17] or a matrix of time pitch (i.e. a piano rollen).

Finally, attempts were undertaken to make objective assessment measurements for music production systems more robust[17], since these measurements give an objective approach to compare various models but also to monitor development of training on machine-based learning systems. Due to mireval effectiveness in evaluating typical MIR tasks, a library that implements frequently used assessment measurement methods for systems generating music might assist enhance productiveness.

We find a toolset for generating music that contributes to the MIR community in due course to meet these problems. So in this paper we offer a new Python library, MusPy, for the creation of symbolic music. It offers fundamental instruments for building a system for generating music, including data set management, I/O data, preprocessing and model assessment.

We do a statistical analysis of the 11 presently supported data sets with MusPy, in order to detect statistical discrepancies. Furthermore, we perform three experiments to assess their relative diversity and the compatibility of different data sets with each other. Together with the statistical analysis, these results give a guidance for selecting correct data sets for future study. Finally, we also show that combining multiple heterogeneous datasets could help improve generalizability of a music generation system.

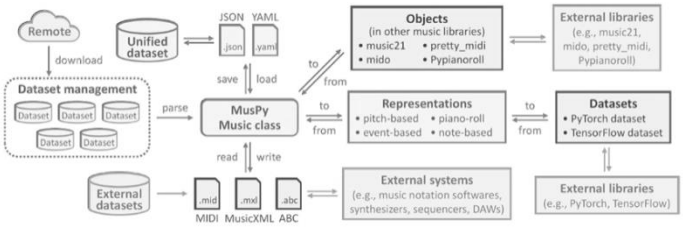



Fig. 2. MusPy Music object at the center is the core element of MusPy.

## II. RELATED WORK

A specialised library for music generation has been developed with little effort, to the best of our knowledge. The most remarkable example is the Magenta project[5]. While MusPy seeks to offer core data collecting, pre-processing, and analysis procedures, Magenta has several model instances, but it is very closely linked with TensorFlow[23]. We at MusPy allow specialised machine learning libraries to design the model generation and training and to make MusPy adaptable in the work with multiple machine learning frameworks.

Many libraries are available to deal with symbolic music. Music21[4] is one of the most representative instruments of computer musicology research and objectives. Music21 has its own corpus, while MusPy has no dataset. Instead, MusPy provides online downloading data sets with tools to manage distinct collections, so that new datasets may be extended in future easily. jSymbolic [5] is focusing on extracting symbolic music statistical information. While jSymbolic may serve as a powerful feature extractor for the training of classification models supervised, MusPy concentrates on generative music modelling and promotes many common representations in the production of music.

Furthermore, MusPy offers numerous objective measurements for assessing systems for music production. Connected generalisation studies using cross-datasets[5] indicate that cross-domain

pretraining can both qualitatively and quantitatively improve results of music creation. MusPy's data set management mechanism facilitates us in analysing the generalizability of different datasets in pairs to properly check this hypothesis.

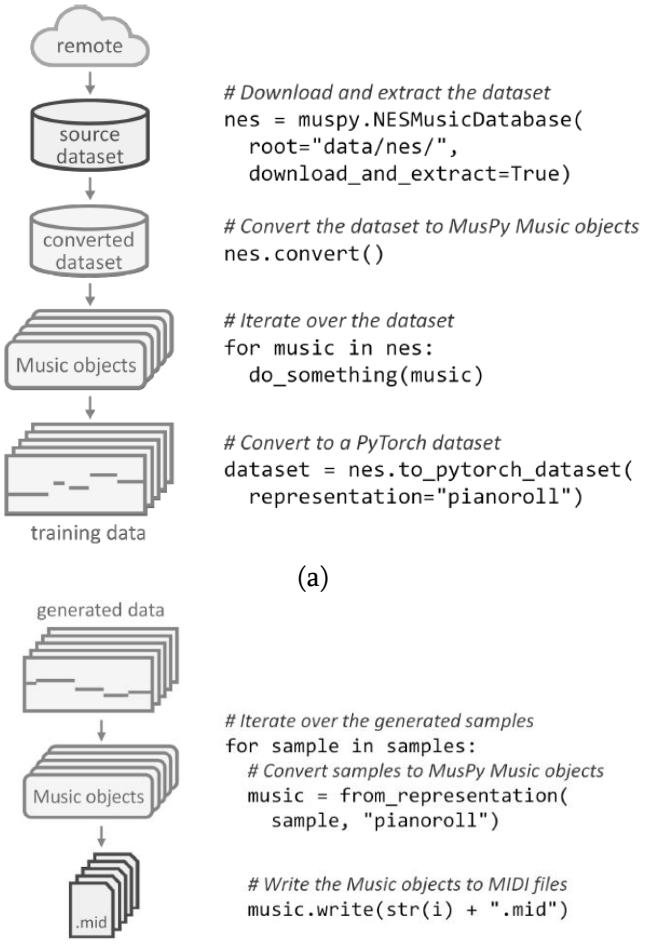



Fig. 3. Examples of (a) training data preparation and (b) result writing pipelines using MusPy.

## III. ABOUT THE LIBRARY MUSPY

MusPy is a Python package open source for the creation of symbolic music. The system diagram of MusPy is shown in Fig. 2. It offers a core class, MusPy Music class, as a universal symbolic container. This core container is then incorporated into the data set management system, I/O interfaces and model assessment tools. In Fig. 3, we offer examples of data preparation and pipelines with MusPy.

### *A. Muspy Music Class And I/O Interfaces*

Our goal is to establish a medium ground between existing symbolic music forms, and to build a unified music generating format. MIDI employs speeds for the transfer of dynamics, bpm for tempo markings and control messages for articulation as part of the protocol for communication between musical instruments. The notions of notes, measurements, and symbolic musical markings are missing, however. MusicXML instead incorporates the notion of notes, measures, and symbolic musical markers as a sheet music exchange format and provides layout information, but it does not include the reproduction data. It also has visual layout information. But symbolic and playback data are crucial for a music generating system. Thus, we follow the playback data standard of MIDI and MusicXML's symbolic music marking standard.

Table 1. Currently supported comparisons of MusPy datasets. The markings of triangle show partial backing. Note that just MusicXML and MIDI files for music21 Corpus have been provided in this version.

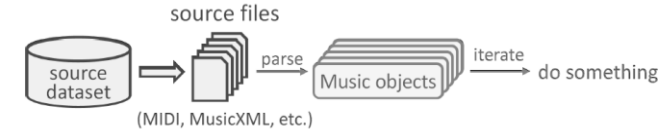
| Dataset | Format | Hours | Songs | Genre | Melody | Chords | Multitrack |
|---|---|---|---|---|---|---|---|
| Lakh MIDI Dataset (LMD) [26] | MIDI | >9000 | 174,533 | misc | △ | △ | △ |
| MAESTRO Dataset [27] | MIDI | 201.21 | 1,282 | classical | | | |
| Wikifonia Lead Sheet Dataset [28] | MusicXML | 198.40 | 6,405 | misc | ✓ | ✓ | |
| Essen Folk Song Database [29] | ABC | 56.62 | 9,034 | folk | ✓ | ✓ | |
| NES Music Database [30] | MIDI | 46.11 | 5,278 | game | ✓ | | ✓ |
| Hymnal Tune Dataset [31] | MIDI | 18.74 | 1,756 | hymn | ✓ | | |
| Hymnal Dataset [31] | MIDI | 17.50 | 1,723 | hymn | | | |
| music21 Corpus [24] | misc | 16.86 | 613 | misc | △ | | △ |
| Nottingham Database (NMD) [32] | ABC | 10.54 | 1,036 | folk | ✓ | ✓ | |
| music21 JSBach Corpus [24] | MusicXML | 3.46 | 410 | classical | | | ✓ |
| JSBach Chorale Dataset [11] | MIDI | 3.21 | 382 | classical | | | ✓ |

Table 2. Comparisons of MIDI, MusicXML and the proposed MusPy formats. Triangle marks indicate optional or limited support.

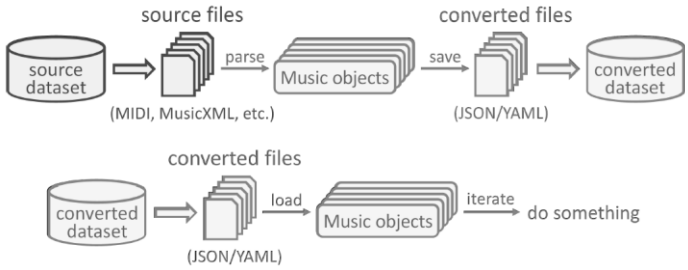
| | MIDI | MusicXML | MusPy |
|---|---|---|---|
| Sequential timing | ✓ | | ✓ |
| Playback velocities | ✓ | △ | ✓ |
| Program information | ✓ | △ | ✓ |
| Layout information | | ✓ | |
| Note beams and slurs | | ✓ | |
| Song/source meta data | △ | ✓ | ✓ |
| Track/part information | △ | ✓ | ✓ |
| Dynamic/tempo markings | | ✓ | ✓ |
| Concept of notes | | ✓ | ✓ |
| Measure boundaries | | ✓ | ✓ |
| Human readability | | △ | ✓ |

In reality, a universal format for symbolic music that we call MusPy is automatically defined in the MusPy Music Class and can be transformed into a JSON/YAML

human-reading file. Table 2 outlines the significant variations between MIDI, MusicXML and the MusPy formats suggested. We will offer an interface to existing symbolic music libraries, e.g. music21(24), mido[23], pretty midi[33] and Pypianoroll[35], using the proposed MusPy Music Class as the internal representation for music data. The result pipeline utilising MusPy is shown in Fig. 3(b).




(a) on-the-fly mode




(b) preconverted mode

Fig. 4. Two internal processing modes for iterating over a MusPy Dataset object.

### *B. Dataset Management*

Similar to Torchvision datasets[36] and TensorFlow data set[37], MusPy provides an easy-to-use framework for data set management. Table 1 lists and compares of the datasets that MusPy presently supports. An inherited class from the MusPy Dataset base is provided with each supported dataset. The modular and flexible architecture of the dataset management system simplifies the maintenance of local data collections or the future extension of support for additional datasets. In the iteration via MusPy data object, Fig. 4 shows two internal processing modes. MusPy also has PyTorch[38] and TensorFlow[23] interface APIs for the creation of machine-learning input pipelines.

### *C. Representations*

Music has several abstract levels, and may thus be stated in several forms. Several representations have been suggested and utilised in literature for the production of Music in particular, intended for the generative modelling of symbolic music[1]. These portrays may be roughly classified into four kinds — pitch-based representations [9-12], event-based representations [13-016], note-based representations [17] and piano-rolls [18,19].

Table 3. T and N indicate number of timescales and notes, respectively. Comparisons supporting MusPy. Note that you can modify settings to comply with unique needs and use scenarios.

| Representation | Shape | Values | Default configurations |
|---|---|---|---|
| Pitch-based | $T \times 1$ | $\{0, 1, \ldots, 129\}$ | 128 note-ons, 1 hold, 1 rest (*support only monophonic music*) |
| Event-based | $T \times 1$ | $\{0, 1, \ldots, 387\}$ | 128 note-ons, 128 note-offs, 100 time shifts, 32 velocities |
| Piano-roll | $T \times 128$ | $\{0, 1\}$ or $\mathbb{R}^+$ | $\{0, 1\}$ for binary piano rolls; $\mathbb{R}^+$ for piano rolls with velocities |
| Note-based | $N \times 4$ | $\mathbb{N}$ or $\mathbb{R}^+$ | List of $(time, pitch, duration, velocity)$ tuples |

A comparison of them is provided in Table 3. We develop these representations in MusPy and integrate them into the dataset management system. Fig. 3(a) shows an example of how training data are prepared in the NES Music Database piano-roll format using MusPy.

### *D. Model Evaluation Tools*

Another important component of creating music generating systems is model assessment. As a result, we incorporate MusPy's audio rendering and score and piano-roll visualisation capabilities. Additionally, these tools may be beneficial for evaluating training progress and presenting final outcomes. Additionally, MusPy implements a number of objective measures described in the literature [17]. As described in [14], these objective metrics may be used to assess a music generating system by analysing the statistical difference between the training and produced samples. Polyphony, polyphony rate, pitch-in-scale rate, scale consistency, pitch entropy, and pitch class entropy are all pitch-related measures. Empty-beat rate, drum inpattern rate, drum pattern consistency, and groove consistency are all rhythm-related measures.

### *E. Summary*

To summarize, MusPy features the following:

Using PyTorch and TensorFlow interfaces, this data management solution manages commonly used datasets. Interfaces to a variety of symbolic music libraries (for example, music21, mido, beautiful midi,

and Pypianoroll) as well as data I/O for popular symbolic music formats (e.g., MIDI, MusicXML, and ABC). Implementations of commonly used musical notation systems, including pitch-based, event-based, piano-roll, and note-based notation. Instruments for assessing music generation models, including audio rendering, score and piano-roll visualisations, and objective metrics..

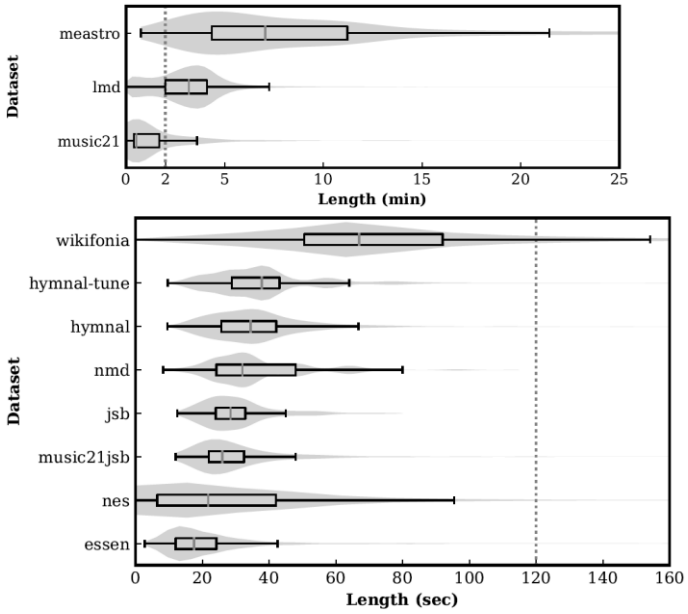



Fig. 5. Length distributions for different datasets.

## IV. DATASET ANALYSIS

Analyzing datasets is important for creating systems for musical composition. We can simply deal with various music datasets using MusPy's dataset management framework. We use MusPy to calculate statistics for three critical aspects of a song—length, tempo, and key—with the goal of revealing statistical disparities across these datasets. To begin, Fig. 5 illustrates the distributions of song durations for various datasets. As we can see, their ranges, medians, and variances are very different.

Second, we show in Fig. 6 the initial tempo distributions for datasets that have tempo information. As can be seen, they are all essentially bell-shaped, although with varying ranges and variations. Additionally, we see two peaks in the Lakh MIDI Dataset (LMD), at 100 and 120 quarter notes per minute (qpm), which may be due to the fact that these two numbers are often selected as the default tempo settings in music notation applications and MIDI editors/sequencers. Additionally, only about ten percent of songs in the Hymnal Tune Dataset begin with a tempo other than 100 qpm.

Finally, Fig. 7 depicts the important histograms for various datasets. As may be seen, the key distributions are rather asymmetric. Furthermore, with the exception of the music21 Corpus, fewer than 3% of songs are in minor keys. LMD has the most skewed key distributions, which may be because C major is often selected as the default key in music notation applications and MIDI editors/sequencers. These statistics may serve as a reference for future researchers in terms of selecting appropriate datasets.

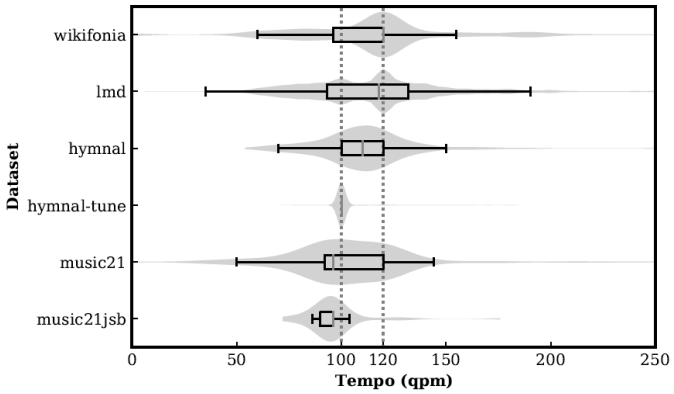



Fig. 6. Initial-tempo distributions for different datasets (those without tempo information are not presented).

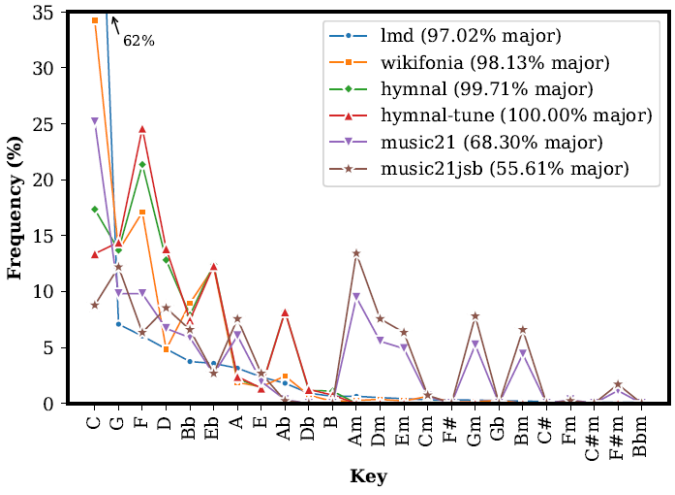


Fig. 7. Key distributions for different datasets. The keys are sorted w.r.t. their frequencies in Lakh MIDI Dataset.

## V. EXPERIMENTS AND RESULTS

In this section, we conduct three experiments to analyze the relative complexities and the cross-dataset generalizabilities of the eleven datasets currently supported by MusPy (see Table 1). We implement four autoregressive models—a recurrent neural network (RNN), a long shortterm memory (LSTM) network a gated recurrent unit (GRU) network [4] and a Transformer network.

For the data, we use the event representation as specified in Table 3 and discard velocity events as some datasets have no velocity information (e.g., datasets using ABC format). Moreover, we also include an end-of-sequence event, leading to in total 357 possible events. For simplicity, we downsample each song into four time steps per quarter note and fix the sequence length to 64, which is equivalent to four measures in 4/4 time. In addition, we discard repeat information in MusicXML data and use only melodies in Wikifonia dataset. We split each dataset into train–test–validation sets with a ratio of 8 : 1 : 1. For the training, the models are trained to predict the next event given the previous events.

We use the cross entropy loss and the Adam optimizer [3]. For evaluation, we randomly sample 1000 sequences of length 64 from the test split, and compute the perplexity of these sequences. We implement the models in Python using PyTorch. For reproducibility, source code and hyperparmeters are available at.

### *A. Autoregressive Models On Different Datasets*

We train the model on a dataset and then test it on the same dataset in this experiment. Fig. 8 illustrates the perplexities associated with various models on various datasets. As can be seen, all models exhibit similar characteristics. They attain lower perplexities when dealing with small, homogenous datasets, but result in higher perplexities when dealing with bigger, more varied datasets. That is, the test perplexity may serve as a proxy for the dataset's variety. Additionally, Fig. 9 illustrates perplexities as a function of dataset size (in hours). By classifying datasets as multi-pitch (i.e., capable of taking any number of concurrent notes) or monophonic, we can observe that perplexity is positively linked with dataset size within each category.

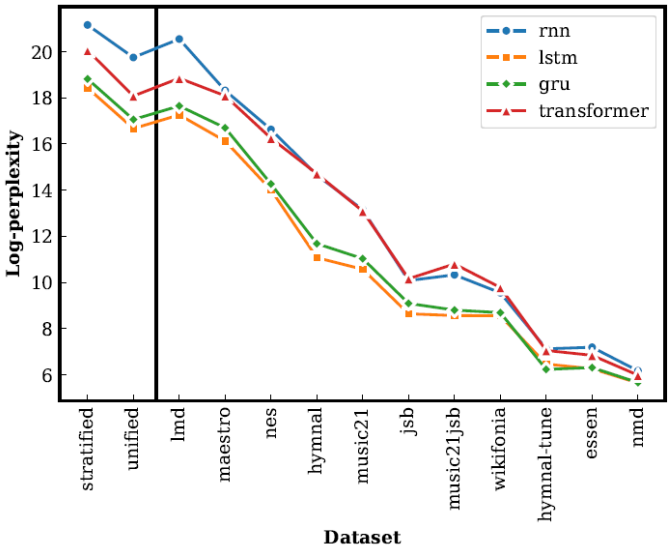



Fig. 8. Log-perplexities for different models on different datasets, sorted by the values for the LSTM model.

In this experiment, we train a model on a dataset and then test it on many other datasets '. The perplexities for each train–test dataset pair are shown in Fig. 10. The following are some observations:

In general, generalizability across datasets is not symmetric. For instance, although a model trained on LMD generalises well to all other datasets, not all models trained on other datasets generalise to LMD, which may be owing to LMD's size and cross-genre nature.

Multi-pitch models generalise effectively to monophonic datasets, while monophonic models do not transfer to multi-pitch datasets (see the red block in Fig. 10).

The model developed using the JSBach Chorale Dataset is not generalizable to any of the other datasets (see the orange block in Fig. 10). This may be because its

samples are downsampled to a quarter note resolution, resulting in an unique note duration distribution.

In comparison to other datasets, the majority of datasets generalise poorly to the NES Music Database (see the green block in Fig. 10). This may be because the NES Music Database only includes game soundtracks.

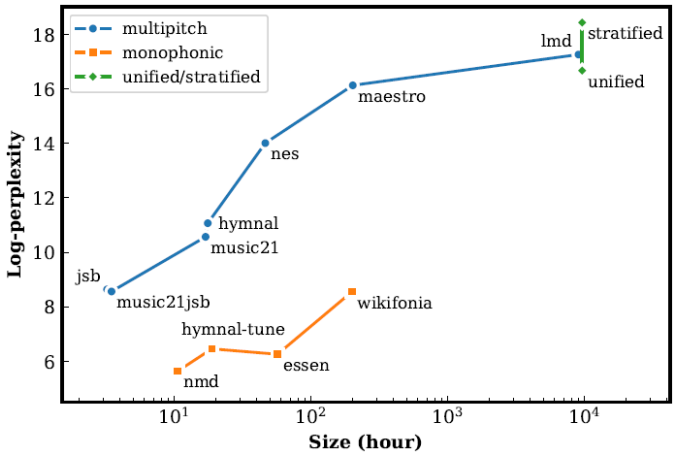



Fig. 9. Log-perplexities for the LSTM model versus dataset size in hours. Each point corresponds to a dataset.

*B. Effects Of Combining Heterogeneous Datasets*

As shown in Fig. 10, LMD has the greatest generalizability, perhaps due to its size, diversity, and crossgenre nature. A model trained on LMD, on the other hand, does not generalise well to the NES Music Database (see the brown block in the close-up of Fig. 10). Thus, we are interested in determining if combining several heterogeneous datasets may aid in increasing generalizability.

All eleven datasets mentioned in Table 1 are combined into a single big unified dataset. Given the size disparity between both datasets, merely concatenating them may result in a significant imbalance and bias toward the larger dataset. As a result, we examine a variant that employs stratified sampling throughout the training process. To get a data sample from the stratified dataset, we uniformly choose one of the eleven datasets and then randomly select one sample from it. Take note that during test time, stratified sampling is deactivated. Additionally, we present the findings for these two datasets in Figures 8, 9 and 10. As shown in Fig. 10, integrating datasets from several sources enhances the model's generalizability. This is consistent with the result in [15] that models trained on specific cross-domain datasets generalise more well to previously unknown datasets. Additionally, stratified sampling mitigates the source imbalance issue by decreasing perplexities in the majority of datasets at the expense of higher perplexity on LMD.

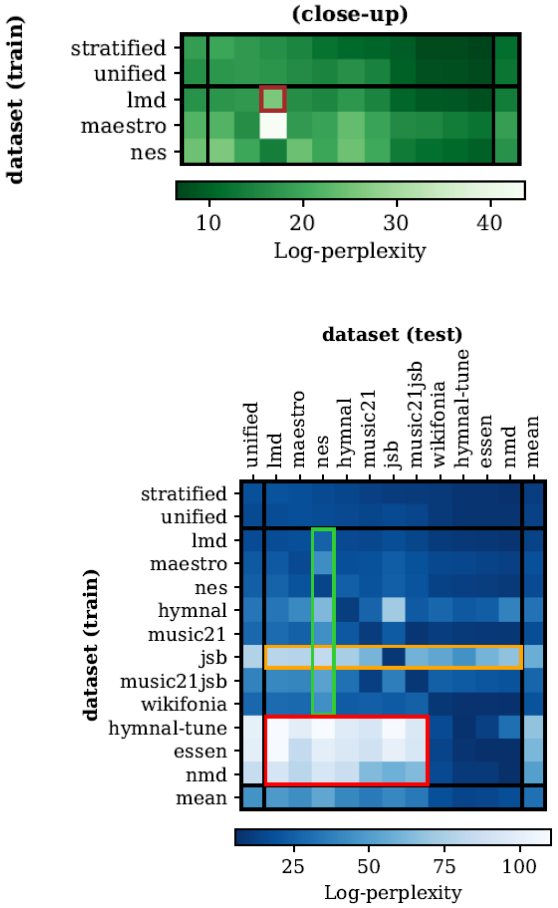



Fig. 10. Results on cross-dataset generalizability. The numbers and colours indicate the log-perplexities of an LSTM model trained on one dataset (row) and tested on another (column). The datasets are ordered according to their diagonal values, which means that they may be trained and tested on the same dataset.

## VI. CONCLUSION

We've introduced MusPy, a new toolset for building music generating systems. We covered the library's architecture and functionality, as well as examples of data pipelines. We performed statistical research and experimentation on the eleven presently supported

datasets using MusPy's dataset management system to determine their relative diversity and cross-dataset generalizability. These findings may aid researchers in selecting suitable datasets for future study. Finally, we demonstrated how integrating diverse datasets may assist enhance a machine learning model's generalizability.

## VII. REFERENCES


[1]. J.P. Briot, G. Hadjeres, and F. Pachet, "Deep learning techniques for music generation: A survey," arXiv preprint arXiv:1709.01620, 2017.

[2]. A. Hankinson, P. Roland, and I. Fujinaga, "The music encoding initiative as a document-encoding framework," in Proc. of the 12th International Society for Music Information Retrieval Conference (ISMIR), 2011.

[3]. R. M. Bittner, M. Fuentes, D. Rubinstein, A. Jansson, K. Choi, and T. Kell, "mirdata: Software for reproducible usage of datasets," in Proc. of the 20th International Society for Music Information Retrieval Conference (ISMIR), 2019.

[4]. A. Roberts, J. Engel, C. Raffel, C. Hawthorne, and

[5]. D. Eck, "A hierarchical latent vector model for learning long-term structure in music," in Proc. of the 35th International Conference on Machine Learning (ICML), 2018.

[6]. S. Oore, I. Simon, S. Dieleman, D. Eck, and K. Simonyan, "This time with feeling: Learning expressive musical performance," Neural Computing and Applications, vol. 32, 2018.

[7]. C. Z. A. Huang, A. Vaswani, J. Uszkoreit, I. Simon, C. Hawthorne, N. Shazeer, A. M. Dai, M. D. Hoffman, M. Dinculescu, and D. Eck, "Music transformer: Generating music with long-term structure," in Proc. of the 7th International Conference for Learning Representations (ICLR), 2019.

[8]. C. Donahue, H. H. Mao, Y. E. Li, G. W. Cottrell, and J. McAuley, "Lakhnes: Improving multi-instrumental music generation with cross-domain pre-training," in Proc. of the 20th International Society for Music Information Retrieval Conference (ISMIR), 2019.

[9]. Y.S. Huang and Y.-H. Yang, "Pop music transformer: Generating music with rhythm and harmony," arXiv preprint arXiv:2002.00212, 2020.

[10]. O. Mogren, "C-RNN-GAN: Continuous recurrent neural networks with adversarial training," in NeuIPS Worshop on Constructive Machine Learning, 2016.

[11]. L.C. Yang, S.-Y. Chou, and Y.-H. Yang, "Midinet: A convolutional generative adversarial network for symbolic-domain music generation," in Proc. of the 18th International Society for Music Information Retrieval Conference (ISMIR), 2017.

[12]. H.W. Dong, W.-Y. Hsiao, L.-C. Yang, and Y.-H. Yang, "MuseGAN: Multi-track sequential generative adversarial networks for symbolic music generation and accompaniment," in Proc. of the 32nd AAAI Conference on Artificial Intelligence (AAAI), 2018.

[13]. L.C. Yang and A. Lerch, "On the evaluation of generative models in music," Neural Computing and Applications, vol. 32, pp. 4773–4784, 2018.

[14]. M. Abadi, P. Barham, J. Chen, Z. Chen, A. Davis, J. Dean, M. Devin, S. Ghemawat, G. Irving, M. Isard, M. Kudlur, J. Levenberg, R. Monga, S. Moore, D. G. Murray, B. Steiner, P. Tucker, V. Vasudevan, P. Warden, M. Wicke, Y. Yu, and X. Zheng, "TensorFlow: A system for large-scale machine learning," in Proc. of the 12th USENIX Symp. on Operating Systems Design and Implementation (OSDI), 2016.

[15]. C. Mckay and I. Fujinaga, "JSymbolic: A feature extractor for MIDI files, C. Raffel, "Learning-based methods for comparing sequences, with applications to audio-to-MIDI alignment and

matching," Ph.D. dissertation, Columbia University, 2016.

[16].C. Hawthorne, A. Stasyuk, A. Roberts, I. Simon, C.-Z. A. Huang, S. Dieleman, E. Elsen, J. Engel, and D. Eck, "Enabling factorized piano music modeling and generation with the MAESTRO dataset," in Proc. of the 7th International Conference on Learning Representations (ICLR), 2019.

[17]. C. Donahue, H. H. Mao, and J. McAuley, "The NES music database: A multi-instrumental dataset with expressive performance attributes," in Proc. of the 19th International Society for Music Information Retrieval Conference (ISMIR), 2018.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Performance Analysis of a Large-Scale Enterprise Network in Real Time Environment

**Md. Taslim Arefin*, Md. Tauhidunnabi Likhon, Chowdhury Badrul Huda, Diganta Roy**
Department of ETE, Daffodil International University, Dhaka, Bangladesh
Corresponding Author Email : arefin@diu.edu.bd*

## ABSTRACT

An enterprise network is a communications backbone that helps to connect computers and other related devices across a large workgroup networks that provides insight and data accessibility. In this paper an enterprise network model has been designed based on real time environment. A comparative analysis of MPLS network over conventional Internet Protocol (IP) network has been performed. Different routing protocols such as OSPF, EIGRP, RIPv1, RIPv2 and MPLS have been considered in the performance analysis. GNS3 has been used to simulate the both networks and the comparative analysis has been made based several parameters such as Packet jitter, Packet delay, Packet drop etc. The simulation results have been analyzed which indicates that MPLS network has performed better than conventional IP network in real-time applications such as Voice and video. MPLS L3 VPN has been used in the proposed model.

**Keywords :** Enterprise Network, MPLS, VPN, GNS3

## I. INTRODUCTION

An enterprise network is an enterprise's communications backbone that helps connect computers and related devices across departments and workgroup networks, facilitating insight and data accessibility[1][3]. An enterprise network reduces communication protocols, facilitating system and device interoperability, as well as improved internal and external enterprise data management. So we choose an area as like as an enterprise network, then we design the enterprise network simply and required. After identify the problems, we also try to solve it. Then we use different protocols. Such as RIPv1, RIPv2, EIGRP, OSPF and MPLS. After analyzing all protocols, we select OSPF is the best one for faster communication in the enterprise network. In this protocol, security is not reliable but we need to make the security reliable. So, we can use Firewall, ACL, L3 VPN. To overcome the enterprise network model limitations, we suggested our proposed model.

In our proposed network model applying OSPF protocol with MPLS L3 VPN, ACL, Firewall configuration the hole protocol can provide us higher security and less traffic when the data is passing through the proposed network model better than the enterprise network model [2][13]. The purpose of writing this paper is to show the best protocol that is used in a large-scale enterprise network which is

reliable & faster. We breakdown the limitation of an enterprise network model through our proposed network model.

The specific objectives of this research are given bellow:

- ✓ To gain proper knowledge about enterprise network.
- ✓ To apply & discuss about different protocol.
- ✓ Suitable protocol will provide for depend upon situation.
- ✓ To provide high security, less traffic & high-speed data flow for large area.
- ✓ To provide proper network service & distributed application for required host.

## II. NETWORK MODEL DESIGN

An enterprise network is also known as a corporate network. The enterprise network model is shown in figure 1.

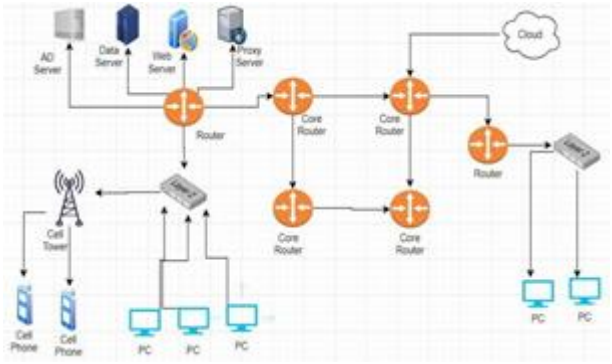



Figure 1: Enterprise Network Model

Figure-1 shows that, Public cloud directly connected to the gateway router. The Data server or storage server provides the data for LAN connection and cell phone via the cell tower for their required. In this paper we used different routing protocols for our work purpose. Those are

- ✓ Static Routing Protocol
- ✓ Dynamic Routing Protocol
- ✓ MPLS Protocol

An enterprise network required some features. Those are given below [10]

- ✓ Core Layer
- ✓ Distribution Layer
- ✓ Access Layer
- ✓ LAN
- ✓ WAN
- ✓ LAN & WAN Distribution

Core Layer: The core layer is a high-speed switching backbone and should be designed to switch packets as fast as possible. This layer of the network should not perform any packet manipulation, such as access lists and filtering, that would slow down the switching of packets [7].

Distribution Layer: The distribution layer is located between the access and core layers and helps differentiate the core from the rest of the network. The purpose of this layer is to provide boundary definition using access lists and other filters to limit what gets into the core. Therefore, this layer defines policy for the network [5].

Access Layer: The access layer, which is the lowest level of the Cisco three tier network model, ensures that packets are delivered to end user devices. This layer is sometimes referred to as the desktop layer, because it focuses on connecting client nodes to the network [6].

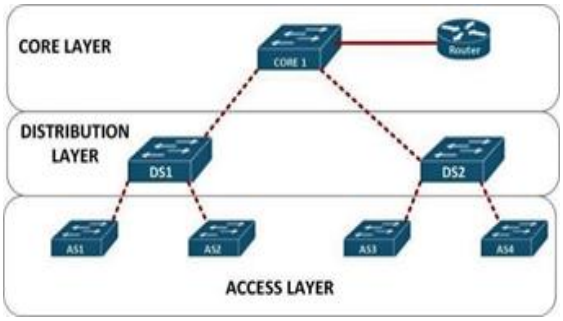



Figure-2: Layer Design in an Enterprise Network

LAN: A local area network is a computer network that interconnects computers within a limited area such as a residence, school, laboratory, university campus or office building [5].

WAN: A wide area network is a telecommunications network that extends over a large geographical area for the primary purpose of computer networking. Wide area networks are often established with leased telecommunication circuits [4][7].

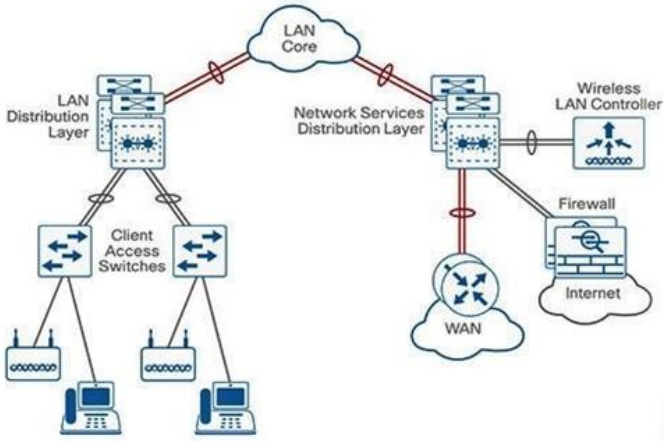



Figure-3: LAN & WAN Network Distribution Design

In this Figure-3 with the LAN core network goes to the LAN distribution Layer. By the requirement of the client the network has been distributed. Here, firewall is also used for protecting the LAN network [8][9].

To analyze the performance, we have designed two scenario using GNS3. Those are-

- ✓ Scenario 1: Enterprise Network Model
- ✓ Scenario 2: Proposed Network Model

a.Enterprise Network Model

An enterprise network infrastructure that provides access to network communication services and resources to end users and devices that are spread over a single geographic location. It may be a single building or a group of buildings spread over an extended geographic area [8].

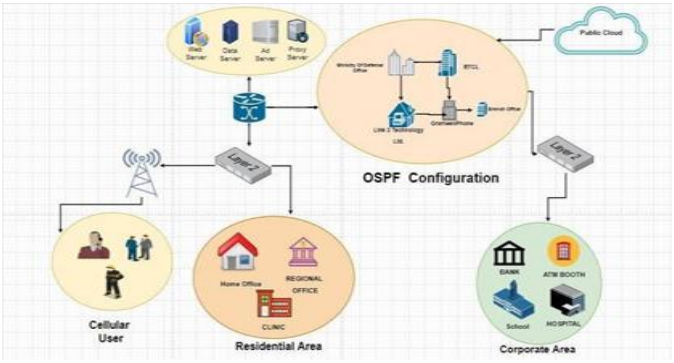



Figure-4: Enterprise Network Model

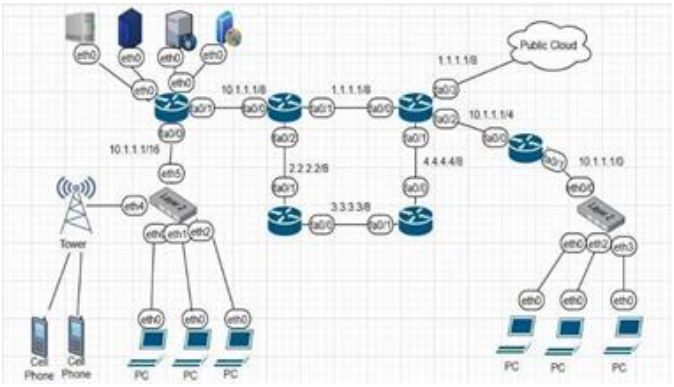



Figure-5: Enterprise Network Model in GNS3

Figure-4 and 5 show an enterprise network. To facilitate our work, we are splitting the whole enterprise network into several small area network. Every small area network is represented as a core router. Cellular & Residential area are connected with layer 2 switch. Layer 2 switch are also connected with servers. Such as Web server, Data server, Ad server, Proxy server. All the server are connected with Public Cloud. In the same way the Corporate area is also connected.

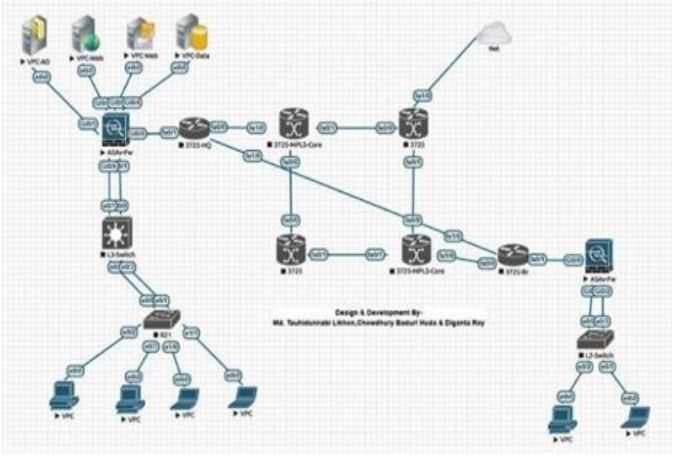


Figure-6: RIP Configuration

Figure-6 shows that Routing Information Protocol (RIP) has been configured. The core router neighborly connected each- other and they are able to pass the packet.

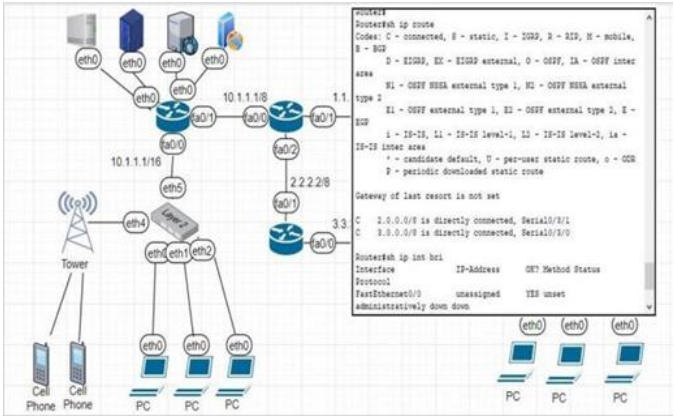


Figure-7: OSPF Configuration

Figure-7 shows that Open Shortest Path Fast (OSPF) has been configured. The core router neighborly connected each-other and they are able to pass the packet in shortest

b.Proposed Network Model

Figure- 8 and 9 show our proposed network model. To facilitate our work, we are splitting the whole proposed network into several small area network. Every small area network is represented as a core router.

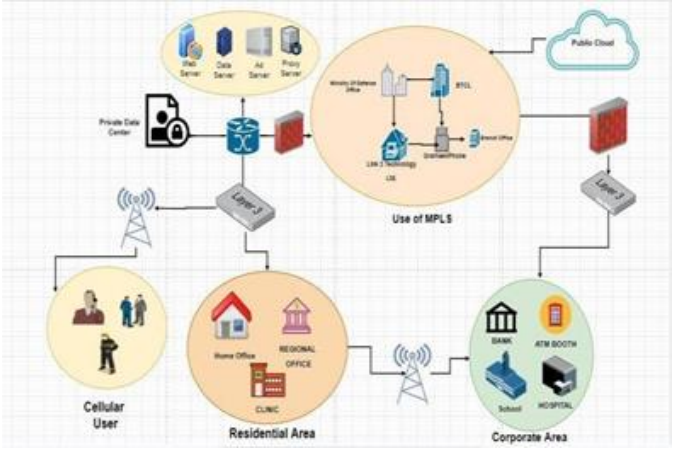



Figure-8: Proposed Network Model

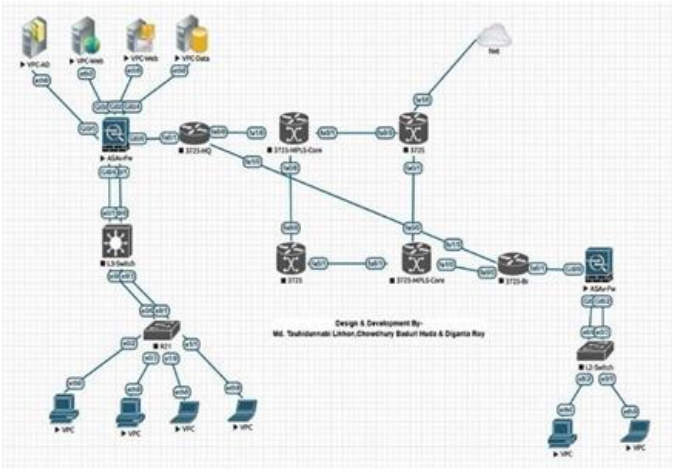


Figure-9: Proposed Network Model in GNS3

Cellular network is connected with cell tower. Cell tower is connected with layer 3 switch that is subordinate with another core router and connected with several servers. Such as Web server, Data server, Ad server, Proxy server. Residential also connected with layer 3 switch and with subordinate with the same core router and also the servers. These servers ae connected with Public Cloud. Corporate area is connected with layer 3 and another core router with firewall. Firewall protect unacceptable IP network or service. Private Data Center is use only for Ministry of defense office. Here the Residential & Corporate area are also connected with cell tower for data communication.

## III. SIMULATION AND ANALYSIS

Simulation is the process of testing a designed model on a platform which imitates the real environment. It provides the opportunity to create, modify and study the behavior of proposed design so that one can predict its strengths and weakness before implementing the model in real environment. We used the popular simulator in this project is-GNS3. Simulation flowchart has been shown in figure 10.

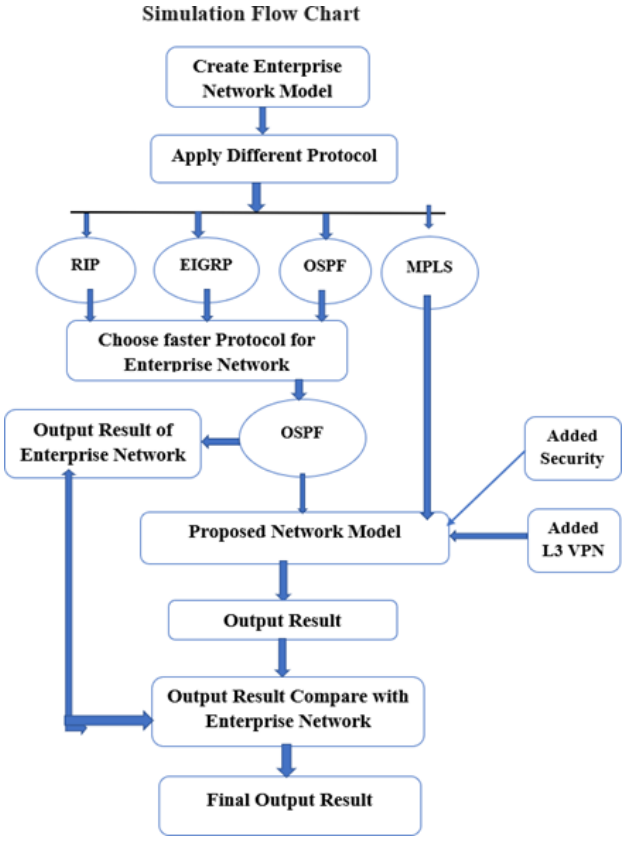



Figure-10: Simulation flowchart

Output Result of Proposed Network Model

Figure-11 is configured with MPLS L3 VPN and it shows MPLS packet forwarding table. That means the hole network is established. Also shows that with hop-to-hop connectivity packets are passing one network to another network.

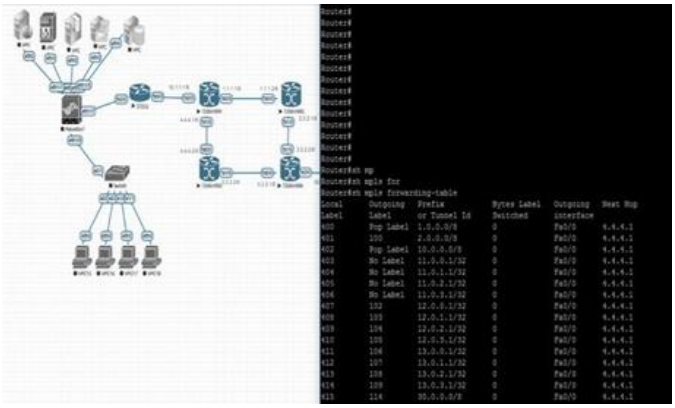


Figure-11: MPLS L3 VPN Configuration

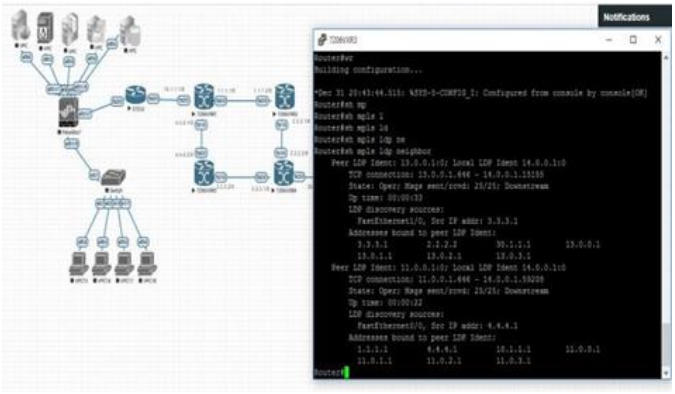


Figure-12: Checking MPLS Neighbor Connectivity

Figure-12 shows MPLS neighbor connectivity. With that the network is able to pass broadcast message to all neighbor network. If any of the neighbor network doesn't get any broadcast message then the total connectivity is unstable.

## IV. PERFORMANCE ANALYSIS

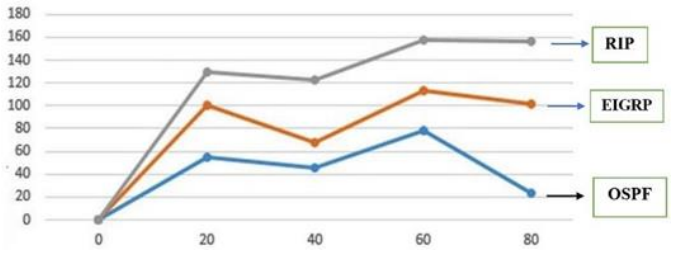



Figure- 13: Network Packet Delay

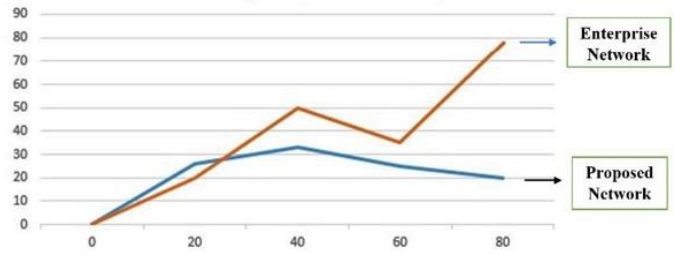



Figure-14: Packet delay Enterprise Network Vs Proposed Network

Figure-14 shows line graph where vertical axis is packet delay and horizontal axis is simulation time (ms) and showed Packet delay Enterprise Network VS packet delay Proposed Network. Here, the proposed model network's packet delay is less than the enterprise network's packet delay.

Packet Loss

Packet loss is where network traffic fails to reach its destination in a timely manner. Most commonly packets get dropped before the destination can be reached. Packet loss can be calculated by [12],

Packet dropped/loss, Pd = Ps – Pa

Where, Ps is the amount of packet sent and Pa is the amount of packet received. Here we have done all the calculation using GNS3 visual trace analyzer.

Packet Delay

Packet delay refers to the time taken for a packet to be transmitted across a network from source to destination. Packet delay or end-to-end delay can be calculated by,

End-to-end delay, D = Td –Ts [11]

Where, Td is packet receives time and Ts is the packet sends time at source node.

Figure- 13 shows line graph where vertical axis is packet output and horizontal axis is simulation time (ms) and also show the output of different protocol is in graphical way. Here the packet delay time of the OSPF is less than EIGRP & RIP. So OSPF is the best protocol for this enterprise network.

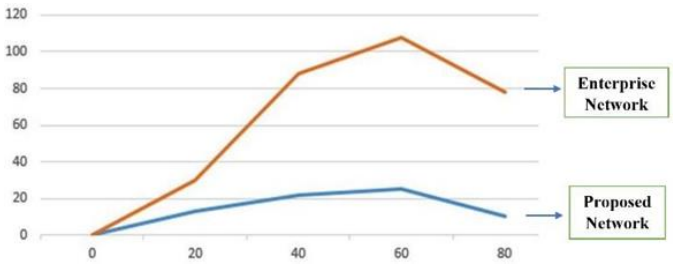



Figure-15: Packet Loss Enterprise Network Vs Proposed Network

Figure-15 shows line graph where vertical axis is packet loss and horizontal axis is simulation time (ms) and showed Packet loss Enterprise Network VS packet loss Proposed Network. Here, the proposed model network's packet loss is less than the enterprise network's model packet loss.

## V. CONCLUSION

In this paper it has clearly indicated that MPLS technology has performed better than the other protocol. MPLS protocol Provide high speed data flow, provide high security, provide Less traffic, proper network service and distributed application for required host. After analyzing our work, we have come to the conclusion that configuring MPLS with L3 VPN for a large-scale network the data transfer rate is high. This protocol is able provide higher security, reliable network, less traffic when the data are transferring from one network to another.

## VI. REFERENCES

[1]. Hao Yang, Ricciato, F., Songwu Lu, Lixia Zhang; Securing a wireless world Proceedings of the IEEE Volume 94; Feb. 2006

[2]. Lucent Technologies; Users Guide for the ORiNOCO Managers Suite; Nov. 2000 12 Wi-Fi Alliance; Wi-Fi Protected Access: Strong,

Standard Based, Interoperable Security for todays Wi-Fi Network.

[3]. Leinwand, Allan, Bruce Pinsky, and Mark Culpepper. Cisco router configuration. Cisco Press, 1998.

[4]. Gurkas, G.Z., Zaim, A.H., Aydin, M.A.;Security Mechanisms And Their Performance Impacts On Wireless Local Area Networks; International Symposium on Computer Networks,2006; June 200

[5]. Mentze, Duane, and David McAnaney. "Automatic networking device configuration method for home networking environments."

[6]. KeunSoon Lee, HyoJin Kim, JooSeok Song; Lightweight packet authentication in IEEE 802.11; Wireless Telecommunications Symposium, 2005; April, 2005

[7]. Manivannan, N., Neelameham, P.;Alternative Pair-wise Key Exchange Protocols (IEEE802.11i) in Wireless LANs; International Conference on Wireless and Mobile Communications, 2006. ICWMC '06; July 2006

[8]. Ju-A Lee, Jae-Hyun Kim, Jun-Hee Park, Kyung-Duk Moon; A Secure Wireless LAN Access Technique for Home Network; IEEE 63rd Vehicular Technology Conference, 2006;

[9]. Kassab, M., Belghith, A., Bonnin, J., Sassi, S.; Fast pre- authentication based on proactive key distribution for 802.11 infrastructure networks; Proceedings of the 1st ACM workshop on Wireless multimedia networking and performance modeling; 2005

[10]. Yurcik, William J. "Network Topologies." Computer Sciences, edited by K. Lee Lerner and Brenda Wilmoth Lerner, 2nd ed., Macmillan Reference USA, 2013.

[11]. R. PRODANOVIC, D. SIMIC , Holistic Approach to WEP Protocol in Securing Wireless Network Infrastructure. Com SIS , Vol. 3, No. 2, pp. 97—113, (2006)

[12]. A.Haque, K.A.M Lutfullah, M.Zahedul Hassan, M.R.Amin, “Performance Analysis and the Study of the behaviour of MPLS Protocol”

[13]. J.Barakovic, A.Husic“QoS design issues and traffic engineering in next generation IP/MPLS network”, june 2007

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# "MAZDOOR"- Online Application for Household Services

**Kunal Bhalgat[1], Sayali Desai[1], Rajeshri Mayanaikar[1], Aaditya Pardeshi[1], Prof. Bhagyashree Dhakulkar[2]**

[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

The "MAZDOOR" system is incredibly useful for everybody who wants home services like painter, electrician, carpenter, plumber, construction worker, fabricator etc. When an individual is new to a locality it's hard to find services they want, in such a situation e-Commerce plays an important role. Hence to help them get their services done in time, we have created an application called the "MAZDOOR" App. Through this application one can search for the services they want, visit the profile of best labor available in their area. The profile contains various information regarding the labor as the name, phone no etc. The customer can directly give a call to the labor and ask for the services they want. Hence, mazdoor app acts as a broker which helps to connect customer to the labor.

**General Terms:** Services, Authentication, Customers, Registration

**Keywords:** [C.5.5], Data Storage and Representation [E.2], User Interfaces [H.5.2], Social Issues [K.4.2], Object-oriented Programming [D.1.5]

## I. INTRODUCTION

"Mazdoor" is an android application that basically helps the common man i.e., the customer to connect to our daily wages labor. The customer can henceforth contact a labor from its regional area through our application to get his work done accordingly. Our application will have a list of various helpers such as: Electrician, Carpenter, Plumber, Construction Worker, Fabricator, Painter etc.The labor will be able to create their profile by entering some necessary details and their working field according to their profession. The customer can contact them according to their preferences. After the connection between the labor and the customer is established the services that the customer needs can be easily done by the labor with reasonable charges according to the customer as well as well labor will. The labor will be referred to the customer as per the feedback given by the previous customers. The labor with an excellent feedback will be showcased at the top position in the customer's device who is located in their area.

We have designed and developed a system that provides many services at your doorstep in just one click. A system that helps you connect to one of the best varieties of laborer providing a huge range of service like painter, movers and packers, repair persons, cleaners, electricians, plumber and many more. A very simple process is carried out to call a labor for their service. System is versatile as the profile of the laborer's can be viewed from everywhere you desire.

The only main intention of creating this amazing application is to provide the daily wages worker a platform to get into the market and earn for their living, as this pandemic has caused a wave of unemployment amongst them. This app can also be a help to the customers as their daily wage worker charges less compared to the various online services that are already available in today's market. This application is user friendly and a simple registration process is carried out for customers as well as labor. This app by our means is the solution for the labor who is unable to find a job as well as it is a solution to a customer who wants a particular service to be done in no time.

## II. LITERATURE REVIEW

The rise of e-commerce and the growth of online services have shown a significant effect on the market share. People are operating and engaging more into doorstep services. Below are materials from various researchers who have worked in this field:

K. Aravindhan and team [1] proposed an online home services system. Feature which makes this system different from other system is "chatbot" which helps the users to clarify the queries posted. The purpose was to obtain the service providers detailed information which helps customer to get their services fulfil instantly.

Neale A. Dagdag and team [2] presented a mobile application (android device). Here the main goal was finding work opportunities for skilled workers. The skilled workers will get coupled with customers who need service such as: electrical service, plumbing service, automotive repair, and other similar services which can be provided at customer's respective home. The main revenue will get generated from commissions and quarterly membership fee from the skilled workers. Additionally, from advertisers and/or companies who wish to tie-up with team of At-Your-Service mobile application.

N. M. Indravasan [4] in his study observed that people are very much in their heavy work culture. In the busy schedule if any unexpected household task pops up. That distracts them from their work. E-Commerce plays primary role in solving this issue. Creating a platform that can provide number of services in one click. For verifying the customers on platform authors went with email verification.

Zhang Fuyan and team [5] evaluates the importance of STM32core. How the problem in a household could be resolved using the STM32core using which they designed a robot which consists of sensors and Wi-Fi camera loader mounted on the machine to remote control the moments. PHP and QT is used to build the server. Using telecommunication technology robot and mobile communicate through each other, Bluetooth was used for location and tracing purpose.

Sheetal Bandekar and team [6] proposed an application called "Domestic Android Application for Home Services" is a customized Mobile Application which uses Android SDK (Software Development Kit), Eclipse, Java and MySQL for Android Application Development. Application provides domestic services to customers such as: electrical services, plumbing services and carpentry services and many more household services. Application uses GPS to fetch the users' location and assigns nearest service provider from his existing location dynamically. Hence, this

system seems to be more dynamic, effective and efficient than the existing system.

Shurong Wang [8] The researcher focused on the problem of migrant labors and enterprises. He came up with a platform for migrant labors training and enterprise labor supply. Platform consists of migrant labors information, enterprise information, training organization. Supervisory authorities are the one how will have all control and access. Due to this system difficult to find the right people was resolved(training), social problems were addressed, and overall quality was increased.

Chang-Xing Qi along with his group mates [9] proposed an application intelligent switching platform which resolves the problem of provincial labor and social security services got through. Intelligent switching platform aims on data interactive mode and inter-departmental information. The customer service system is a centralized and integrated platform which is built with call centers and other modem means of communication and information technology. The architecture of the system was designed in such a way that there was a detailed function of the system.

Taein Hwang [10] in his thesis focused on (DSM). Some service providers come up with their own service platform, but may small-scale service providers don't own platform and so fails in connecting with customers digitally. This was resolved through digital home service delivery and management system (DSM). It shows how home services of the service providers can be delivered to the service user via the DSM system. One of important point highlighted by author here is how the service user can be provided with various services through reliable service aggregator and receive a single bill for the subscribed services.

S Rachitha [11] studied and explored the relationship between customers and service providers. Establishing a market platform which not only embrace consumer demand but also giving importance to service professionals and providing an opportunity to earn additional income. Authors proposed an idea of providing an option to the people, wherein if they encounter any issue. They can contact a service professional from another location as well. Respective person can assist them in fixing the issue. To reduce the infrastructure overhead and operational cost web application was deployed on cloud. System also provides quality of service, as it works on servicemen working history and rating.

## III. SYSTEM REQUIREMENTS

1) Software Requirements

1.1) SERVER SIDE

a) Operating System: Windows 7 SP1 or later (64-bit), x86-64 based
b) Database: Firebase Database.
c) Payment Gateway: Any Payment Gateway viz., Razer pay, Paytm.

1.2) CLIENT SIDE

a) Mobile Device with Android OS 5.0 or above and a stable internet connection.

2) Hardware Requirements

2.1)SERVER SIDE

a) A hosting service based on Firebase Database.

2.2)CLIENT SIDE

a) Disk Space: 25-50 MB.
b) RAM:256

## IV. SYSTEM DESIGN

### 1) System Tools

Major Tools used in our system:

#### 1.1) Flutter

Flutter which is Google's portable user interface (UI) framework for building modern, native, and reactive applications for iOS and Android is the frontend of the application. The widgets in Flutter are used to create the UI, and **Dart** language is used to develop the application. As Flutter uses its own rendering engine to draw widgets. Elements have a reference to the widget and are responsible for comparing the widget differences. For developing our system using Flutter we needed a dependent and reliable Integrated Development Environment (IDE). To achieve this, we used **Android studio** which is the official integrated development environment (IDE) for Google's Android operating system, built on JetBrains IntelliJ IDEA software and designed specifically for Android development. As Flutter is a cross – platform, the same code base can be used for iOS and Android app. The development of the interface of application is done using flutter since the changes done using flutter are reflected suddenly and it is very simple to use.

#### 1.2) Firebase

Firebase which is the platform developed by Google to develop web application and mobile application is the backend of the application. Firebase is a Backend-as-a-Service (BaaS) app development platform that provides hosted backend services such as a real time database, cloud storage, authentication, crash reporting, machine learning, remote configuration, and hosting for your static files. Firebase is used to store and retrieve the information regarding the profile of labor and services they are going to provide. Besides this it is also used to verify and validate the customer, admin and labor. The details of customer and labor such as email, password, name is going to be stored on firebase. The verification of email id of customer and labor is also done by firebase cloud storage. It is a reliable database and most of time flutter packages work great with firebase.

Firebase authentication provides an easy sign -in process. There is no compromise done with the security using firebase. Since it is real time database set it helps to store and synchronize data. Firebase also allows to fix the bugs instantly.

### 2) Existing System

The existing systems contain the small print of the service providers which may be viewed by the users who require the household services to be done. The system provides the services like gas services, plumbing services and electrical services. User can view the services through the system and that they can contact the actual providers to urge the services. The user has to register to utilize the service that's provided by the system. The system acts the intermediary between the user who is in need of services and therefore the provider who offers the service. Within the present system, the users can only ready to get the small print about the service providers they are doing not have the choice to register for the services required and therefore the tracking of such services Once the user specifies his request for service, the users' location is fetched using GPS (Global Positioning System) that fetches the latitude and longitude. Based on his current location, the application will try to find out the nearest service provider by fetching the latitude and longitude of the service provider, and then the nearest service provider is allotted to the requested user by sending SMS (Short Message Service), to cater the user's request. Users can give the feedback about the services that was provided to them. The existing system is available only in one language that is English and thus it is difficult for some people to use the application.

## 3) Proposed system

The proposed system is a web application developed using Flutter as front end and Firebase as back end to assist the users in getting the essential services like plumbing, electrician, carpenter, plumber and site worker. Any user who is either a customer or service provider can register with this website User can register with this website by providing the basic details like name, age, gender, address, mobile number and mail id. Along with the basic details the service provider needs to fill up some extra fields such as Aadhar card no service they provide. Once the user fills all the fields an OTP is generated and used for account verification. After this they can login by providing their username and password to avail the needed services. User can look for service provider by mentioning the location. Once the user needs a particular service, they can place a request. After placing the request, the user is directed to the payment module of the system. Then the confirmation of the request is received by the user as well as by the service provider. The user can post their grievances and feedbacks about the offered services. The reviews that are posted by the customers help to rate the service providers can be viewed by the admin and the necessary actions can be taken over any the complaints. The system consists of login for user, service provider and admin. When the user logs in with his credentials, they can able to search the service and retrieve it from the database. When the service provider logs in with their credentials, they can able to view the request and edit their respective profiles. Once the service is added it is stored into the database and it can be retrieved when the service wants to be viewed. The admin is responsible to manage all the data related to the services and has the right to edit or delete any of the information that is against the policy of our application.

## 4) System Modules

### 4.1) Registration Module

The user who wants to avail our services will have to register to our application. The user can register itself as customer or labor based upon its need. Once all the required details and credentials are provided, an OTP will get generated and your account will henceforth get verified. Now the user has successfully created their account and is free to use our services. Each time the user has to use the application they have to login to the application using valid username and password.

### 4.2) Admin Module

The functionality of this module is basically related to the admin. The admin is responsible to manage all the data related to the services and has the right to edit or delete any of the information that is against the policy of our application. This module is managed by the Firebase console.

### 4.3) Service Module

When a customer wants to access the service, they can do it by logging in to their account. The application has a very interactive and easy to understand user interface. The customer can easily search for the service they are looking for through various categories of services. Further they can scroll between their choice of service and get recommendation as to which labor is near to the user's area and which one has a better feedback.

### 4.4) Payment Module

Once the customer finds an appropriate service provider that they are looking for they had to place a request for the service where the customer needs to pay for the services opted. Various options are available through which one can do the payment. It is done through an external payment gateway which guarantees a secure and safe transaction. After the payment is done, a confirmation acknowledgement is

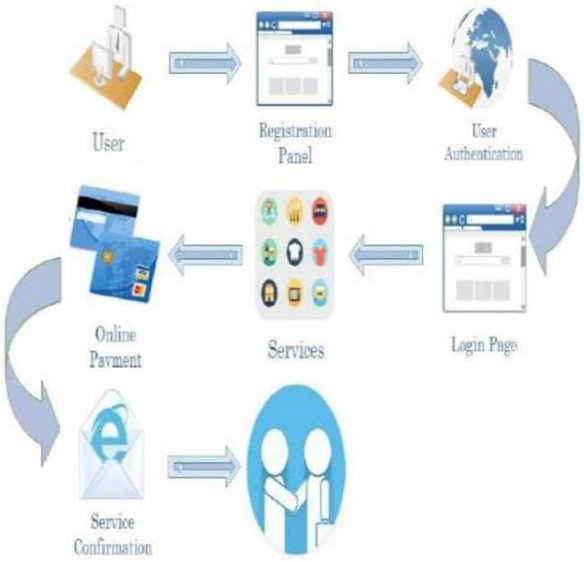
forwarded to the user about all the details of services opted.

### 4.5) Feedback Module

Once the service is completed our customers are requested to rate the overall service done by service provider and asked for any valuable feedback or improvements to be done in providing a better service. Based on this feedback the application rates the service providers.

The idea proposed in this paper is one among the new innovations where it reduces the trouble for customers to search for the labor and to get the profitable services to be done.

### 5) System architecture for the proposed model




## V. CONCLUSION

The application designed reduces the difficulty of finding an appropriate service provider by providing a detailed information that helps the user to get their services fulfil instantly. A systematic Android application offers ease in accessing services in a more comfortable way. The system is very helpful in today's life as it allows the user to contact well-qualified and skilled labors at just one click. The system to a extend helps to reduce the current situation of unemployment that has raised due to the pandemic of Covid -19 by allowing labors to seek new jobs through it. Unlike other application, the system will be available in regional languages (i.e., Marathi, Hindi). Thus, the application seems to be more dynamic, effective and efficient than existing system

## VI. FUTURE SCOPE

"Mazdoor"- an online application for household services provides some of the domestic services which are most frequently used. The system accommodates the changing needs of the end user. The overall system can be designed so that its capacity can be increased in response to the further requirements for which the application provides an appropriate service overseas. Further this application can be prolonged by merely adding up the required services and additional features. For example, the current system provides the following services such as home carpenter, electrician, plumber, site worker and Painter further the system can be extended as per the requirements of the user. The system can be added with various services such as mobile and computer repair, laundry services, catering services, RO servicing, packers and movers and many more. The application that is currently developed support three languages - English, Hindi and Marathi which will be soon developed in other native languages for the ease of the user.

## VII. REFERENCES

[1]. K.Aravindhan, K.Periyakaruppam, T.S Anusa, S.Kousika, A.Lakshmi Priya, "Web Application Based On Demand HOme Service System"6th International Conference on Advanced Computing And Communication Systems (ICACCS) ,2020.

[2]. N.M. Indravasan, Adarsh G, Shruthi C, Shanthi K, "An Online System for Household Services" International Journal of Engineering Research & Technology (IJERT), ISSN: 2278-0181, May 2018.

[3]. Sheetal Bandekar, Avril D'Silva, "Domestic Android Application for Home Services" International Journal of Computer Applications, ISSN No.0975 – 8887, Volume 148 – No.6, August 2016.

[4]. Shahrzad Shahriari, Mohammadreza Shahriari, Saeid gheiji, "Ecommerce and It Impactson Global Trend and Market" International Journal of Research – Granthaalayah. Vol.3 (Iss.4): April 2015

[5]. Taein Hwang, Hojin Park, Jin Wook Chung, "Design and Implementation of the Home Service Delivery and Management System Based on OSGi Platform", IEEE 2006.

[6]. Nikam Poonam, Gunjal Trupti, Jadhav Priti, Parakhe Sonali, Prachi Tambe, "Survey on Home Provider" InternationalResearch Journal of Engineering and Technology (IRJET) December 2019.

[7]. Zhang Fuyan, Teng Yingyan, "Design and Realization of Household Service Robot Based on STM32 and Server" International Conference on Robots and Intelligent System, 2017.

[8]. Chang-Xing Qi, Qing-Dong Du,Hong-Wei Wang ,"Construction of Provincial Labor and Social Security Customer Service System" International Conference On Computer Design And Appliations, 2010.

[9]. Neale A. Dagdag , Almar Allan F. De Guzman, Rowena V. Pamplega, Grace Lorraine D. Intal, " At-Your-Service Mobile Application: E-Hub for Skilled Workers"IEEE 6th International Conference on Industrial Engineering and Application,2019.

[10]. Shurong Wang, "The Architecture Design of Migrant Labors Training Employment Information Platform" IEEE 6 International Conference on Industrial Engineering and Application,2011

[11]. S Rachitha, Sanjana Sathish, Shruthi S, Vismitha,Ambika V, "Web based System for Domestic Services",IJRECE VOL. 7 ISSUE 2 (APRIL-JUNE 2019)

[12]. Bo Zhang, Ruihan Yong, Meizi Li, Jianguo Pan, Jifeng Huanglaa, "A Hybrid Trust Evaluation Framework for E-commerce in Online Social Network:" 2169-3536, IEEE. Translations and content mining are permitted for academic research.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Career Path Prediction Using Machine Learning Classification Techniques

**Prathamesh Gavhane*, Dhanraj Shinde, Ashwini Lomte, Naveen Nattuva, Shital Mandhane**
Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India

## ABSTRACT

In today's era, choosing the right career option is a challenging task [5]. Starting at the early stage of life students usually fail to grasp the idea of which career to pursue as they lack maturity and the experience related to that field. Furthermore, students suffer greatly in deciding which career would result the highest benefit. Students do not have sufficient knowledge to take the decision on their own which may lead to complications in future. In order to avoid future complications students should make a proper decision in selecting a highest benefit career for them. Selecting a wrong career which is not meant for them will end up with work in which they are not interested or they do not have that much knowledge in that field. As students lack in decision making, they reach fortune tellers hoping that they will guide them on the right path for a bright future [3]. Instead of relying on fortune tellers to make the best prediction for the future. By considering all these things in this work we will scientifically and systematically study the feasibility of career path prediction from the survey data. This model will recommend students a career choice according to their abilities and qualities with respect to their field. If students end up having good abilities and qualities in their respective field, they can select that field otherwise they have to drop that field and choose another one. This paper presents a career path prediction using machine learning which will help students to select the appropriate career for their bright future. As career recommendations are a unique approach, we feel it should be an interactive platform. So, while building the application we presented an interactive framework which will allow students interactively perform the task and get results. The present work has 15 different types of career options. Experiments have been done using machine learning supervised classification techniques like Logistic Regression, Decision Tree, KNN, Naïve Bayes, SVM, Random Forest, Stochastic Gradient Descent, AdaBoost, XgBoost, and some hybrid algorithms using stacking like SvmAda, RfAda and KnnSgd.

**Keywords:** Machine Learning, supervised classification algorithms, Career prediction.

## I. INTRODUCTION

Machine Learning (ML) is the study of computer algorithms that improve automatically through experience. It is seen as a subset of artificial intelligence. Machine learning algorithms build a model based on sample data, known as training data, in order to make predictions or decisions without being explicitly programmed to do so. Machine learning algorithms are used in a wide variety of applications. Machine learning helps the computers to act without explicitly being programmed. Simply it is

giving computers the ability to learn by using statistical techniques [11]. This helps in solving very complex tasks and problems very easily and without involving much human labour.

Nowadays students are getting confused about their right career path. Because of this confusion they are ending up with the career in which they are least interested. In today's world competition is heavily increasing day by day. Mainly it is too heavy in present day's technical society. Students need to be firmly well organized and planned from the initial stages of their education, so as to reach the goal. To help them in improving themselves, motivating themselves to a better career path. So, it is very important to constantly evaluate their performance, identify their interests and evaluate how close they are to their goal and whether they are on the right path that directs towards their targeted [11].

There are many new career opportunities in every field, because with the increase in research and exploration in various domains. The reasons for this confusion could be unawareness of self-talent and self- personality traits, unawareness of the various options available, equal interests in multiple fields, less exposure, market boom, assumed social life, peer-pressure etc. This creates more confusion for the students to select one career option. There should be proper counselling of the student's psychology, interest and their capacity to work in a particular field [7]. Otherwise, students may select a wrong career option and the consequences of this wrong decision could be work dissatisfaction, poor performance, anxiety and stress, social disregard etc.

There are career counselling services which are helping students to find their career goals, which is the reason counselling centres have been established. These counselling centre's help students to know the wide variety of options available for them. Now students can choose the best path for them provided by the counsellor.

In this paper we are going to provide a machine learning model which will give you the career path prediction. To the best of our knowledge, there is no available benchmark dataset suitable for career path modelling [3]. We thus created new datasets by crawling fifteen popular career paths, namely engineer, doctor, pharmacist, lawyer, archaeologist, financial advisor, motivational speaker, chartered accountant, hotel management, wedding planner, writer, photographer, cabin crew, journalist and translator. For each career path we have an individual dataset. We have collected the dataset by forwarding the google form links to the students, which were containing some questions to answer. Likewise, we successfully completed the collection of datasets.

## II. LITERATURE REVIEW

[1]. Roshani Ade & P. R. Deshmukh (2014). In this paper for classification of students using psychometric tests. They used incremental naive bayes algorithm. And the results were TP-Rate_0.896, FP Rate_0.01, Precision_0.903, Recall_0.896, F-Measure_0.893 and ROC-Area_0.99. In future naïve bayes algorithm can be used as a weak classifier in the ensemble concept for incremental learning.

[2]. Ahmad F. Subahi (2018). He proposes a data collection strategy to build the required career path prediction dataset for a promising data-driven system. A new artificial neural network (ANN) approach for career path prediction was used.

[3]. Ye Liu, ET AL (2016). They have created a career path prediction model for career path instead of going to the fortune tellers. They have collected the information from various social networks. And the future work is to extend the model to consider the source descriptiveness and learn the source confidence adaptively.

[4]. Beth Dietz-Uhler & Janet E. Hurn (2013). So, they have used a learning analytics to predict student success through a perspective of faculty. In this paper, they defined about learning analytics, how educational institutions has been used it, what learning analytics tools are available and how faculty can make use of data in their courser to improve the performance of students.

[5]. Min Nie, ET AL (2020). In past, professional career appraisers used questionnaires to suggest the best career path for a student, instead of that they have created a career choice prediction based on campus big data mining the potential behavior of college students. Algorithm used is XGBOOST (ACCBOX). Accuracy of ACCBOX was 0.638.

[6]. Amer Al-Badarenah & Jamal Alsakran (2016). As we know that there are recommendation systems for the recommendation purpose while online shopping, movies, songs, etc. In that way they have created an automated recommender system for course selection which will be easy for students to choose the right subject for them.

[7]. Nikita Gorad, ET AL (2017). Keeping in mind that selecting the right career is one of the important decisions. Some students end up selecting wrong decision. For that purpose, they have created a career counselling model using data mining. They used adaptive boosting algorithm which gave around 94% of accuracy.

[8]. Dileep Chaudhary, ET AL (2019). For selecting an appropriate career path, they have created a student future prediction model using machine learning. Algorithms used were linear regression, decision tree and random forest, to improve accuracy they used adaptive boosting over the algorithms.

[9]. Vivek Kumar Mourya, ET AL (2020). They have created a career guide application using machine learning. Through this application students can easily choose a best career path for them. The machine learning algorithm used for predicting is a clustering algorithm named as K-means algorithm.

[10]. Lakshmi Prasanna & DR.D.Haritha (2019). Keeping recommender system in mind, they have created a smart career guidance and recommendation system. This paper proposes feasible predictions for student's field selection based on their marks and choice of interest. Ten to eleven machine learning algorithms were used for the predictions. In which logistic regression gave 82% accuracy. In future we can use clustering methods for better understanding.

[11]. K. Sripath Roy, ET AL (2018). They have created a student career prediction model using advanced machine learning techniques. Algorithms used are support vector machine (SVM), xgboost and decision tree. SVM gave more accuracy with 90.3 percent and then the XG Boost with 88.33 percent accuracy.

[12]. Mubarak Albarka Umar (2019). A case study of student academic performance prediction using artificial neural networks was presented. This study presents a neural network model capable of predicting student's GPA using students' personal information, academic information, and place of residence. Thus, the model correctly predicts 73.68% of student performance and specifically, 66.67% of students that are likely to dropout or experience delay before graduating.

[13]. Ezenkw.C.P, ET AL (2017). In this paper, an Automated Career Guidance Expert System (AC-GES) has been developed using case-based reasoning (CBR) technique. AC-GES is to assist high school students in choosing career paths that best suit their abilities based on their previous performances in some selected subjects, using Nigerian students as a case study.

[14]. Leaf Abu Amirah, ET AL (2016). They have used data mining technique in educational data to predict student's academic performance using

ensemble methods. They have used bagging, boosting and random forest (RF) and set of classifiers such as artificial neural network, naïve Bayesian and decision tree. The obtained results reveal that there is a strong relationship between learner's behaviors and their academic achievement.

[15]. Sudheep Elayidom, ET AL (2009). They have applied data mining on dataset using statistical techniques for career selection. This will help the students in a great way in deciding the right path for them for a bright future. The software developed is simple to use besides being reasonably accurate. Moreover, the user-friendly interface used in this project turns out to be easy to handle and avoid complications.

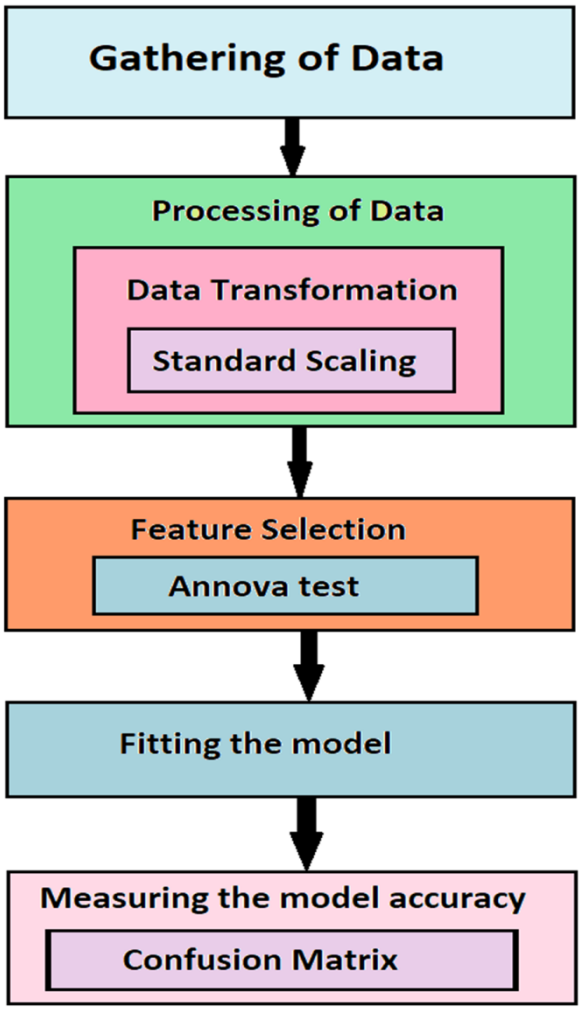
[16]. Maha Nawaz, ET AL (2014). In this paper they have created an automated career counseling system for students using case-based reasoning (CBR) and J48. This model presents an automated system that copies a one-to-one meeting with a professional career counselor. Out of the two algorithms tested, CBR gave the highest accuracy and Decision tree J-48 gave the lowest accuracy. The results indicate that the system is capable of correctly proposing majors with approximately 80% accuracy when presented with sufficient data and features.

## III. RESEARCH METHODOLOGY

The proposed work is done with the use of data that is collected from survey forms. There are 15 types of datasets namely Engineering, Doctor, Chartered accountant, Cabin crew, Journalist, Photographer, Lawyer, Pharmacist, Archaeologist, Motivational speaker, Writer, Wedding planner, financial advisor, Hotel management, Translator. The various classification methods have been used to predict the class of the careers.

The whole procedure of analysis is divided into the following steps:

1. Gathering the data
2. Pre-processing of the data
3. Feature Selection
4. Fit the model
5. Measure the model accuracy




## IV. PREPROCESSING OF DATA

Pre-processing is a step-in data science to clean, transform and reduce the data in order to better fit the model.

There are various methods of data pre-processing:

1) Data Cleaning

a) Missing Data
b) Noisy Data

2) Data Transformation
   a) Normalization
   b) Attribute selection
3) Data Reduction
   a) Aggregation
   b) Dimensionality Reduction

In this work, standard scaling has been done to transform the data

The standard score of a sample x is given as

$$Z = (x- \mu) s$$

Where $\mu$ is the mean of samples and $s$ is the standard deviation.

## V. FEATURE SELECTION

Feature selection is a method to select the best features that are able to contribute more in the prediction of the output.

The methods that are used in the feature selection are:

1) Filter Method
   i) Pearson Correlation
   ii) Linear Discriminant Analysis
   iii) Analysis of Variance (ANOVA)
   iv) Chi Square Test
2) Wrapper Method
   i) Forward Selection
   ii) Backward Elimination
   iii) Recursive Feature Elimination
3) Embedded Method

In the present work, Anova Test is used to do the feature selection. The general formula for Anova test is:

F = MST/MSE

Where,

F = Anova Coefficient

MST = Mean sum of squares between the groups

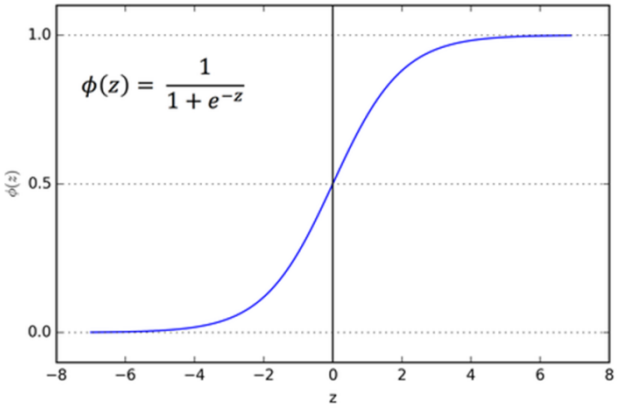
MSE = Mean sum squares due to error

## VI. FITTING THE MODEL

The detailed steps of the machine learning classification techniques that has been used in the proposed work are discussed here one by one

### LOGISTIC REGRESSION

Logistic regression is one such regression algorithm which can be used for performing classification problems. It calculates the probability that a given value belongs to a specific class. If the probability is more than 50%, it assigns the value in that particular class; else if the probability is less than 50%, the value is assigned to the other class. Therefore, we can say that logistic regression acts as a binary classifier. We use the sigmoid function as the underlying function in Logistic regression as shown in fig below




### DECISION TREE

The decision tree is an easy technique to reach a conclusion following some conditions. A decision tree contains two types of nodes: a) Decision Node and b) Leaf Node. The decision node tells the condition that which attribute has to be selected and the leaf node tells the class.

The primary decision node is known as the root node. Each decision node is selected on the basis of the two different popular methods:

1. Information Gain Method
2. Gini Index Method

Now for obtaining the result we have calculated the Entropy.

Entropy is the measure of randomness in the data. In other words, it gives the impurity present in the dataset.

Entropy is given the formula:

$E = -p^*\log2(p) – q^*\log2(q)$

Therefore, Information Gain is given by,

Gain (T, X) = Entropy(T) – Entropy (T, X)

Where,

T = Parent node before split.

X = split node from T.

Gini Index is given by,

$Gini = 1 - \Sigma(pi)2$

Where,

P = Probability of particular class.

Stochastic Gradient Descent Classifier:

Stochastic Gradient Descent (SGD) is an efficient technique for linear classification problems under the convex loss functions such as (linear) support vector machine and logistic regression.

SGD is merely an optimization technique and does not correspond to a specific set of machine learning algorithms. The advantage of stochastic gradient descent is efficiency and ease of implementation.

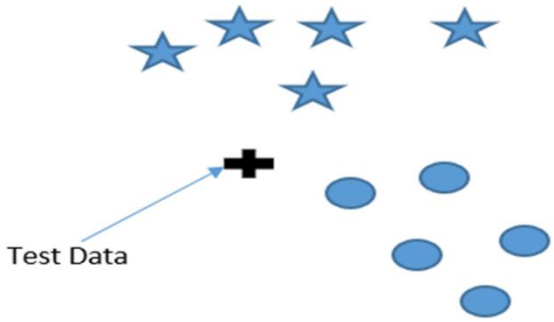
In this work, a linear support vector machine is used as a classifier and a gradient descent algorithm is applied to optimize the result.

## K-NEAREST NEIGHBORS

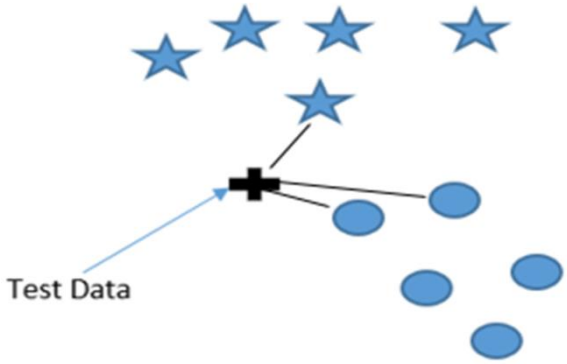
K-nearest neighbors (KNN) is a type of supervised learning algorithm which is used for both regression and classification purposes, but mostly it is used for the later. Given a dataset with different classes, KNN tries to predict the correct class of test data by calculating the distance between the test data and all the training points. It then selects the k points which are closest to the test data. Once the points are selected, the algorithm calculates the probability (in case of classification) of the test point belonging to the classes of the k training points and the class with the highest probability is selected. In the case of a regression problem, the predicted value is the mean of the k selected training points.

Let's understand this with an illustration:

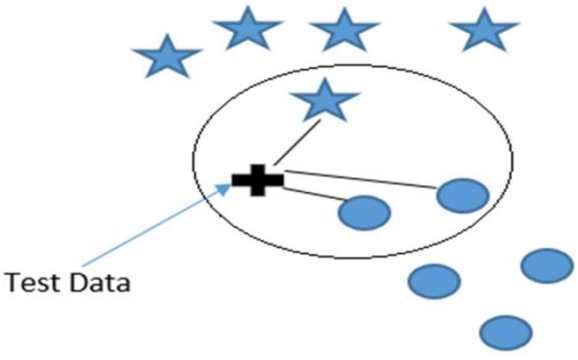
1) Given a training dataset as given below. We have a new test data that we need to assign to one of the two classes.




2) Now, the k-NN algorithm calculates the distance between the test data and the given training data.




3) After calculating the distance, it will select the k training points which are nearest to the test data. Let's assume the value of k is 3 for our example.




4) Now, 3 nearest neighbors are selected, as shown in the figure above Number of Oval class values = 2

Number of Star class values = 1 Probability (Oval) = 2/3 Probability (Star) = 1/3 Since the probability for oval class is higher than Star, the k-NN algorithm will assign the test data to the oval class.

## NAIVE BAYES:

Naïve Bayes is a classification technique that uses the Bayesian theorem to predict the class for the new feature set.

$$P(A|B) = \frac{P(B|A)\ P(A)}{P(B)}$$

Where,

P(A|B) = Probability of A occurring given evidence B has already occurred.

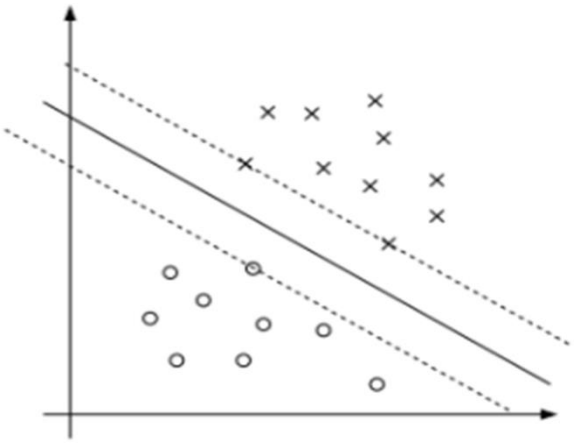
P(B|A) = Probability of B occurring given evidence A has already occurred.

P(A) = Probability of A occurring.

P(B) = Probability of B occurring

## SUPPORT VECTOR MACHINE

Support Vector Machines are the one of the most effective algorithms to solve the linear problems. Although, Logistic regression also classifies the linear problems but SVM uses the concept of support vectors to do linear separation. It has a clever way to reduce overfitting and can use many features without requiring too much computation.



Consider the above fig is a hypothetical example of a dataset which is linearly separable and a decision boundary is drawn as a solid line as a plane with two dotted lines as positive and negative planes. The stars in green colour are considered as positive point while circle in orange colour is negative point

The equation of positive plane is given as $w^T x + b$ +1, equation of negative plane is given as $w^T x + b = -1$ and equation of hypothesis plane is given as $w^T x + b = 0$.

The positive and negative plane changes as the hypothesis plane changes. For better understanding, here points have been taken that are linear separable but in the real world the data can be non-separable. The distance from the hypothesis plane to the nearest positive point or plane is given by d+. and distance from the hypothesis plane to the nearest negative point or plane is given by d-

Hence the equation for the positive plane is given as $w^T d+ + b = +1$ and that of the negative plane is given as $w^T d- + b = -1$

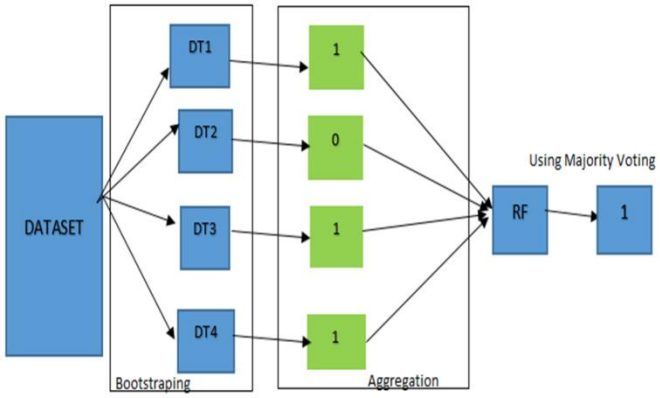
## Random Forest Classifier

Random Forest is an ensemble technique. Ensemble technique is an aggregation or combination of several base models. The ensemble technique is of two types: Bagging and Boosting

Bagging is also called as bootstrap aggregation. Feeding the data to the base models by row sampling with replacement and predicting the classes is called as bootstrapping and aggregation is the result based on majority vote of base models on the test data.

Random Forest is a bagging technique that uses the Decision tree as its base model. It applies both feature sampling and row sampling with replacement to feed the data to the base models.

The figure given below is an example showing the Random Forest classification.




Suppose training dataset which is being classified into 0 or 1 that is binary classification is given to different decision tree models with the feature sampling and row sampling with replacement then the results by the decision trees are given as shown in the figure. Now when a test dataset is passed then the results of the decision trees aggregates using the majority voting method to predict the final class.

AdaBoost:

Adaboost is an ensemble technique. It is a boosting algorithm. It combines the weak learners or classifiers to improve the performance. Each learner is trained with a simple set of training samples. Each sample has a weight and the sample of all the weights are adjusted iteratively. Adaboost iteratively trains each learner and calculates a weight for each one, and this weight represents the robustness of the weak learner. Here the decision tree is used as a base learner.

The Adaboost algorithm has three main steps:

- **Sampling step:** In this step, some samples $Dt$ are selected from the training set, where $Dt$ the set of samples in the iteration t.
- **Training step:** In this step, different classifiers are trained using$Dt$, and the error rates ($\epsilon i$) for each classifier is calculated.
- **Combination step:** Here all trained models are combined.

Stacking is an ensemble technique. It combines the predictions of many machine learning models on the same dataset.

1. The stacking uses the two-level architectures:

Base Level (0- Level):

2. The base level architecture consists of the base machine models of which some features are to be combined.

Meta Level (1-Level):

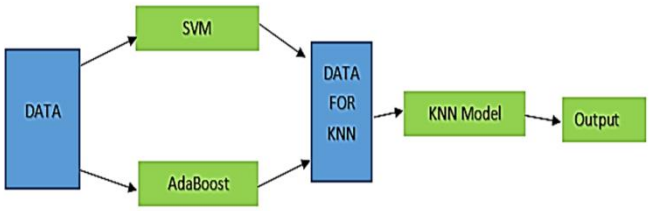
The Meta level architecture consists of the machine learning model that learns how to best combine the predictions of the base model.

The base models are trained on the training dataset while the Meta model is trained based on the predictions of the base model. Hence the output of the base model works as an input to the Meta model.

In this work, the stacking is done in order to produce three different new classifiers. In all the algorithms, KNN is used as the Meta model while the base models are changed. Let's discuss all the models one by one:

SVMAda:

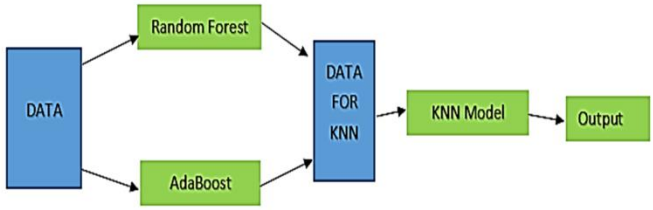
This classifier consists of the two base classifiers linear support vector machine and Adaboost. The outputs of the base models are then given to the KNN to predict the final output. The model consists of the two base models SVM (Support Vector Machines) and Adaboost hence it is named as SvmAda.




RfcAda:

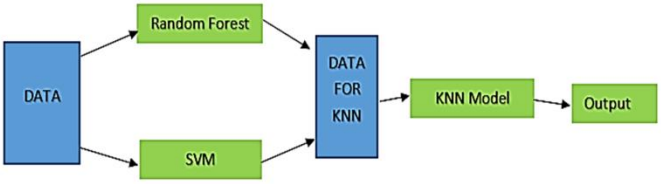
This classifier consists of the two base classifiers Random Forest and Adaboost. The outputs of the base models are then given to the KNN to predict the final output. The model consists of the two base models

RFC (Random Forest Classifier) and Adaboost hence it is named as RFCAda.




SvmRfc:

This classifier consists of the two base classifiers linear support vector machine and Random Forest Classifier. The outputs of the base models are then given to the KNN to predict the final output. The model consists of the two base models SVM (Support Vector Machines) and Rfc(Random Forest Classifier) hence it is named as SvmRfc.




## CALCULATION OF ACCURACY

The accuracy is calculated on the basis of the confusion matrix. The confusion matrix is a table that is used to calculate the accuracy.

| | | Actual Class | |
|---|---|---|---|
| | | Class1 | Class2 |
| Predicted Class | Class1 | TP | FP |
| | Class2 | FN | TN |

Confusion Matrix

Accuracy = TP+TN/TP+FP+TN+FN

Where:

TP: True Positive

TN: True Negative

FN: False Negative

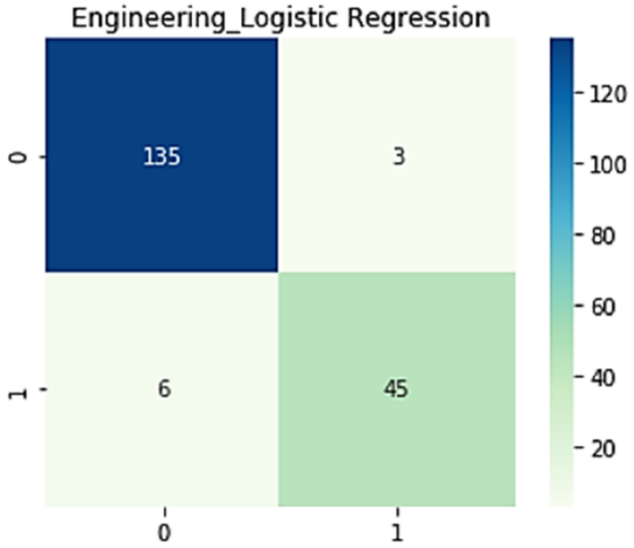
FP: False Positive

## VII. RESULT AND ANALYSIS

Each algorithm has been implemented using some common steps. The feature selection is done with the Anova test.

Engineering (Logistic Regression):

Logistic Regression classifier classifies the data based on the sigmoid function. The accuracy is calculated on the basis of selecting the features. Evaluating the accuracy, it was 95.24%. Accuracy was calculated using the Confusion matrix as shown in Fig below.



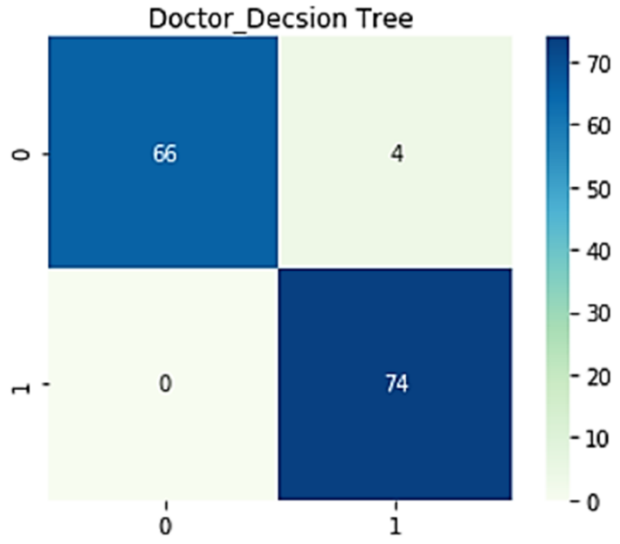

Accuracy = 135 +45/135+3+6+45

= 95.24

Hence the accuracy obtained is 95.24%.

Doctor (Decision Tree):

Initially the model was trained with an imbalanced dataset. Due to which model was biased. Later data was balanced using oversampling. Decision tree was used for model building and it achieved the accuracy of 97.22%. Accuracy was calculated using a confusion matrix as shown in fig. below



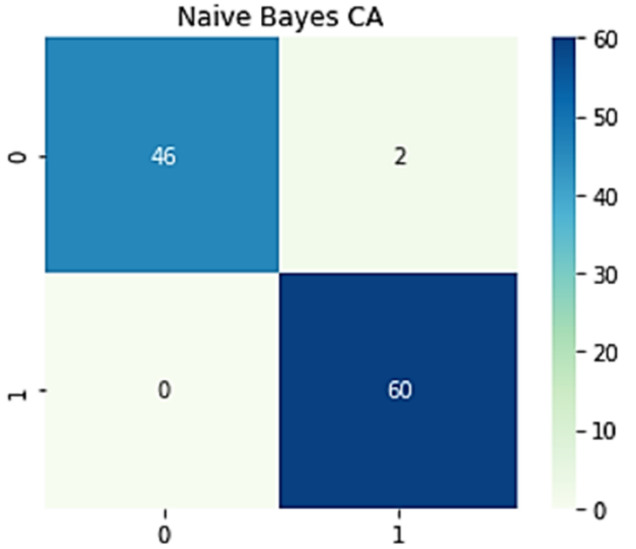

Accuracy = 66+74/66+4+0+74

= 97.22

Hence the accuracy obtained is 95.24%.

CA (Naïve Bayes):

Naïve Bayes algorithm performed well when all the features were used for classifying the career data the overall accuracy achieved is calculated using confusion matrix shown in Fig. (19)



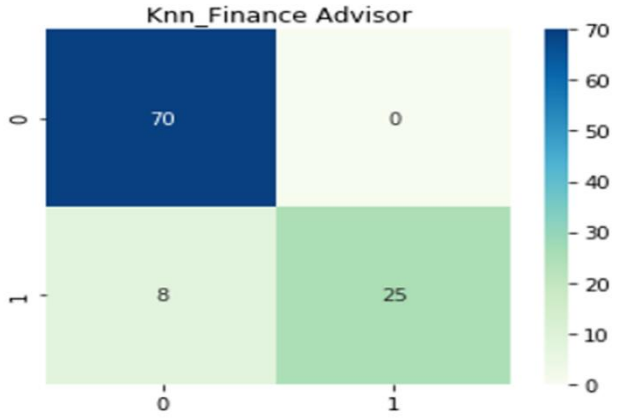

Accuracy = 46+60/46+2+0+60

= 98.15

Hence the accuracy obtained is 98.15%.

Financial Advisor (Knn):

To prepare the k-NN model dataset is divided into a training set (80%) and test set (20%). On evaluating the performance of model by considering the all features the accuracy achieved was 89.39% this is calculated using confusion matrix which is shown in Fig. (16)



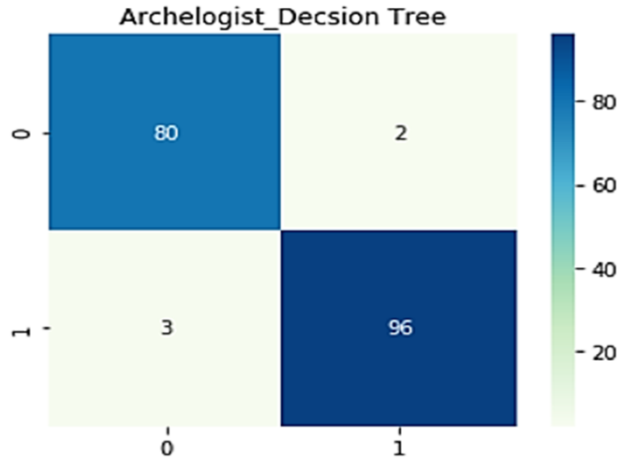

Accuracy = 46+60/46+2+0+60

= 98.15

Hence the accuracy obtained is 98.15%.

Archaeologist (Decision tree classifier):

Initially the archaeologist's dataset was passed through various algorithms. It was found out that the model is performing good with the decision tree. It achieved an accuracy of 97.24%. Accuracy was calculated using a confusion matrix. As shown below.



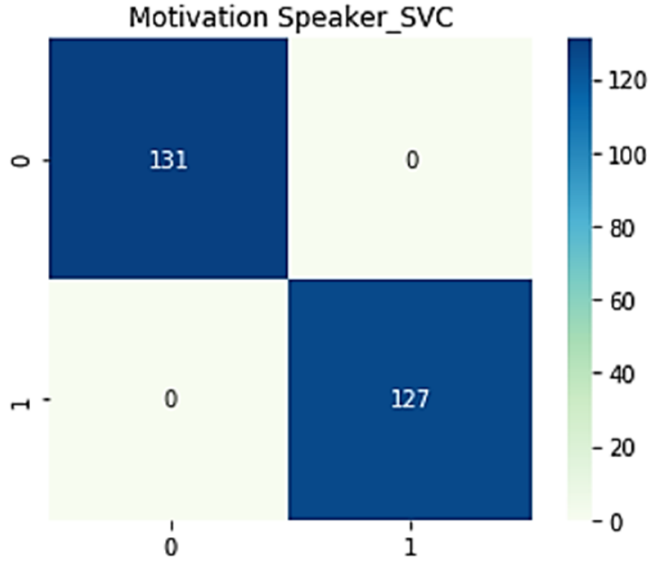

Accuracy = 80+96/80+2+3+96

= 97.24

Hence the accuracy obtained is 97.24%.

Motivational Speaker (Support Vector Classifier):

Firstly, Model was trained using the support vector machine by considering five best features. On evaluating the performance of the algorithm, accuracy achieved was 88.64%. Further the features were added according to their importance. Model outperformed when all the features were considered for classifying the data. The confusion matrix is shown in fig. (21)



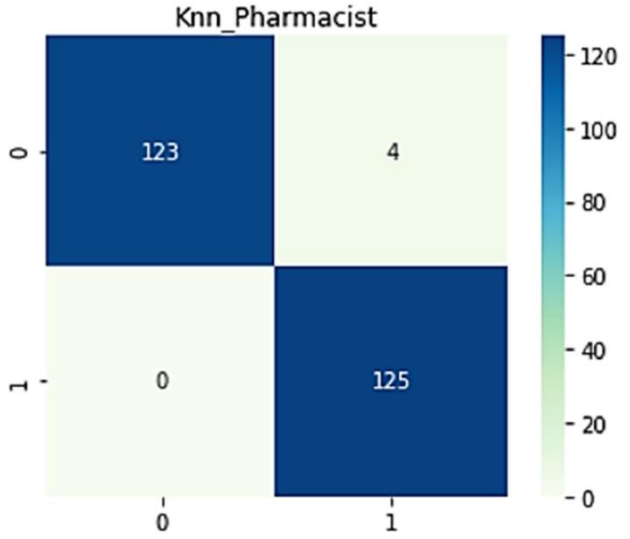

Accuracy = 131+127/131+0+0+127

= 100%

Hence the accuracy obtained is 100%.

Pharmacist (Knn):

Initially the model was trained with an imbalanced dataset. Due to which model was biased. Later data was balanced using oversampling. Decision tree was used for model building and it achieved the accuracy of 98.41%. Accuracy was calculated using a confusion matrix as shown in fig. below



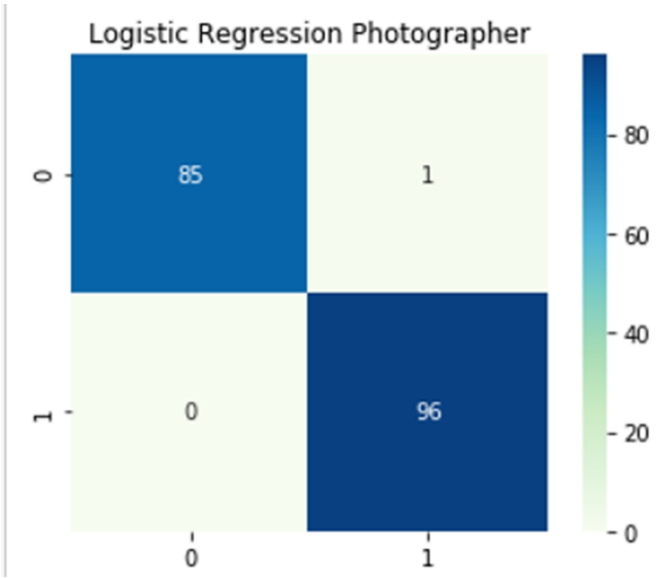

Accuracy = 123+125/123+4+0+125

= 98.41%

Hence the accuracy obtained is 98.41%.

Photographer (Logistic Regression):

Initially there were many outliers in the dataset, which led to drop down of accuracy. Later proper statistical analysis was done by quantile method. Hence the model outperformed and achieved the accuracy of 99.45%.



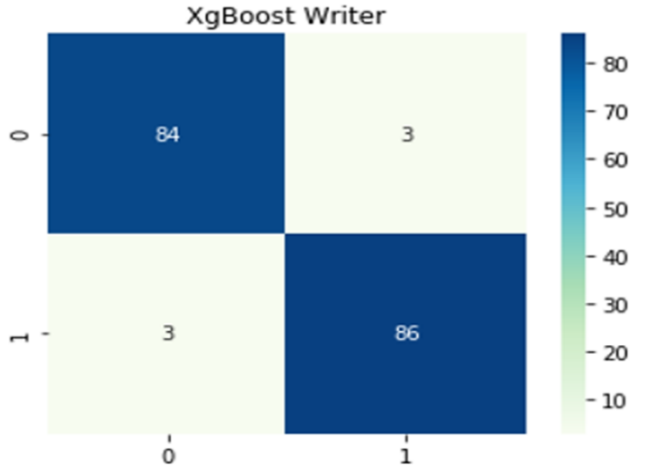

Accuracy = 85+96/85+1+0+96

= 99.45%

Hence the accuracy obtained is 99.45%.

Writer (XgBoost):

An Ensemble technique was used for model building of Writer. Boosting algorithms performed better than all other algorithms. Accuracy was calculated using confusion matrix as shown below



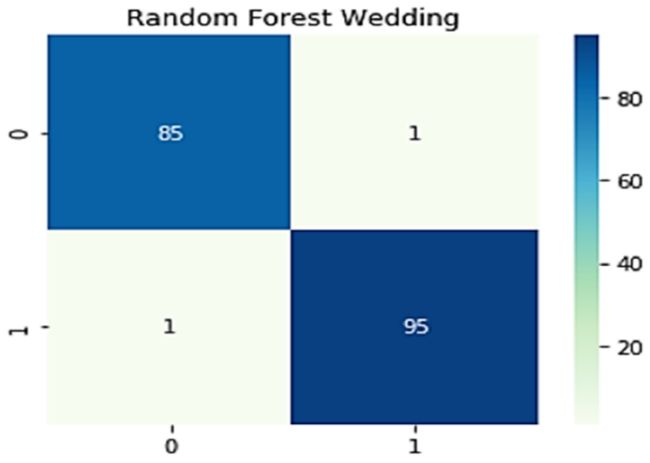

Accuracy = 84+86/84+3+3+86

= 96.59%

Hence the accuracy obtained is 96.59%.

Wedding Planner (Random Forest):

Random forest Classifier, an ensemble learning method was also trained to classify the customer data. Firstly, the model was trained using six best features and the accuracy achieved was 89.24%. Later all the features were added and Confusion matrix was drawn for calculating the accuracy is shown in Fig. (23)



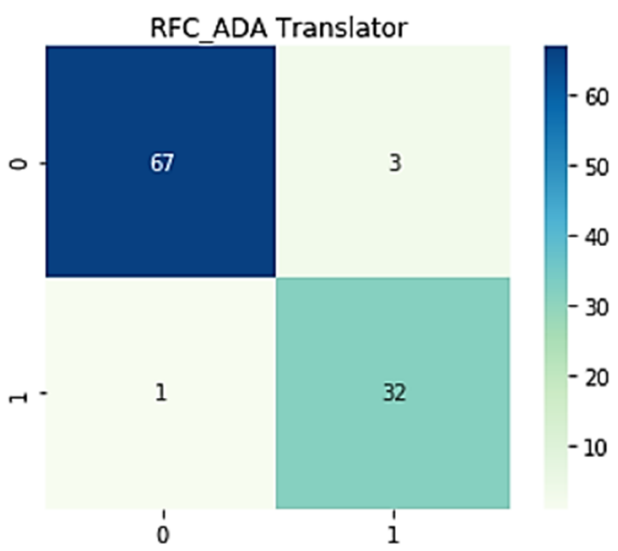

Accuracy = 85+95/85+1+1+96

= 98.90%

Hence the accuracy obtained is 98.90%.

Translator (RfcAda):

RfAda is a hybrid algorithm with Random Forest Classifier and AdaBoost as the base algorithm. Stacking an ensemble technique is used to combine the prediction from Random Forest and AdaBoost. On evaluating the performance of the algorithm, the accuracy obtained was 96.12.



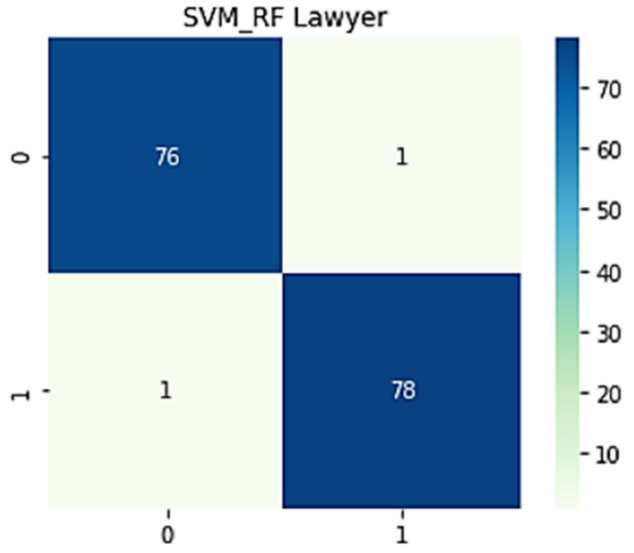

Accuracy = 67+32/67+3+1+32

= 96.12%

Hence the accuracy obtained is 96.12%.

Lawyer (Svm_Rfc):

Svm_Rfc is a hybrid algorithm with Random Forest Classifier and Support Vector Machine as the base algorithm. Stacking an ensemble technique is used to combine the prediction from Random Forest and Support Vector Machine. On evaluating the performance of algorithm, the accuracy obtained was 98.72



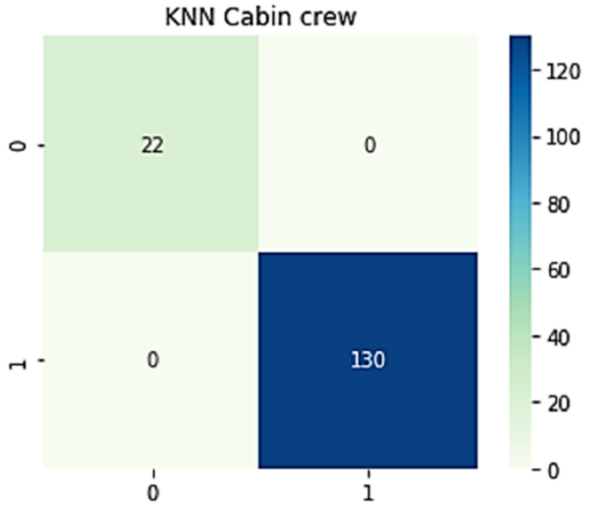

Accuracy = 76+78/76+1+1+78
= 98.72%
Hence the accuracy obtained is 98.72%.

Hotel Management:
Svm_Ada is a hybrid algorithm with Support Vector Machine and AdaBoost as the base algorithm. Stacking an ensemble technique is used to combine the prediction from Support Vector Machine and AdaBoost. On evaluating the performance of the algorithm, the accuracy obtained was 99.36%.


Accuracy = 82+73/82+0+1+73
= 99.36%
Hence the accuracy obtained is 99.36%.

Cabin Crew (KNN):

To prepare the k-NN model dataset is divided into a training set (80%) and test set (20%). On evaluating the performance of the model, it was found that the model achieved the accuracy of 100%. Accuracy was calculated using Confusion matrix as shown below:




Accuracy = 22+130/22+0+0+130
= 100%
Hence the accuracy obtained is 100%.

## VIII. CONCLUSION

In this paper, we have studied students career choice based on their interest and most importantly the skillset they have. Furthermore, the study has offered several significant insights for improving the model. Choosing a right career option plays important role for an individual. So having the good skillset related to that career is very important. Observations showed the student having interest in particular career contribute only 50% of his success.
But having proper skillset and capacity to do that work contributes rest of the 50%. Although, the analysis is done on the most of the important machine learning algorithms but a combination of new hybrid algorithms like SvmAda, RfcAda and SvmRfc showed the great result. Observations showed new hybrid

algorithms and new dataset with some more instances may create an impact in the enhancement of the model accuracy.

## IX. REFERENCES


[1]. Ade R. and Deshmukh P. R. (2014). Classification of Students Using psychometric tests with the help of Incremental Naive Bayes Algorithm. International Journal of Computer Applications. (0975 – 8887) Volume 89 – No 14.

[2]. Subahi A., F. (2018). Data Collection for Career Path Prediction Based on Analyzing Body of Knowledge of Computer Science Degrees. Journal of Software. Volume 13.

[3]. Liu Y., Zhang L., Nie L., Yan Y., Rosenblum D. S. (2016). Fortune Teller: Predicting Your Career Path. Proceedings of the Thirtieth AAAI Conference on Artificial Intelligence (AAAI-16).

[4]. Uhler B. D., Hurn J. E. (2013). Using Learning Analytics to Predict (and Improve) Student Success: A Faculty Perspective. Journal of Interactive Online Learning. Volume 12.

[5]. Nie M., Xiong Z., Zhong R., Deng W., Yang G. (2020). Career Choice Prediction Based on Campus Big Data—Mining the Potential Behavior of College Students. Applied science. a. Doi: 10.3390/app10082841.

[6]. Badarenah A. A., Alsakran J. (2016). An Automated Recommender System for Course Selection. International Journal of Advanced Computer Science and Applications, Vol. 7, No. 3.

[7]. Gorad N., Zalte I., Nandi A., Nayak D. (2017). Career Counselling Using Data Mining. International Journal of Innovative Research in Computer and Communication Engineering. Vol. 5, Issue 4.

[8]. Chaudhary D., Prajapati H., Rathod R., Patel P., Gurjwar R. K. (2019). Student Future Prediction Using Machine Learning. International Journal of Scientific Research in Computer Science, Engineering and Information Technology. Volume 5, Issue 2.

[9]. Mourya V., Phatale S., Thakur S., Mane P. (2020). Career Guide Application using ML. International Research Journal of Engineering and Technology (IRJET). Volume: 07 Issue: 09.

[10]. Prasanna L., Haritha D. (2019). Smart Career Guidance and Recommendation System. International Journal of Engineering Development and Research. Volume 7, Issue 3.

[11]. Roy K. S., Roopkanth K., Uday V., Bhavana V., Priyanka J. (2018). Student Career Prediction Using Advanced Machine Learning Techniques. International Journal of Engineering & Technology.

[12]. Umar M. A. (2019). Student Academic Performance Prediction using Artificial Neural Networks: A Case Study. International Journal of Computer Applications (0975 – 8887) Volume 178.

[13]. Ezenkwu C.P., Johnson E.H., Jerome O.B. (2017). Automated Career Guidance Expert System Using Case-Based Reasoning Technique. Cisd ijournal. Volume 8, No. 1.

[14]. Amieh E. A., Hamtini T., Aljarah I. (2016). Mining Educational Data to Predict Student's Academic Performance using Ensemble Methods. International Journal of Database Theory and Application. doi.org/10.14257/ijdta.2016.9.8.13.

[15]. Elayidom S., Idikkula S. M., Alexander J. (2009). Applying Data mining using Statistical Techniques for Career Selection. International Journal of Recent Trends in Engineering, Vol. 1, No. 1.

[16]. Nawaz M., Adnan A., Tariq U., Salman J. F., Asjad R., Tamoor M. (2014). Automated Career Counseling System for Students using CBR and J48. Journal of Applied Environmental and Biological Sciences.

[17]. Anthony V., Naidoo. (1998). Career Maturity: A Review of Four Decades of Research. Educational Resources Information Centre (ERIC).

[18]. Buhlmann P. (2012). Bagging, Boosting and Ensemble Methods. ETH Zurich, Seminar fur Statistik, HG G17, CH-8092 Zurich, Switzerland.

[19]. Miškovic V. (2014). Machine Learning of Hybrid Classification Models for Decision Support. SINTEZA.

[20]. Vafeiadis T., Diamantaras K.I., Sarigiannidis G., Chatzisavvas K.CH. (2015). A comparison of machine learning techniques for customer churn prediction. Elsevier.

[21]. Dawood E.ABD.E., Elfakhrany E., Maghraby F.A. (2017). Improve profiling bank customer's behavior using machine learning. IEEE ACCESS.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Product Grading System Using Blockchain

**Yash Kothari*[1], Debajit Roy[1], Sanskriti Gupta[1], Vishwajeet George[1], Aseema Jana[1]**
*[1]Department of Computer Engineering, Dr. D. Y. Patil School of Engineering and Technology, Pune, Maharashtra, India

## ABSTRACT

Ratings and Reviews affect our decision making drastically, the current review systems are usually centralized and can be tampered. In today's era, choosing the right product has become an arduous task. So many options are available in the market, so many products are being advertised which make similar claims that the buyer gets confused which one is true and should be relied upon. It breeds a lot of dilemma in the mind of the customer. Essentially, a review helps to get the insight of the product, typically it describes what sets the product apart from others. A review offers valuable guidance from people who have used the product, it indicates what's the worst or best that could happen. This paper presents a decentralized approach which avoids the central authorities by using blockchain technology. Survey has been done by studying different approaches for making a decentralized system for taking reviews.

**Keywords:** Blockchain, Smart contracts, Ethereum ,IPFS, Online Consumer Reviews.

## I. INTRODUCTION

Blockchain is a distributed ledger technology (DLT), that makes the history of any digital asset unalterable and transparent with use of decentralization and cryptographic hashing. Basically, it is a decentralized, distributed and a digital ledger having records known as blocks. The distributed ledger records the provenance of a digital asset. Each block has cryptographic hash of previous block, connecting the two. The linked blocks form a chain.

An Enormous usage and growth has been seen in online reviews recently. These ratings and reviews are used for various purposes by Tripadvisor, Airbnb, Amazon, Alibaba, eBay etc. The trustworthiness of these reviews has been (and is being) questionable, as these reviews can be tampered by the central authority. Customers give reviews to express their experience with the product. A highly rated product is the first thing the customer look at and can be deciding factor to choose between products [1,2].

Consumers that rely on reviews have to trust atleast two parties involved, i.e the authors of the reviews and the operators of online portals. Untrustworthy reviews of single authors, e.g., an extremely positive review in between negative reviews, can possibly be recognized by consumers. The operators acts as central authority and can modify the data throughout this complete review process. In worst case, they can even exclude consumers from submitting their review [2].

Revain[5,1] is a platform for user reviews that uses IBM's artificial intelligence. It filters out the potential

fake and low quality reviews and the good quality reviews are stored on Ethereum blockchain. The system consists of three components – firstly a stable token system using token (R and RVN). Secondly, IBM 's AI system for filtering out the quality reviews. Finally a immutable blockchain to store reviews so that they never get tampered with.

In this paper, we study a decentralized review system using blockchain to resolve the problem of central authorities. Consumers no longer need to rely on central authorities as blockchains operate decentrally across a network of several nodes, in which every user can participate [2]. Rating and reviews can be stored on the block using smart contracts and assures distributed trust since it is nearly impossible to modify any transaction stored in the blockchain. The information stored in the blockchain is public , i.e anyone can search the chain for historical transactions, enabling consumers to submit and access trustworthy reviews.

Ethereum is a blockchain, developed in 2014 by Vitalik Buterin. In comparison to the Bitcoin blockchain, which handles accounts and transactions, Ethereum stores programming logic also. When paying for its execution, any turing-complete script can be run on Ethereum. Thereby, it enables decentralized apps without any possibility of downtime, censorship, or third-party interference[2,9]. Smart Contracts were first introduced by Szabo [8] in 1994. These are self-executing contracts that operate autonomously. In Ethereum, smart contracts can be written by Solidity. Contracts are executed on several nodes within Ethereum virtual machines (EVM). After executing a contract, nodes must reach a consensus of the calculated result [2,8].Once the consumer gives the review , the review will be stored on to the block and nobody can modify those reviews. These reviews can be referred as untampered reviews [2].

After publishing a smart contract, the contract is executed by sending transaction to the contact address. This implementation can be done in two ways.

The first way is by handling the transaction at the backend. The key pair(private and public keys) will be generated at the backend. The signing of transactions also is also done in the backend[2]. The other way is using an app for creation and generation of the keys like metamask.

The drawback of the first way is that the keys are stored on the backend which acts as a central database which can be exploited.

Metamask can be used for generating of keys and helping in transaction. Along with Metamask, customer reviews are stored into the blockchain which can increase the storage cost. To reduce this cost, a distributed file-system can be used such as InterPlanetary File System(IPFS), each item on IPFS can be identified by a hash and can be accessed by URL. The hash came from IPFS, then can be stored onto the blockchain which reduces the storage cost.

## II. PGS APPROACH

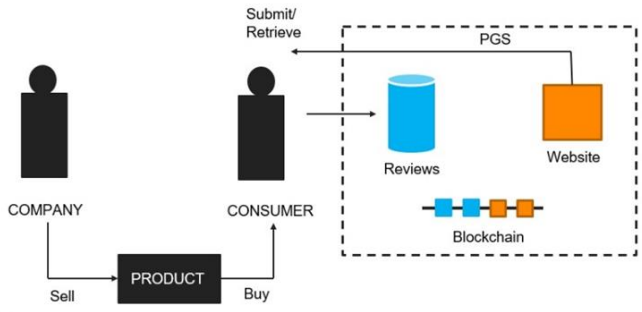



**Figure 1: PGS Approach**

The fundamental goal of PGS is to avoid central authority and to create a system that will give access to give review, rating and store the data which cannot be tampered by any third party user, as in the centralized approach central authorities can exclude

specific users to submit their ratings and reviews and as these reviews are stored on the central database, they can modify the existing reviews and also can add fake reviews from fictional consumers. In PGS approach, it is no longer possible, once the review is stored on the blockchain, it cannot be modified as shown in Figure 1. We would be using Ethereum virtual machine (EVM) which is a design based on peer-to-peer network protocol. Anyone can participate in the network and play the role of a verifier, i.e, a miner, which is a basic element in EVM. This virtual machine is an environment that runs smart contracts.

This approach must fulfill some requirements-

1) Consumer must have purchased the product.
2) Consumer must be distinguishable.
3) Consumer must have a crypto-wallet in order to sign the transactions for submitting the review.

## III. IMPLEMENTATION CHALLENGES

### A. Validating that the consumer bought the product

Unfortunately, it is difficult to solve the issue of knowing that the consumer has bought the product and giving rating on the basis of his/her experience. In PGS approach, it is compulsory to upload a image of the product explaining why they are happy/sad with the product while giving a review. The same image cannot be used by others as no duplicate images can be uploaded which will be explained in the next point.

### B. Reducing costs of data storage

Another challenge is of storage of these images on to the blockchain. Storing data on the blockchain can be extremely expensive. For example, if you want to store 1GB of data in a Blockchain system, the estimated cost would be around 100$. In order to tackle this problem we use a versioned file system which makes use of cryptographic hashes. We are going to discuss about two solutions on how to encounter this challenge-

The first one is by using a database like MySQL for storing the hash of the images along with the image and make the hash field has primary key which will ensure that no duplicate images can be entered. The image which is uploaded by the user is first converted into a Base64 format string value. This string value is then converted into a hash-code using the SHA-256 algorithm, which is the most effective hashing algorithm. Once the image is converted into its equivalent hash value, it is then stored in the MySQL database. Same images will produce same hashes and can be detected from the database. Incase of failure of giving a review, the uploaded image is deleted from the database.

The other approach is by using InterPlanetary File System(IPFS). IPFS is a peer-to-peer network protocol which is used to store and share data in a distributed file system. Blockchain used together with IPFS gives rise to a decentralized file storage system which allows one to keep track of files and their respective versions from everyone in a network. This file system is indisputable as it is similar to the blockchain network and doesn't allow any tampering of data. On storing something on the IPFS, it returns a hash value which can be stored on the smart contract and the content can be accessed the uploaded content using the hash.

## IV. IMPLEMENTATION DETAILS

Smart Contract was implemented using Solidity programming language and tested using Remix IDE. In order to get access to the facilities of the website, the consumer first needs to register themselves. After registering, for a consumer to a give a review, consumer needs to upload an image after which they can rate and give review for the product. Consumer

has to sign transaction for account creation and every time they are giving a review.

## V. LITERATURE REVIEW

[1] K. Salah, A. Alfalasi, M. Alfalasi (2019). In this paper they have proposed a blockchain-based review system which is used to store the reviews on the blockchain. They have combined the use of Ethereum networks and smart contracts with Inter-Planetary File System(IPFS). IPFS will act as storage system in which reviews will be stored and the hash of that file will be stored in the blockchain along with the reviewer's Ethereum address. The Service Provider will issue tokens and the user can submit the review using that token, the token will get verified and the user will be rewarded.

[2] Daniel Martens, Walid Maalej (2018). They have proposed a decentralized review approach which resolves the problem of central authorities, being able to influence the review processes and have also summarized the implementation, challenges and discuss design alternatives.

[3] Ching-Nung Yang, Yi-Cheng Chen, Shih-Yu Chen, Song-Yu Wu (2019). They have introduced a system that tried to resolve a problem of online shopping scams by making an alliance with e-commerce companies and trusted organization to establish a credible product grading system. After verification and product grading , the manager of alliance will write the data onto the blockchain operating a smart contract and the customer may buy product with high grades to insure product quality.

[4] Zibin Zheng,Shaoan Xie, Hong-Ning Dai, Weili Chen, Xiangping Chen, Jian Weng, Muhammad Imran(2019). They have given an overview of blockchain and smart contracts. They have also compared the advantages of smart contract over conventional contracts which includes reducing risks, cutting down administration and service costs and improving the efficiency of business processes. The paper also tells about the creation, execution and deployment of smart contracts and also about creation challenges.

[5] Revain: White paper. This document describes the Revain-plaform. It creates an easy-to-use service that would help companies to receive constructive feedback for their projects. Revain is the first review platform that implements blockchain technology for ensuring the feedback to be genuine and legitimate. In addition, it also discusses about the problems occurring in the current scenario and mathematical formulas for calculating bonuses that make submitting fake reviews unprofitable.

[6] ChengjunCai, HuayiDuan, and Cong Wang, (2018). In this paper, they have establish a set of design principles which will facilitate the development of secure blockchain applications and security management against known attacks like DDoS, Eclipse attacks in the network layer and recovering strategies to deal with massive attacks, consensus protocols and security enhancement.

[7] Gábor Magyar (2017), defines blockchain as the chain of blocks using immutable key referencing mechanism. There is no central authority responsible for governing and managing the data in the blockchain. The values recorded in the blockchain are synchronized between all the peers on the network and the consensus mechanism provides the commonly accepted validity of data. The paper introduces a new approach to an healthcare information model using blockchain.

[8] Nick Szabo. 1994. This paper describes about digital cash protocols as example for smart contracts, defining smart contract as a computerized transaction protocol that executes the terms of a contract , it gives a brief about

cryptographic protocols and how smart contracts can bring a difference in the future.

[9] Vitalik Buterin. In this paper author has discussed about the history of bitcoin as a state transition system, mining, merkle trees, about Ethereum and applications of Ethereum.

[10] Daniele Magazzeni and Peter McBurney, William Nash (2017). In this paper, they have explained about blockchain as a type of distributed ledger in which data is stored in blocks which are linked together to form a sequential chain. They have also discussed about distributed ledger-technologies, shared state, smart contracts and verification and validation of those smart contracts.

[11] Weiqi Dai, Chunkai Dai, Kim-Kwang Raymond Choo, Changze Cui, Deiqing Zou, and Hai Jin (2019). They explain the conventional data trading system which comprises of 3 parties including middle person. The seller will send the data on the trusted platform and set a selling price. The buyer will select product of interest and order similar to e-commerce transaction. However if the dataset cannot be directly used by buyer, then buyer will need to re-process the dataset to require the results satisfying the buyer's need. This paper analyzes the market and sets new rule for trading in the market using smart contracts to implement secure data trading platform(SDTP) on Ethereum.

## VI. CONCLUSION

Product's rating highly influence customer's decision. A highly rated product is the first thing the customer looks at and if that rating/review is tampered or manipulated , the customer can get trap into these scams. This paper studied the existed problem which involves central authorities acting as operators. This paper presents a decentralized approach which avoid central authorities by using blockchain technology, enabling customers to submit and retrieve unmodified reviews. This paper also highlight some of the implementation challenges encountered undergoing our approach on the public Ethereum blockchain and discuss possible alternatives.

## VII. REFERENCES

[1]. K. Salah, A. Alfalasi, M. Alfalasi (2019). A Blockchain-based System for Online Customer Reviews. 2019 IEEE INFOCOM WKSHPS: CryBlock 2019: Cryptocurrencies and Blockchains for Distributed Systems.

[2]. Daniel Martens, Walid Maalej (2018). ReviewChain: Untampered Product Reviews on the Blockchain. arXiv:1803.01661v1 [cs.CY] 5 Mar 2018.

[3]. Ching-Nung Yang, Yi-Cheng Chen, Shih-Yu Chen, Song-Yu Wu (2019). A Reliable E-commerce Business Model Using Blockchain Based Product Grading System. 2019 the 4th IEEE International Conference on Big Data Analytics.

[4]. Zibin Zheng,Shaoan Xie, Hong-Ning Dai, Weili Chen, Xiangping Chen, Jian Weng, Muhammad Imran(2019). An Overview on Smart Contracts: Challenges, Advances and Platforms.

[5]. Revain: New generation feedback platform based on the blockchaintechnology", Revain Whitepaper. [Online]. .Available:revain.org/pdf/wp/en-wp.pdf. [Accessed: 22- Apr- 2018].

[6]. ChengjunCai, HuayiDuan, and Cong Wang," Tutorial: Building Secure and Trustworthy Blockchain Applications". 2018 IEEE Secure Development Conference 2018

[7]. Gábor Magyar," Blockchain: solving the privacy and research availability tradeoff for EHR data" IEEE 30th Jubilee Neumann Colloquium • November 24-25, •Budapest, Hungary 2017

[8]. Nick Szabo. 1994. Smart contracts. (1994). http://szabo.best.v.wh.net/smart.contracts.html.

[9]. Vitalik Buterin, Ethereum White Paper, A Next Generation Smart Contract & Decentralized Application Platform

[10]. Daniele Magazzeni and Peter McBurney, William Nash (2017). Validation and Verficiation of Smart Contracts: A Research Agenda. Published by the ieee computer society.

[11]. Weiqi Dai, Chunkai Dai, Kim-Kwang Raymond Choo, Changze Cui, Deiqing Zou, and Hai Jin," SDTE: A Secure Blockchain-based Data Trading Ecosystem" IEEE permission. http://www.ieee.org/publications_standards/publications/rights/index.html for more information 2019.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Smart Passenger

**Akash Kurund*, Manthan Khariwal, Prashant Gaikwad, Akshay Mali, Varsha Babar**
Department of Computer Engineering, Dr. D. Y. Patil School of Engineering and Technology, Pune, Maharashtra, India

## ABSTRACT

Smart Passenger is a smart device which is used to keep driver away from his drowsiness and makes his journey peaceful. Smart Passenger keeps interacting with the driver so that he stays awake during his entire journey. Smart passenger has features such as mist spraying of water, alarm system, alcohol detection, etc. Smart passenger interaction with the driver will be completely based upon driver's interest as well as his hobbies. A camera fixed with this device keeps track over the driver's movement of eyes and face using ML algorithms. Once the drowsiness is detected, stage of drowsiness will be checked & appropriate action is performed.

**Keywords :** Machine learning, IoT, NLP.

## I. INTRODUCTION

Based on a study by AAA Foundation on Traffic Safety about 328,000 drowsy driving crashes occur annually. The same study found that 109,000 of those drowsy driving crashes resulted in an injury and about 6,400 were fatal. To reduce these accidents, we have come up with a smart device which acts as a companion with a driver during his entire journey and keeps him awake. This device has a built-in camera which keeps track on the eyes and mouth of the driver. It also has a microphone which is used by driver to interact with device. Based on these inputs, this device alerts the user in various ways such as mist spraying of water or raising an alarm. Its main functionality is to interact with the driver and asking him different set of questions based upon his/her interest. Driver has to fill few information in his account on the Smart Passenger website where he can upload his area of interest, hobbies, etc. all the things which he loves to talk about. Then this device uses this given data and ask question based on it. Suppose if the driver gives interest as "Cricket" then the device will ask questions like "Hey buddy, who is your favourite cricketer?" or "What do you like most about cricket?". Also, device will ask questions based on his personal information such as "Which is your favourite holiday destination?" and if the user answers wrong or answers late, then device performs appropriate actions. Apart from this, it also has a GPS inside which helps him send his location to the specified contact. Not only device asks question but also the driver can ask questions such as "Hey smarty, what's the weather condition in Pune?". Smart passenger gives real time information to the driver fetching data from the internet. Once the driver is found drowsy, first step is to keep interacting with him. If still he feels drowsy, then the next step is to mist spray of water over his face to make him feel fresh enough. This water will be in a very little amount and won't stumble. Still if he

feels drowsy, then an alarm is raised with a high volume so that he wakes up as well as nearby passing vehicles also be alert from the driver. It contains an alcohol sensor which detects if the driver is drunk. If found drunk, it asks driver not to drive car and also sends a message with location to the given contact number.

## II. LITERATURE REVIEW

[1]. Deep Learning for Natural Language Processing & Language Modelling by Mr. Piotr Klosowski. This paper presents deep learning methods for language processing and modelling. Development of statistical language models helps to predict a sequence of recognized words and phonemes, and can be used for improving speech processing and speech recognition

[2]. A Survey on State-of-the-Art Drowsiness Detection Techniques by Muhammad Ramzan, Hikmat Ullah Khan, Shahid Mahmood Awan, Amina Ismail, Mahwish Ilyas and Ahsan Mahmood. Drowsiness or fatigue is a major cause of road accidents and has significant implications for road safety. Several deadly accidents can be prevented if the drowsy drivers are warned in time.

[3]. Telematics: Artificial passenger & beyond by Mr. Dimitri Kanevsky. This paper describes human-machine interface for in-vehicle technology that are based on conversational interactivity.

[4]. Drunken driving detection and prevention models using Internet of Things by Suparna Sahabiswas and Sourav Saha. In this paper a model based on IoT is proposed with the aim to safeguard drunk and drowsy drivers especially at night. It also discusses several models which have already been proposed and attempts to assimilate the best ideas which are proposed there.

[5]. Artificial intelligence techniques for driving safety by Zahid Halim, Rizwana Kalsoom, Shariq Bashir and Ghulam Abbas. This paper presents a study on the existing approaches for the detection of unsafe driving patterns of a vehicle used to predict accidents.

[6]. Facial expression recognition using face-regions by Khadija Lekdioui, Yassine Ruichek, Rochdi Messoussi, Youness Chaabi and Raja Touahni. This paper proposes a facial expression recognition method based on a novel facial decomposition.

[7]. Research on Speech Recognition Technology and Its Application by Youhao Yu. The paper depicts the speech recognition system and the main techniques of speech recognition, and makes a preliminary exploration for its application in various fields.

[8]. Driver fatigue detection system by Yogesh Chellappa, Narendra Nath Joshi, and Vaishnavi Bharadwaj. The research aims to detect the onset of drowsiness in drivers, while the vehicle is in motion. Detection is done by continuously looking out for symptoms of drowsiness.

[9]. Real-Time Eye Blink Detection using Facial Landmarks by Tereza Soukupova and Jan Cech. This paper presents eye blink system which uses Facial points and a threshold value for differentiating between drowsy eye blink and normal eye blink.

## III. FUNCTIONS OF SMART PASSENGER

### A. Alcohol Detection

Alcohol detection is one of the features in this device which uses sensor to detect alcohol and raise and alarm for warning other passing cars.

MQ3 sensor is used in detecting alcohol.

MQ-3 gas sensor has high sensitivity to Alcohol, and has good resistance to disturb of gasoline, smoke and vapor. This sensor provides an analogue resistive output based on alcohol concentration. When the alcohol gas exists, the sensor's conductivity gets

higher along with the gas concentration rising. Whenever the user enters the car, the stinky smell of alcohol is detected by this sensor and informs the microprocessor to raise an alarm.

Fig.2.1 MQ3 Sensor

### B. Water Spray

Water spray is key functionality of this device. This device sprinkles a very low amount of sweet smell water over user face to make him feel fresh. This spray won't stumble driver as the amount of water is very less. This uses a small refillable bottle with a spray notch head over it. It is actuated using a 100 RPM centre shaft DC motor. With the help of this motor, the spray nozzle is actuated.

Fig. 2.2 DC Motor

### C. Real time Location

If the driver is drunken, then his real time location is sent to the specified mobile number which he has added to his profile as an emergency contact. This will help his relatives to track him if he meets with an accident due to drunken drive. Also, in future scope this location can be forwarded to nearby police stations so that cops can trace him. It uses a REB 4216 GPS module to locate the driver. Based on the latitude and longitude, the driver's location can be found. This will get internet connectivity through a GSM module which consist of only internet scheme.


Fig.2.3 GPS Module

### D. Drowsiness Detection

This device's main functionality is drowsiness detection. Using computer vision algorithms, we can automatically detect driver's drowsiness in real time video stream and then take appropriate action. It uses Raspberry Pi Camera module to detect drowsiness. To detect drowsiness, we first have to detect eye blinks in video stream. If the eye is closed for more than a specified threshold, then drowsiness is detected. This is done by finding Eye Aspect Ratio (EAR). It is represented by Σ(x, y) co-ordinates, starting from the left corner of an eye and then working clockwise around remainder of the region.

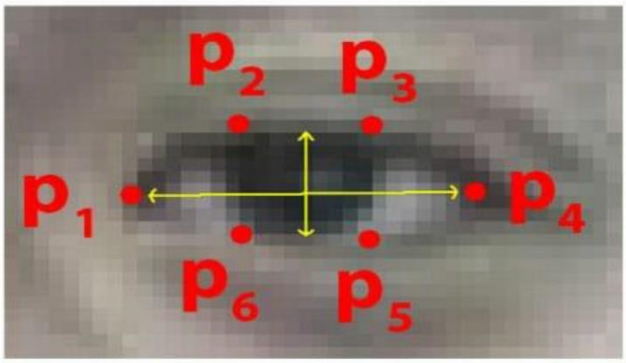



Fig.2.4 EAR

So, after getting these 6 co-ordinates of an eye, we can then derive an equation that reflects thin relation called the Eye Aspect Ratio.

$$EAR = \frac{|| P2 - P6 || + || P3 - P5||}{2|| P1 - P4||}$$

Where p1, p2…., p6 are facial landmark locations. The numerators of this equation compute the eye verticals landmarks, while the denominator computes the distance between horizontal eye landmarks. Since there is only one set of horizontal points but two sets of vertical points.

So, how EAR equation detects the blink of eye? Well, the EAR is approximately constant while the eye is open but will rapidly fall to zero when an eye blink occurs.

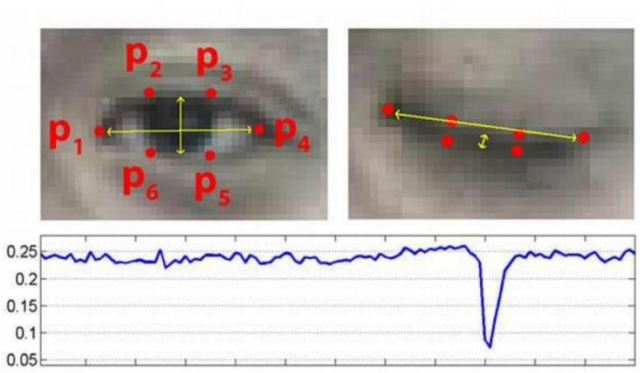



Fig.2.5 EAR Calculation

So, consider Fig.2.5, on the left side we have an eye which is fully open – the EAR is large and constant over time. However, once the person blinks the eye, EAR decreases to zero, then rapidly increases again, indicating a single blink has taken.

Using same technique, we compute eye aspect ratio for each eye, which gives us singular value. We than have declare the constant "Threshold" i.e. 0.25 & "Frame check" i.e. 20 in our algorithm.

So, if eye aspect ratio falls below this threshold, we will start counting number of frames the person has closed their eyes for. If the person's eye is closed for more than 20 frames, then it will be detected as drowsy and appropriate action will be taken.

### E. Human Machine Interaction

By using NLP algorithms, human machine interaction is made possible. Data generated from conversation are unstructured data. Unstructured Data usually do not fit properly into the traditional row and column structure of databases, and represents the vast majority of data available. Similarly, whatever user speaks through microphone is unstructured and we need to handle this which is very messy and complex part. During this process we use tokenization technique of NLP where segments of the voice are broken into small piece of text called token where each token will be a word spoken by the user from microphone. Suppose if user says "Hey Smarty, what's the weather condition in Pune?" While driver is speaking this tokenization, technique breaks it into tokens like [Hey][Smarty][what's][the] [weather][condition][in][Pune]. Once it is broken into tokens it becomes easy to understand what user said by accessing these tokens. Tokenization removes the commas, question mark, etc. so that processing time is reduced.

## IV. WORKING OF SMART PASSENGER

Working of Smart Passenger is very simple, driver first interacts with smart passenger using an inbuilt microphone. At the same time, this device keeps monitoring driver's face to detect drowsiness. This thing continues in a loop for long time. If any alcohol gas is detected inside the car, MQ3 Sensor will detect the gas and makes a call to alert system.

For drowsiness detection it, performs several operations such as extract frame, find facial landmarks, calculate EAR, etc. Based on that decision is made whether driver is drowsy or not. If drowsy, then a call to alert system is made.

For Natural Language Processing, the input taken from microphone is given to NLP algorithm. Then the algorithm processes the sound with different operations such as morphological processing, syntax analysis, semantic analysis, etc. Based on that smart passenger interacts with the driver. Also, if the user fails to answer the question to in given time then a call to alert system is made.

Questions asked to the driver are based on the profile which driver filled while creating an account on smart passenger official website. This data is accessed over the internet into the smart passenger and based on this the entire conversation is planned.

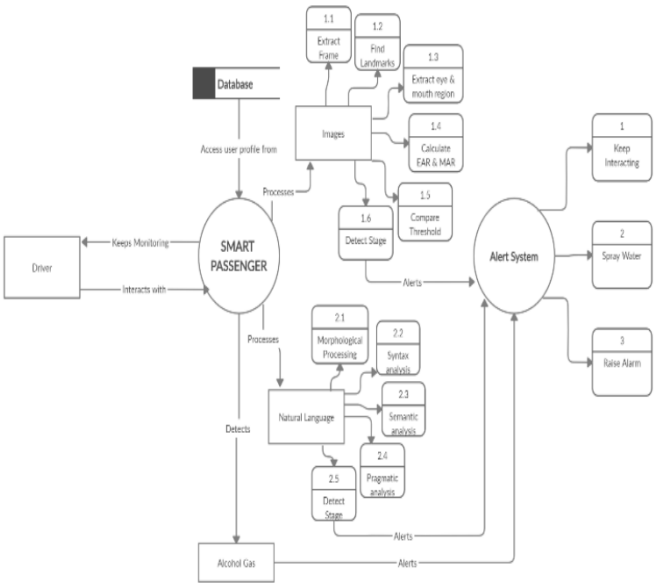



Fig. 3.1. Working of Smart Passenger

## V. RESEARCH METHODOLOGY

To start, we will apply OpenCV's Haar cascades to detect the face in an image, which boils down to finding the bounding box *(x, y)*-coordinates of the face in the frame.

Given the bounding box the face we can apply dlib's facial landmark predictor to obtain **68 salient points** used to localize the eyes, eyebrows, nose, mouth, and jawline:

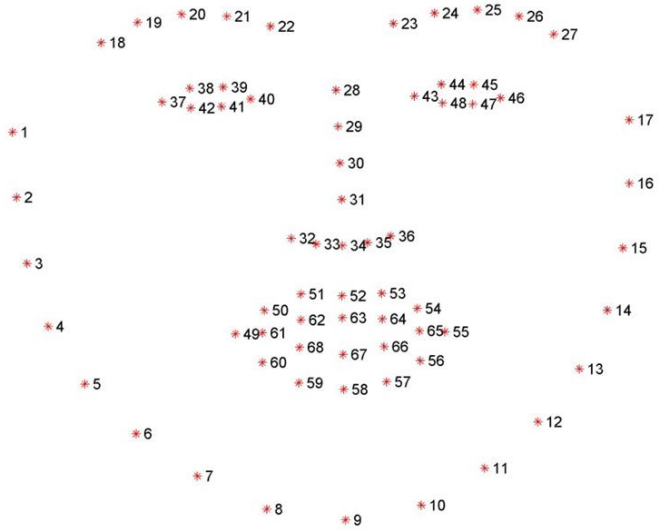


**Fig 4.1:** Visualizing the 68 facial landmark coordinates

Given the facial landmarks associated with an eye, we can apply the *Eye Aspect Ratio (EAR)* algorithm.

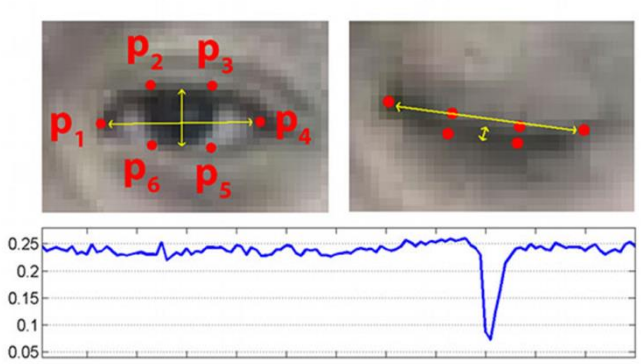



**Fig 4.2:** *Top-left:* A visualization of eye landmarks when then the eye is open. *Top-right:* Eye landmarks when the eye is closed. *Bottom:* Plotting the eye aspect ratio over time. The dip in the eye aspect ratio indicates a blink

On the *top-left* we have an eye that is fully open and the eye facial landmarks plotted. Then on the *top-right* we have an eye that is closed. The *bottom* then plots the eye aspect ratio over time. As we can see, the eye aspect ratio is constant (indicating that the eye is open), then rapidly drops to close to zero, then increases again, indicating a blink has taken place.

In our drowsiness detector case, we'll be monitoring the eye aspect ratio to see if the value *falls* but *does*

*not increase again*, thus implying that the driver/user has closed their eyes.

Once implemented, our algorithm will start by localizing the facial landmarks on extracting the eye regions and then finally raising an alarm if the eye aspect ratio is below a pre-defined threshold for a sufficiently long amount of time (indicating that the driver is tired).

## VI. SPEECH RECOGNITION

- speech recognition –" Library for performing speech recognition, with support for several engines and APIs, online and offline"
- pydub – "Manipulate audio with a simple and easy high-level interface"
- gTTS – "Python library and CLI tool to interface with Google Translates text-to-speech API"

The next thing to do and likely most importantly for a speech recognition feature is to recognize speech. To do so, we'll need to first capture incoming audio from the microphone, and then perform the speech recognition. This is all handled via the speech recognition library.

## VII. CONCLUSION

In this paper, we have studied about facial expression detection as well as voice-based interaction by the machine with the driver using Machine Learning. From this paper, we conclude that Drowsiness detection can be handled with a very good way using Machine Learning.

## VIII. REFERENCES

[1]. Deep Learning for Natural Language Processing & Language Modelling by Mr. Piotr Klosowski SAP 2018, September 19th -21st, 2018, Poznan, POLAND.

[2]. A Survey on State-of-the-Art Drowsiness Detection Techniques by Muhammad Ramzan, Hikmat Ullah Khan, Shahid Mahmood Awan, Amina Ismail, Mahwish Ilyas and Ahsan Mahmood in IEEE Access on 1st May 2019.

[3]. Telematics: Artificial passenger & beyond by Mr. Dimitri Kanevsky at IBM, T. J. Watson Research Center.

[4]. Drunken driving detection and prevention models using Internet of Things by Suparna Sahabiswas and Sourav Saha.

[5]. Artificial intelligence techniques for driving safety by Zahid Halim, Rizwana Kalsoom, Shariq Bashir and Ghulam Abbas at Artif Intell Rev DOI 10.1007/s10462-016-9467-9

[6]. Facial expression recognition using face-regions by Khadija Lekdioui, Yassine Ruichek, Rochdi Messoussi, Youness Chaabi and Raja Touahni in 3rd International Conference on Advanced Technologies for Signal and Image Processing - ATSIP'2017, May 22-24, 2017, Fez, Morroco.

[7]. Research on Speech Recognition Technology and Its Application by Youhao Yu in 2012 International Conference on Computer Science and Electronics Engineering.

[8]. Driver fatigue detection system by Yogesh Chellappa, Narendra Nath Joshi, and Vaishnavi Bharadwaj in 2016 IEEE International Conference on Signal and Image Processing.

[9]. Real-Time Eye Blink Detection using Facial Landmarks by Tereza Soukupova and Jan Cech in 21st Computer Vision Winter Workshop Luka Cehovin, Rok Mandeljc, Vitomir Struc (eds.) Rimske Toplice, Slovenia, February 3–5, 2016.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# IOT Based Smart Electric Meter

**Shikha Kushwaha[1], Sahil Dhankhar[1], Shailendra Singh[1], Mr. Vishal Kisan Borate[2]**
[1]Department of Computer Engineering, D.Y Patil School of Engineering Lohegaon, Pune, Maharashtra, India
[2]Assistant Professor, Department of Computer Engineering, D.Y Patil School of Engineering Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Electricity plays a cardinal role in day to day life. The electrical energy consumption in India is the third biggest after China and USA with 5.5% global share in 2016. Due to manual work, our existing electricity billing system has major drawbacks. This system gives the information on meter reading, power cut and the alert systems for producing an alarm when energy consumption exceeds beyond the specified limit using IoT.This idea is being implemented to reduce the human dependency to collect the monthly reading and minimize the technical problems regarding billing process. From the electricity board section, the information regarding the bill amount, payment and the pre-planned power shut down details are communicated to the consumer. If the customer does not pay the bill in time, the user is informed through a message. In the already existing smart energy meter, it shows the energy consumed by the appliances from the date of installation of the energy meter and its corresponding rupees. In this proposed energy meter, the meter gives the energy consumed on daily basis, its corresponding rupees, billing details and payment using IoT. This system not only reduces the power cut issues and the labor cost for noticing the residential energy consumption in regular intervals but also increases the energy conservation with the help of alarm systems and the energy meter accuracy by reducing the billing error and the cost of maintenance.

**Keywords**—Arduino, GSM, IoT, energy consumption, human dependency, shut down, alert message, payment details, daily basis, alarm systems.

## I. INTRODUCTION

Monitoring and keeping tracking of electricity consumption for verification is a tedious task today since manual meter reading and recording is in vogue. It is important to know from the customer view point that if one is charged fairly and according to the need. [2]

Automation of the system will allow users to monitor energy meter readings over the internet in the real-time. [2]


Figure 1. Traditional Meter

As shown in fig1.In apartments, the energy meter is far away from the residents. An LCD display is placed in each residential house in the apartment to inform about the messages regarding the power cut, energy consumption on daily basis, billing details and an alarm for the critical limit indication.[4]

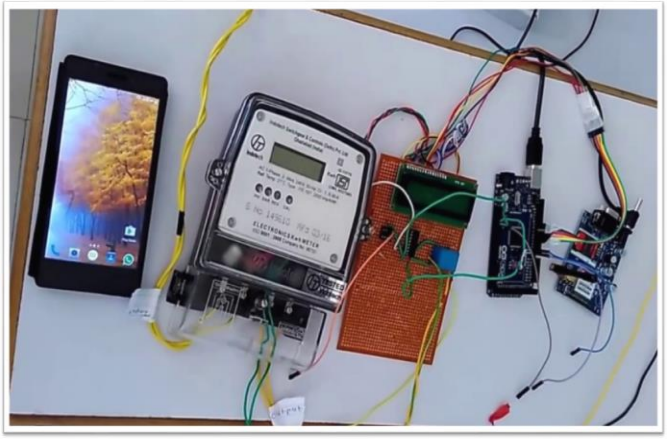


Figure 2. Proposed Iot based Smart Electric Meter

## II. METHODS AND MATERIAL

In this section we'll be discussing about Mathematical Model, System Architecture and Data Flow Diagram of this project.

### A. MATHEMATICAL MODEL

Let S be the list of modules or the functionalities of the system.

Thus, S is a set: S= {power supply, reading the sensor output, output}.

#### MODEL 1

Algorithm for power supply

F1: To take input power supply

- Input: providing power supply to voltmeter
- Output: display the current and voltage reading

#### MODEL 2

F2: calculating electricity consumption and theft detection

- Input: reading from sensor
- Output: consumption of power and theft detection

Steps:

1) Take the reading from sensor
2) compute the bill for current billing cycle
3) calculate difference od home input and power supply.

#### MODEL 3

F3: sending the detected reading and consumption to consumer

- Input: calculated value of units and theft detection
- Output: sending the computed values to user

Steps:

1) readings are obtained of electricity consumption and difference of meter input and home input
2) if difference meter consumption, then there is electric theft
3) Send the consumption units computed bill and warming if a theft is detected.

## B. SYSTEM ARCHITECTURE

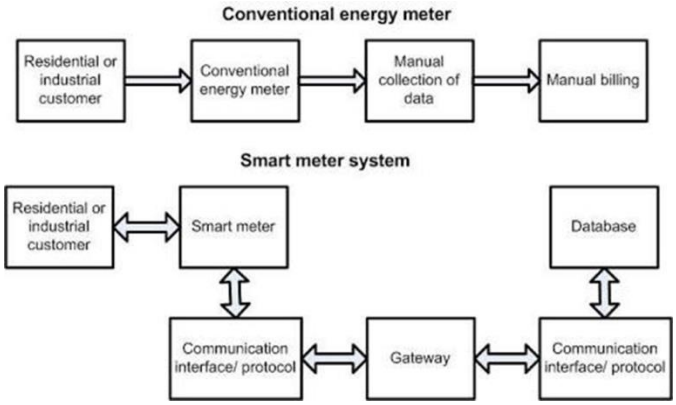



Figure 3. System Architecture

## C. DATA FLOW DIAGRAM

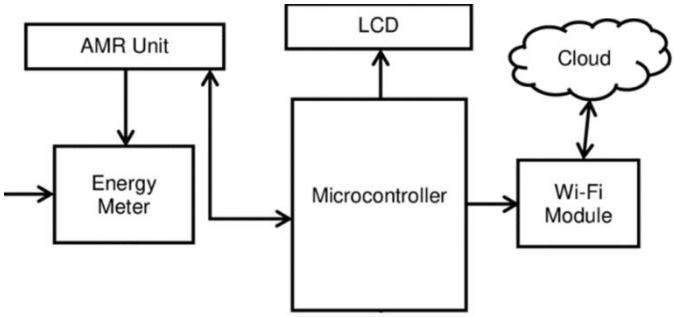



Figure.4 Data Flow Diagram

The goal of this proposed energy metering system improves the customer demand for higher energy as well as by utility. The block diagram consists of an Arduino Uno board, an energy meter, and IoT through Ethernet. This paper presents communication measurement, accuracy, and more timely data. The information of energy measurement can be used by the consumer through Ethernet to send data to the server. The simplified block diagram of the system is shown in Fig 3

## III. RESULTS AND DISCUSSION

In this section we've discussed the functioning of the device and the outputs it provides

The experimental setup for the system is as shown in Figure. 2. The ACS 712 current sensor gives precise current measurement for both AC and DC signals. These are good sensors for metering and measuring overall power consumption of systems. The ACS712 current sensor measures up to 20A of AC current.

This project is efficient in reading consumption reading units from the meter and sending them to Arduino which eventually sends them to user.

## A. Algorithm

Step 1 : Initialization

In this step module initialization takes place. The system detects the module and other parts which are Wi-Fi module, Electric Meter, Loads.

Step 2 : Inputs and Result Calculation

In this step Arduino device collects the energy meter readings and calculates the consumed power which would be sent to LCD screen and user.

Step 3 : Display of Reading Output

In this step output from Arduino after calculation is sent to display screen and user.

## B. LCD Display Outputs

1) LCD Display Screen in idle state

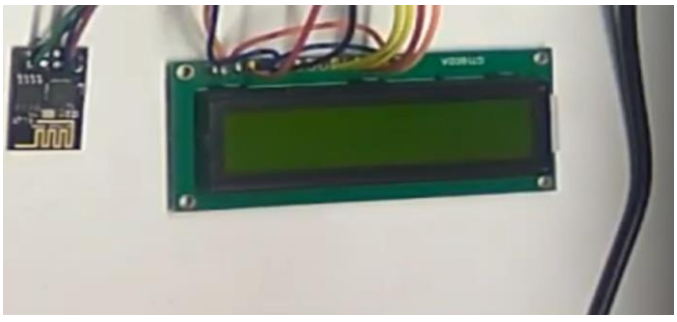


Figure.5 LCD Idle State

Shows the LCD screen in idle .This is connected to the meter and Arduino. This will display all the values of meter reading including current along with the Unit consumed and then bill amount will be displayed here.

2) LCD Display Screen after starting module

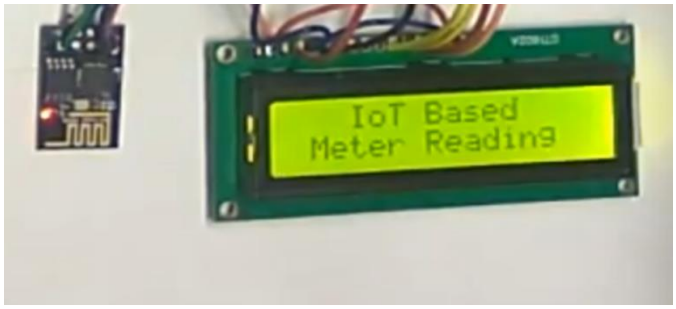



Figure. 6 Module Starting

Shows display on LCD after the module is started. Write now it is displaying the topic of our project and later will display all desired values as per requirements.

3) LCD Display Screen Connecting WiFi


Figure.7 Module Connecting to Wi-Fi

Shows WiFi connectivity with the entire setup. Currently it is displaying ongoing WiFi connectivity with our system.Once it is done a message regarding connected will be displayed.

4) LCD Display Screen Operational state

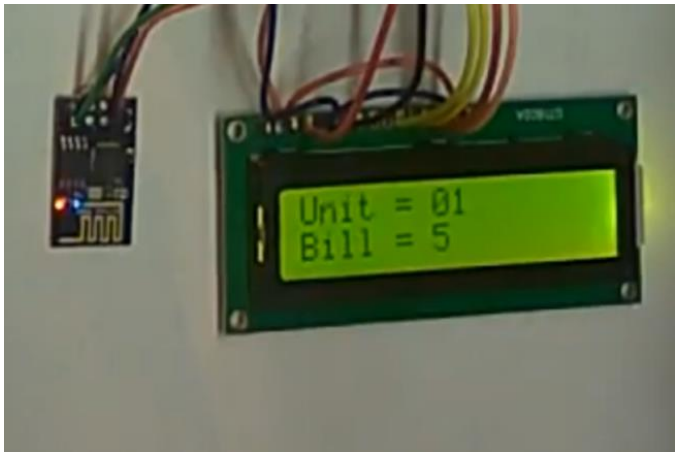



Figure. 8 Displaying Units Consumed

Shows unit consumption and bill amount. The current display is showing 1kWh unit where the bill amount displayed is in ₹. Currently it is showing the amount for 1kWh is 5₹.

Final Completed Project

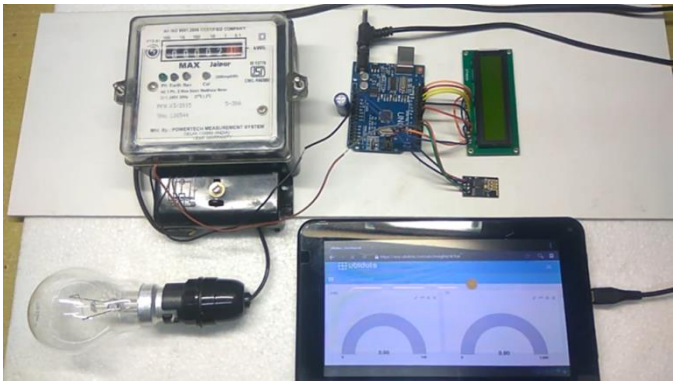


Figure. 9 End Product

Final setup of the project.

## IV. CONCLUSION

Arduino and Wi-Fi based Smart Electric Meter for advanced metering and billing system is built which is able to read and send data via wireless protocol using Wi-Fi technology through Wi-Fi modem, capable of managing the meter as well as the line connection.

However, this project needs more modification for more reliable and higher degree of satisfaction and safety.

The goal of this project work was designed for the two-way communication of energy consumed in the home can send to the web server by using Ethernet communication (IoT). By using the Ethernet communication the customer and utility receive the real status of energy consumption with less cost as compared to other communication protocols. This proposed system is cheap as compared to other communication protocols. The collected data about energy consumption is monitored by consumer and supplier at anytime, anywhere from any part of the world. Improvements can be achieved in the

controlling and monitoring of energy online from any edge of the world

## V. REFERENCES


[1]. Himshekhar Das and L.C. Saikia, "GSM enabled smart energy meter and automation of home appliances", Institute of Electrical and Electronics Engineers (IEEE), 2015.

[2]. V.Preethi and G. Harish, "Design and implementation of smart energy meter", Institute of Electrical and Electronics Engineers (IEEE), 2016. 188International Conference on Power, Energy, Control and Transmission Systems (ICPECTS). Authorized licensed use limited to: Middlesex University. Downloaded on September 04,2020 at 01:45:08 UTC from IEEE Xplore. Restrictions apply.

[3]. Md.Masudur Rahman, Noor-E-Jannat, Mohd. Ohidul Islam and Md. Serazus, "Arduino and GSM based smart energy meter for advanced metering and billing system", Institute of Electrical and Electronics Engineers (IEEE), 2015.

[4]. S. Visalatchi and K Kamal Sandeep, "Smart energy metering and power theft control using Arduino & GSM", Institute of Electrical and Electronics Engineers (IEEE), 2017.

[5]. Gobhinath.S, Gunasundari.N and Gowthami.P, "Internet of Things (IoT) Based Energy Meter", International Research Journal of Engineering and Technology (IRJET), 2016.

[6]. P.V. Santhosh Roja, B. Kiran Babu and V. Samson Deva Kumar, "Wireless Energy Meter and Billing via SMS", International Journal of Science and Research (IJSR), 2013.

[7]. Vanishree k Rao and Sri G N Madhu, "GSM based Energy Meter Reading and Billing", International Journal of Science and Research (IJSR), 2016.

[8]. Pritee Mahajan, Sneha Tatia and Prachi Jadhav, "Smart Meter: An IOT Based Meter for Live Electricity Monitoring and Bill Payment", International Journal of Electrical, Electronics and Computer Systems (IJEECS),2017

[9]. Q. M., Ashraf, M. I. M., Yusoff, A. A., Azman, N.M., NorN. A. A., Fuzi, M. S., Saharedan, & N. A. Omar, "Energymonitoring prototype for Internet of Things: Preliminaryresults", In 2015 IEEE 2nd World Forum on Internet ofThings (WF-IoT), IEEE, pp. 1-5, Dec. 2015.

[10]. S., Karthikeyan, & P. T. V., Bhuvaneswari, "IotBased real-time residential energy meter monitoring system", In 2017 Trends in IndustrialMeasurement and Automation(TIMA), IEEE, pp. 1-5, Jan. 2017.

[11]. N., Anggraini, A., Fiade, & M. Fauzan, "Flow measurement of charges and electricity costs monitoring system with android based Iot (case study: Boarding house Adelina)", In 2017 5th International Conference on Cyber and IT Service Management (CITSM), IEEE, pp. 1-5, August, 2017.

[12]. L.C.Saika, H. Das, N.B Dev Choudhry, T.Malakar, "GPRS enabled smart energy meter and automation of home appliances", IEEE Annual India Conference, pp. 1-5, Bangalore.

[13]. S. Male, P. Vethekar, K. Moore "A Smart Wireless Electronic Energy Meter Reading Using Embedded Technology", International Journal of Engineering Research and Application,Vol. 4, No.1, pp.145-147, January 2014.

[14]. M. Wei, S.H. hang, M. Alam, "An IoT-based energy management platform for industrial,purposes applied energy limited volume 164,pp.607_619, February 2016.

[15]. Shikha Kushwaha, Sahil Dhankhar, Shailendra Singh, Vishal Kisan Borate "IoT Based Smart electric meter using Ardiuno " International Journal of Scientific Research in Science and Technology (IJSRST), Vol 5, Issue 8, pp:80-84, Nov-Dec 2020

[16]. Handoko, M. Y. Nayan, M. Awan "Hybrid Automatic Meter Reading System", International Journal of Advanced Research in Computer Science and Software Engineering, Volume 2, No. 7, pp.361-365, Malaysia, July 2012.

[17]. K. Gill, S.H. Yang, F. Yao, and Xin Lu, "A ZigBeeBased Home Automation System," IEEE, Transactions on Consumer Electronics, Vol. 55, No. 2, May 2009, pp. 422-430.

[18]. Imran A. Zualkernan, A. R. Al-Ali, Mustafa A. Jabbar, Imad Zabalawi, and Ahmed Wasfy,"InfoPods: Zigbee-based remote information monitoring devices for smart-homes," IEEE Transactions on Consumer Electronics, Vol. 55, No. 3, August 2009, pp. 1221.

[19]. Maity, "Intelligent Online Measurement and Management of Energy Meter Data through Advanced Wireless Network," International Conference on Devices and Communications(ICDECOM), pp.1-4, Mesra, 25 Feb. 2011.

[20]. L.C.Saika, H. Das, N.B Dev Choudhry, T.Malakar, "GPRS enabled smart energy meter andautomation of home appliances", IEEE Annual India Conference, pp. 1-5, Bangalore,December 2016..

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Quantifiable Data Security Model for Cloud Computing Platform

**Geetanjali Pandey[1], Maithili Gavli[1], Shruti Khaire[1], Pragati Mote[1], Prof. Vandana Chavan[2]**
[1]Student, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Whatever one public cloud, private cloud or a mixed cloud, the users lack of effective security quantifiable evaluation methods to grasp the security situation of its own information infrastructure on the whole. This paper provides a quantifiable security evaluation system for different clouds that can be accessed by consistent API. The evaluation system includes security scanning engine, security recovery engine, security quantifiable evaluation model, visual display module and etc. The security evaluation model composes of a set of evaluation elements corresponding different fields, such as computing, storage, network, maintenance, application security, and etc. In order to effectively manage the networks for administrators within limited time and energy, we are developing a hierarchical framework which detects the malicious attacks and prevent our data from that attack. Thus, in our application we are using two algorithms, firstly Intrusion Detection System (IDS) which is used to detect the attack and provide the information of the hacker to the administrator and the second algorithm used is named as Intrusion Prevention System (IPS) to prevent our data from the hacker. We are also going to retrieve the data which are changed by the hacker using support vector machine (SVM).

**Keywords**: Cloud-Computing, Security, IDS, IPS, SVM.

## I. INTRODUCTION

With the continuous development of cloud computing technology, cloud has become one common method to create the different users' information infrastructure [1]. But as the cloud technology brings us very low-cost services and operation conveniences, it also caused that the information infrastructure of users is fragmented. The cloud users cannot know whether their cloud services are safe, and whether their data can be safely placed in different clouds. Currently, capturing and analysing the abnormal behaviour is one of the most critical issues in keeping a network, data centre or cloud under control. Firewall, Intrusion Detection System (IDS) and Intrusion Prevention System (IPS) are regarded as the most important devices for security management [2]. We will develop a hierarchical framework to perform high threat mining and ranking based on their processing urgencies, in turn to reduce the operating difficulties for the network administrators. We have seen that personal computer's data and the cloud data are

hacked due to less security provided by the user. This Data and the information is hacked or changed by the hacker, so we need to recover the hacked data or the retrieved data. In the existing system, there is no application to identify and detect the hacker. So in the current system, we use IDS and IPS techniques for detecting and preventing the data from the hacker [3].

IDS is a system that monitors network traffic for suspicious activity and issues alert when such activity is been discovered. It is a software application that scans the whole network or a system for harmful activity or policy breaching. A good intrusion detection system requirements for the highest possible detection rate and false alarm rate as low as possible due to intrusion detection in user behavior mainly as a data format, so the core problem is how to correctly and efficiently handle the data collected, and reach a conclusion [4].

An IPS is a system that has the ability to detect attacks, both known and unknown, and prevent the attack from being successful. Thus, Intrusion Prevention System is also known as Intrusion Detection and Prevention System [5].

We are also retrieving the cloud data using SVM. SVM is a supervised machine learning algorithm and can be used for both classification and regression challenges. However, it is mostly used in classification problems. Thus, in the proposed system, we are aiming to provide the security to our data stored in the cloud server, so that we can prevent our data from any malicious activity.

## II. LITERATURE SURVEY

| Sr. No | Paper | Remarks |
|---|---|---|
| 1. | One quantifiable security evaluation model for cloud computing platform | Aimed on quantifiable security evaluation system for different clouds that can be accessed [1]. |
| 2. | An Effective High Threating Alarm Mining Method for Cloud Security Management | Introduction of IPS and IDS discuss of the various threats to prevent them [2]. |
| 3. | Data Mining Based Intrusion Detection System in VPN Application | Quantifiable security evaluation system for different clouds that can be accessed by consistent API [3]. |
| 4 | Design of a new Intrusion Detection System of WSNs | In this paper a new Intrusion Detection System of WSNs is designed, its detection work is based on selective available information of every node in the network [4]. |
| 5. | A Survey on Intrusion Detection System (IDS) and Internal Intrusion Detection and Protection System (IIDPS) | IDS will identify the internal intruder's accurately in real time and can be used by several firms, MNC's for protecting their valuable data. [5]. |
| 6 | Study on Data Security Policy Based On Cloud Storage | The purpose of this paper is to achieve data security of cloud storage and to formulate corresponding cloud storage security policy. |
| 7 | Distributed Intrusion Detection System using Block chain and | Proposes the development of Distributed Intrusion Detection System (DIDS) |

| | | |
|---|---|---|
| | Cloud Computing Infrastructure | |
| 8 | Intrusion detection systems vulnerability on adversarial examples | The role of Intrusion Detection System within security architecture is to improve a security level by identification |

Table No .01

## III. ALGORITHMS

### 1]. IDS (Intrusion Detection System)

Intrusion detection system (IDS) is a system that monitors and analyses data to detect any intrusion in the system or network. High volume, variety and high speed of data generated in the network have made the data analysis process to detect attacks by traditional techniques very difficult. Intrusion detection system for detecting an attempt to undermine the integrity of computer resources, authenticity and availability of software behaviour, it can real-time monitoring system activities, real-time discovery of aggressive behaviour and take appropriate measures to avoid or minimize the occurrence of attacks generated by attack hazard.[1]

The IDS has three methods for detecting attacks; Signature-based detection, Anomaly-based detection, and Hybrid-based detection. An Intrusion Detection System (IDS) is a system that monitors network traffic for suspicious activity and issues alerts when such activity is discovered. It is a software application that scans a network or a system for harmful activity or policy breaching. Any malicious venture or violation is normally reported either to an administrator or collected centrally using a security information and event management (SIEM) system. A SIEM system integrates the outputs from multiple sources and uses alarm filtering techniques to differentiate malicious activity from false alarms.

Although intrusion detection systems monitor networks for potentially malicious activity, they are also disposed to false alarms. Hence, organizations need to fine-tune their IDS products when they first install them. It means properly setting up the intrusion detection systems to recognize what normal traffic on the network looks like as compared to malicious activity.

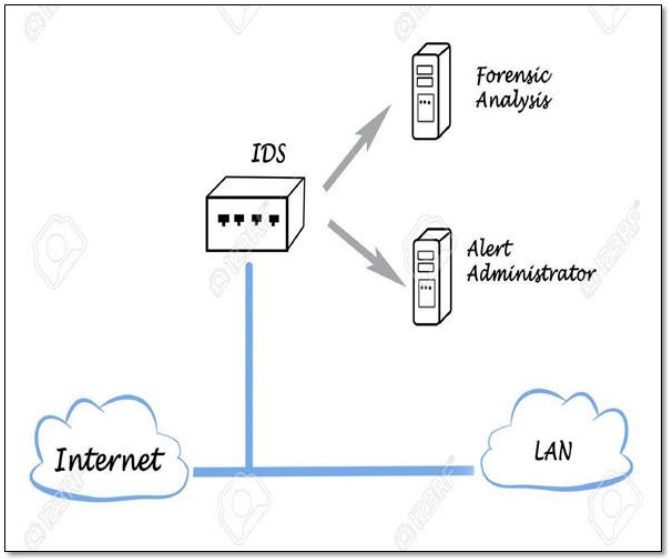



FIG 1. IDS

### 2]. IPS (Intrusion Prevention system)

Intrusion Prevention Systems are an important component of IT systems, defence, and without this technology, our data and our networks are much more susceptible to malicious activities. Intrusion Prevention Systems, a more advanced version of Intrusion Detection Systems, are now making their mark on the IT industry reaching a new level of network security. An IPS (Intrusion Prevention System) is any device (hardware or software) that has the ability to detect attacks, both known and unknown, and prevent the attack from being successful. Basically an IPS is a firewall which can detect an anomaly in the regular routine of network traffic and then stop the possibly malicious activity.

Intrusion Prevention System (IPS) is an important supplementary for security management [9]. There are many reasons why someone would want to use an IPS, among these are extra protection from denial of service attacks and protection from many critical exposures found in software such as Microsoft Windows. The capabilities of IPSs are already in use by large organizations and in the near future we will more than likely see private home users utilizing a variation of IPS. IPS typically record information related to observed events, notify security administrators of important observed events and produce reports. Many IPS can also respond to a detected threat by attempting to prevent it from succeeding. They use various response techniques, which involve the IPS stopping the attack itself, changing the security environment or changing the attack's content.[4]

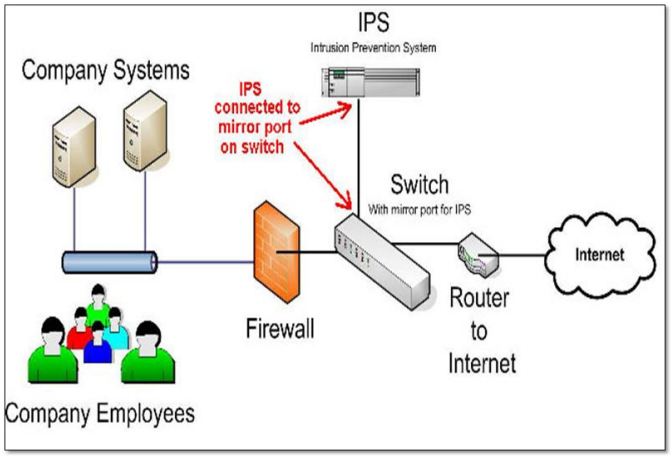



FIG 2.IPS

### 3]. SVM (Support Vector Machine)

The objective of the support vector machine algorithm is to find a hyper plane in an N-dimensional space (N — the number of features) that distinctly classifies the data points. An SVM model is basically a representation of different classes in a hyper plane in multidimensional space. The hyper plane will be generated in an iterative manner by SVM so that the error can be minimized. The goal of SVM is to divide the data sets into classes to find a maximum marginal hyper plane (MMH). The followings are important concepts in SVM – 1.Support Vectors – Data points that are closest to the hyperplane is called support vectors. Separating line will be defined with the help of these data points.

2. Hyper plane – As we can see in the above diagram, it is a decision plane or space which is divided between a set of objects having different classes.

3. Margin – It may be defined as the gap between two lines on the closet data points of different classes. It can be calculated as the perpendicular distance from the line to the support vectors.

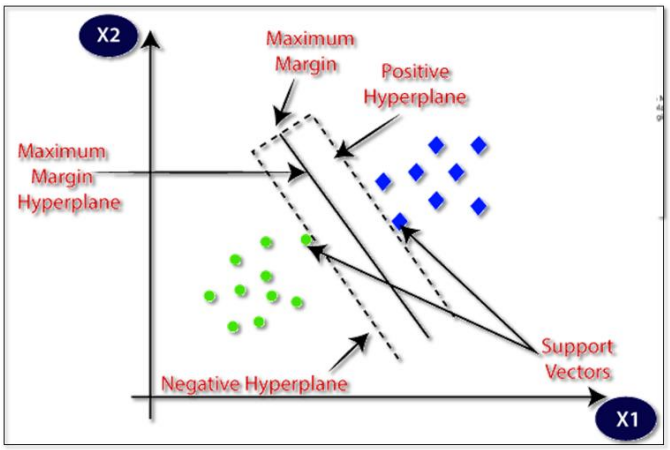



FIG 3. SVM

## IV. EXISTING SYSTEM

In the existing system, there is no computerizes system to identify intrusion detection, attack in your personal computer or laptop. A hacker can easily change your personal database or hack our personal database. But we cannot identify them so we can't understand who has stolen our data. So in proposed system we are trying to give security to our data and stored out data in a cloud server so hacker cannot identify the data storage location. The existing network intrusion detection research is mostly concentrated on the wired network; the intrusion detection research on wireless sensor networks is relatively little [2].

## V. MATHEMATICAL MODEL

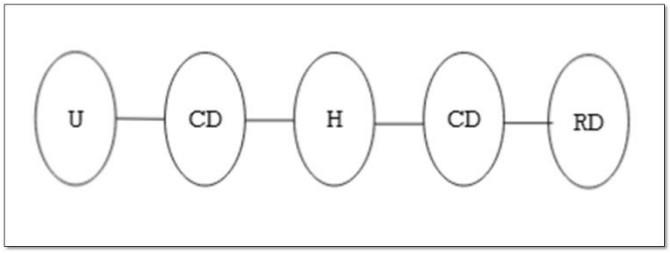



FIG 4. MODEL

Where,
U =User stores data on Cloud
CD=Data stored on cloud server
H =Hacker can make login attempt
CD =Hacker changes the data
RD =Retrieve the original data.
Above mathematical model is NP-Hard. Because sometime result is not accurate.

Input: Hacker can make login attempt on the user's Pc.
Output: System then captures the hacker's face, retrieve the data and system is blocked.

Let us consider, H as hacker who can make login attempt on user's PC and change the data.
H = {U, CD, CD}
Where,
U = {User can upload data on cloud server.}
CD = {Cloud server store the user's data}
CD = {Hacker can change the data of user}

U = {H, CD, RD}
Where, H= {User receives hacker's face image via mail}
CD = {Hacker can change the data of the user}
RD = {System data is retrieved which was changed by the hacker}
Functions: Functions implemented to get the businessman original data and detect the hacker face.
Functional relations: 1] Hacking, 2] Security, 3] IPS, 4] IDS.

Success Condition: Successfully algorithm implementation and proper input
Failure Condition: 1. huge data can lead to more time consuming to get the information. 2. Hardware failure. 3. Software failure.
Space Complexity: The space complexity depends on Presentation and visualization of discovered patterns. More the storage of data more is the space complexity.
Time Complexity: Check No. of patterns available in the database = n. If (n > 1) then retrieving of information can be time consuming. So the time complexity of this algorithm is O (n ^n).

## VI. SYSTEM ARCHITECTURE

If a hacker is trying to hack the data of our system, we will catch the face of the hacker if a login attempt fails at the first time. At the second time if attacker changed the data on our PC, then our system will retrieve the previous data using support vector machine. If the hacker attempted for the third time to hack the system, then we will block the system, and we will not provide any login option for the hacker.[10]

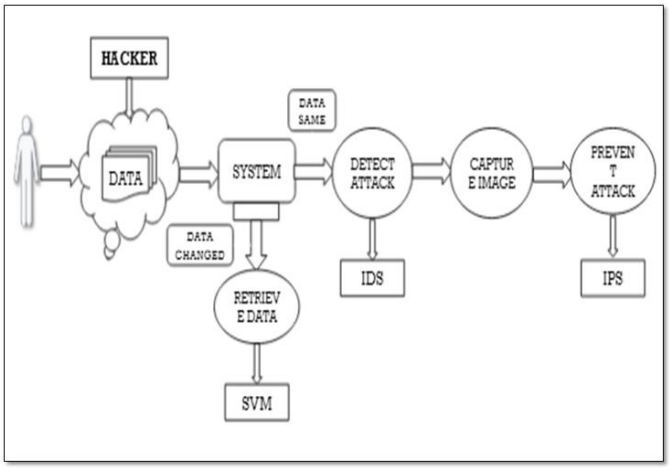



FIG 5. SYSTEM ARCHITECTURE

## VII. IMPLEMENTATION

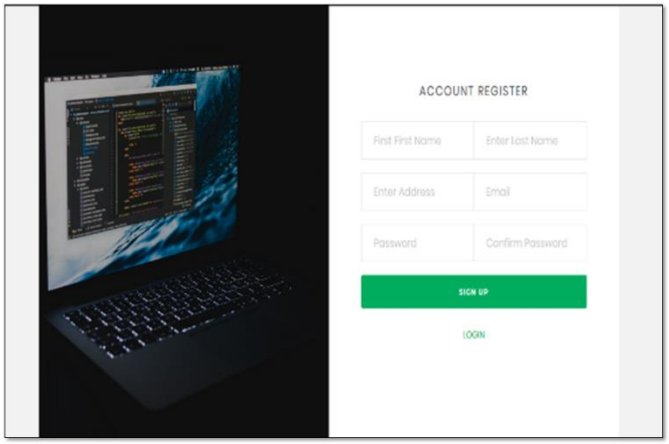



FIG 6. REGISTER PAGE

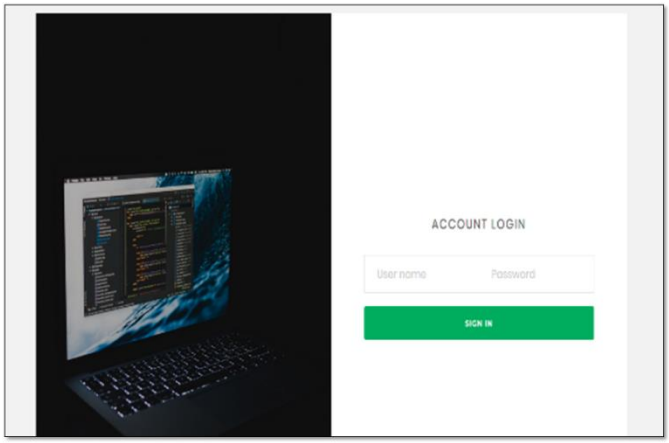



FIG 7. LOGIN PAGE

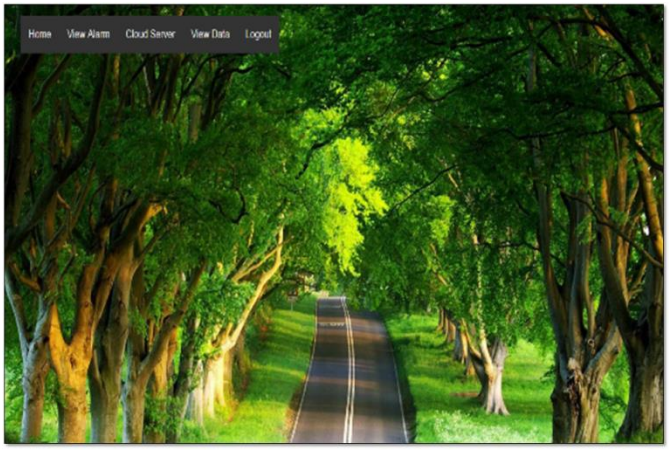



FIG 8. HOME PAGE

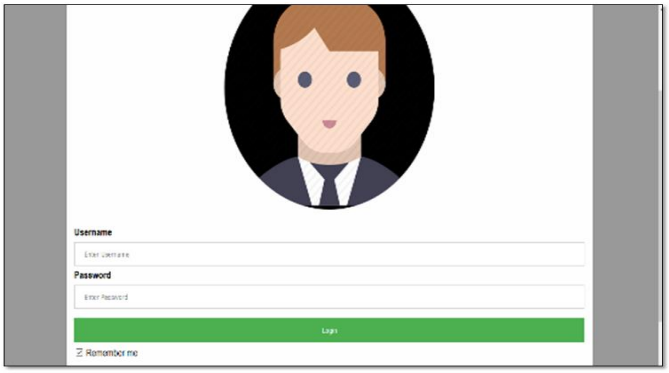



FIG 9. CLOUD LOGIN

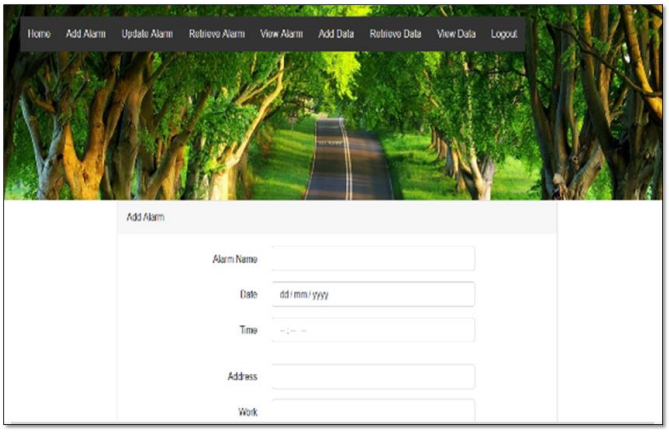



FIG 10. CLOUD DATA

## VIII. ADVANTAGES OF SYSTEM ARCHITECTURE

1]. Using IPS and IDS algorithm system can provide the security of the user's important information and data.

2]. SVM algorithm can recover the user's important information and data which is changed or modified by the hacker.

3]. This is reliable system.

4]. This system can prevent the hackers from hacking.

5]. When hacker trying to hack the user's important information and data, then system send the email of the hacker's image to the user, because of this email system immediately alerts the user.

6]. Replace a Human Monitoring Your Network 24x7.

## IX. APPLICATIONS

1]. Small business: The reason being, many large companies have the infrastructure in place to guard against cyberattacks. Small businesses, however, either don't have the proper resources to thwart an attack or they don't take cybersecurity as seriously as they should.

2]. Healthcare: The healthcare industry is another prime target for ransomware attacks because of the sheer amount of patient data stored by healthcare entities. Health information is some of the most valuable data on the dark web because it can be used to commit insurance fraud.

3]. Higher Education : When you think of potential targets for hackers, colleges and universities probably aren't the first to come to mind, however, the higher education industry is another mecca of personal data. From social security numbers, addresses and passwords to loan and bank information, it's no wonder attacks on colleges and universities are becoming more prevalent.

4]. Energy: Last, but by no means least, is the energy sector. Here, things like the electric power grid and power generation facilities are controlled by technology and communication systems that could be disrupted, hacked or taken over during a cyberattack to put our economy in serious danger.

## X. CONCLUSION

In order to effectively manage the networks for administrators within limited time and energy, we develop a hierarchical framework to secure the data of the user by detecting and preventing any malicious attack. With the help of IDS and IPS our data is highly secure. We can also get images of the person who is unauthorized accessing our data. If our data is hacked then we can also retrieve it. We can also block the system if hacker is repeatedly trying to attempt the login. Thus, we find that the accuracy of our proposed method is larger than 97%, the analysis results verify that our proposed methods compares more effectively with other methods[9].

## XI.FUTURE WORK

1]. Malware is targeting virtual machines: "Many breeds of malware today can detect if they are running within virtual machines and make adjustments or shut down altogether in order to evade detection, but only a few proof of concept viruses has actually attempted to break free into the host machine," explained Fred Couchette, senior security analyst at Approvers. "We expect to see more of these in the near future".

2]. ATM-like hardware hacks: "We've seen criminals physically walk into stores and replace credit card terminals with working replacements that had been modified to contain a 3G modems, which transmitted payment details directly back to them," said Lyne. "This high scale, intelligent hardware hacking demonstrates that the threat is not just impacting the conventional PC".

3]. RAM is scraping: "For years everyone has been locked down databases since they are the source of information, but now hackers that can breach a server can get an application less than 1MB in size on the server and capture all the data as it is written to RAM before it goes into a database," said Chris Drake, CEO of Fire Host. "An application like this can also capture data (such as credit card numbers) that don't even go into a database, but that are processed by a third party provider. RAM scraping will be a huge concern as it gains more popularity among the hacker crowd.

## XII.REFERENCES


[1]. Mohan Sundaram, R., A. Jayanthiladevi, and G. Keerthana. "Software Defined Cloud Infrastructure." Handbook of Research on Cloud and Fog Computing Infrastructures for Data Science. IGI Global, 2018. 108-123.

[2]. Rittinghouse, John W., and James F. Ransome. Cloud computing: implementation, management, and security. CRC press, 2016.

[3]. Ahmed, Monjur, and Mohammad Ashraf Hossain. "Cloud computing and security issues in the cloud." International Journal of Network Security & Its Applications 6.1 (2014): 25.

[4]. Carlin, Sean, and Kevin Curran. "Cloud computing security." (2011)

[5]. Gouda M, Liu X, “Firewall design: consistency, completeness, and compactness,” In Proceedings of the 24th IEEE International Conference on Distributed Computing System, 2004.

[6]. Valeur F, Vigna G, Kruegel C, et al, “A Comprehensive approach to intrusion detection alarmcorrelation,” IEEE Transactions on dependable and secure computing,vol. 1, pp. 146-169, 2004.

[7]. Kumar S, Spafford E H, “A Software Architecture to support Misuse Intrusion Detection,” Computers & Security,vol. 14, 1995.

[8]. Garcia-Teodoro P, Diaz-Verdejo J, Maciá-Fernández G, et al, “Anomalybased network intrusion detection: Techniques, systems and challenges,” computers & security, vol. 28, pp. 18-28, 2009.

[9]. Lee, Texas, Deng Xiaohui. Network virus against the status quo and Countermeasure technology. Network Security Technology Operation and applications, 2001,8 (2) :96-100

[10]. Wu occasion, Huang Chuan-he, WANG Li-Na and so on. Based on data mining intrusion detection system. Computer and Applications, 2003,10 (4) :48-54

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Automated Website Development

**Akashy Mahalle, Shivaraya Patil, Tushar Gangurde, Vaibhav Patil**
Department of Computer Engineering, Dr. DY Patil School of Engineering, Charholi BK, via lohegaon, Pune, Maharashtra, India

## ABSTRACT

A website helps a business to grow by using different marketing strategies. This report describes a novel approach to develop a website by just providing the text (description of the website) or an image as input. Using Text Input, it will suggest template (screenshots) after identifying the theme of the site inferred from the input. Those templates are converted into code for further customizations for their personal use. Current problem was that a web developer would take more than 15 days only to just make the basic structure of a website. This issue is resolved by our work, which will generate the complete code of the webpage/ website in less amount of time. In this paper, it will tokenize each word to find their synonyms and then mapped it with root words for the theme identification and uses deep learning model to convert templates into code.

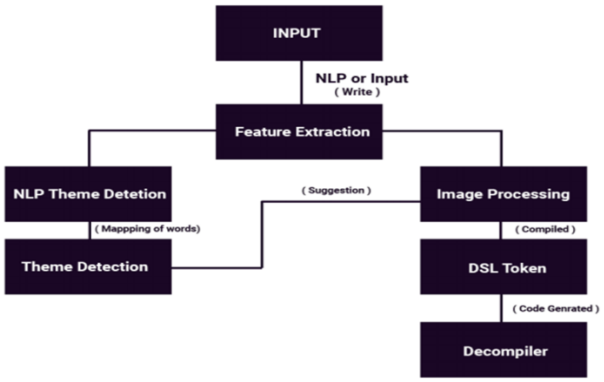
**Keywords :** Website, Automatic, code

## I. INTRODUCTION

The process of implementing client-side software based on a Graphical User Interface (GUI) mock-up created by a designer is the responsibility of developers. Implementing GUI code is, however, time-consuming and prevent developers from dedicating the majority of their time implementing the actual functionality and logic of the software they are building. Moreover, the computer languages used to implement such GUIs are specific to each target runtime system; thus resulting in tedious and repetitive work when the software being built is expected to run on multiple platforms using native technologies. In this paper, we describe a model trained end-to-end with stochastic gradient descent to simultaneously learns to model sequences and spatio-temporal visual features to generate variable-length strings of tokens from a single GUI image as inpu

## II. METHODS AND MATERIAL

The proposed system is done in various steps like text segmentation, tokenizing, part of speech tagging, word map and theme, suggesting, CNN, LSTM and decoder as show




- **Input Image and Text**
  User can upload images of UI to convert UI to code.

- **Feature Extraction**

  The methods of input have feature extraction Algorithms which extracts characteristics from both inputs each of them has their own feature extraction algorithm.

  Image input uses CNN as a feature extraction algorithm to get characteristics of input. CNN is widely used in computer vision problems because of its topology, which allows them to extract minor details from the input.

- **Theme Detection**

  After Tokenizing, these phases come into play that uses Name Entity Recognition or Chunking that extracts Noun and Adjectives from tokenized data that are called Chunked data from that data synonym are extracted and mapped with root words.

- **Image Processing and DSL Token generation**

  After the extraction of features from the image using CNN, we used DSL tokens to describe UI Components. To find different graphical components and their relation between each other DSL Token generation is used. DSL reduces the size of search space by reducing the total number of tokens of vocabulary of the DSL.

- **Decoder**

  By using supervised learning method, model is trained by inputting an image I and xt is a contextual sequence of X of T tokens, t ∈ {0 . . . T – 1} as inputs; and xT token is taken as the target label. Input image I is encoded into vector representation p by using CNN-based vision model. LSTM Model is used to encode the input token xt into an intermediate representation qt which allows the model to concentrate more on certain type of tokens and less focus on others.

## III. RESULTS AND DISCUSSION

This work will generate code for UI input provided by the user. fig 1 shows input provided by user as an image and code is the output generated by the system. Output contain the actual code of the website that was pass as an input.

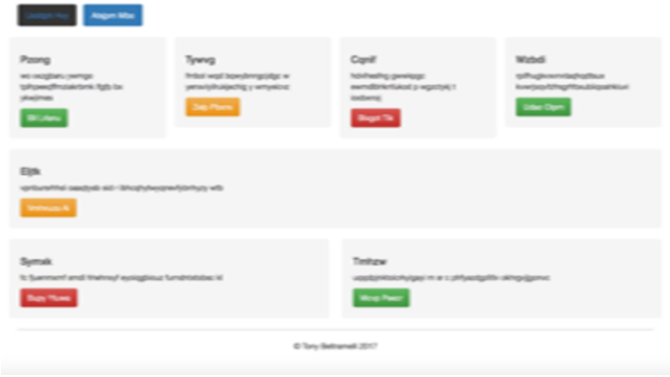


Fig 1

```
START <!DOCTYPE html>
<html lang="en" dir="ltr">
<head>
<title>Basic 88</title>
<meta charset="iso-8859-1">
<link rel="stylesheet" href="styles/layout.css" type="text/css">
<!--[if lt IE 9]><script src="scripts/html5shiv.js"></script><![endif]-->
</head>
<body>
<div class="wrapper row1">
  <header id="header" class="clear">
    <div id="hgroup">
      <h1><a href="#">Basic 88</a></h1>
      <h2>Free HTML5 Website Template</h2>
    </div>
    <nav>
      <ul>
        <li><a href="#">Text Link</a></li>
        <li><a href="#">Text Link</a></li>
        <li><a href="#">Text Link</a></li>
        <li><a href="#">Text Link</a></li>
        <li class="last"><a href="#">Text Link</a></li>
      </ul>
    </nav>
  </header>
</div>
</body>
</html>
```

Output

User can copy this code and paste it on any html page as shown in fig 2, and can run the code.

```
<html>
  <header>
    <meta charset="utf-8">
    <meta name="viewport" content="width=device-wi
    <link rel="stylesheet" href="https://maxcdn.bo
<link rel="stylesheet" href="https://maxcdn.bootst
<style>
.header{margin:20px 0}nav ul.nav-pills li{backgrou
</style>
    <title>Scaffold</title>
  </header>
  <body>
    <main class="container">
      <div class="header clearfix">
  <nav>
    <ul class="nav nav-pills pull-left">
      <li class="active"><a href="#">Mopy Yvzww</a
<li><a href="#">Lvvwre Ewa</a></li>

    </ul>
  </nav>
</div>
```

## IV. CONCLUSION

This proposed system has discussed the theme detection technique, suggesting themes to user, and generating code from the selected template. Current problem was that a web developer will take more than 15 days only to just make the basic structure of a website. This issue is resolved by our work, which will generate the complete code of the webpage/ website in less amount of time. This system can be used by anyone to make a website from just a text input or screenshot of a website to generate code from it.

## V. REFERENCES

[1]. J. Donahue, L. Anne Hendricks, S. Guadarrama, M. Rohrbach, S.Venugopalan, K. Saenko, and T. Darrell. 2015. Long-term recurrent convolutional networks for visual recognition and description. In Proceedings of the IEEE conference on computer vision and pattern recognition, pages 2625–2634.

[2]. F. A. Gers, J. Schmidhuber, and F. Cummins. 2000. Learning to forget: Continual prediction with lstm. Neural Computation, 12(10), 2451–247.

[3]. I. Goodfellow, J. Pouget-Abadie, M. Mirza, B. Xu, D. Warde-Farley, S. Ozair, A. Courville, and Y. Bengio. 2014. Generative adversarial nets. In Advances in neural information processing systems, pages 2672–2680.

[4]. A. Karpathy and L. Fei-Fei. 2015. Deep visual-semantic alignments for generating image descriptions. In Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, pages 3128–3137.

[5]. T. Mikolov, I. Sutskever, K. Chen, G. S. Corrado, and J. Dean. 2013. Distributed representations of words and phrases and their compositionality. In Advances in neural information processing systems, pages 3111–3119.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# IVA : An Intelligent Virtual Assistant System Implementation using Speech and Speaker Recognition

**Vrushali Kolte[1], Kalyani Kasar[1], Samidha Jadhav[1], Sunil Rathod[2]**

[1]Students, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India

[2]Assistant professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Currently, many people use IOT-based voice recognition devices such as Siri by Apple, Alexa by Amazon and Echo from Google. Where there is a boost in IOT devices to the contrary, there is hardly any speech recognition software like Cortana that has very few desktop features. Another fall of these technologies is the security issue because it stores its data in the cloud which can be recovered by any technique and can be used improperly. To overcome above issues this paper proposes IVA, a voice-based intelligent virtual assistant comprising of speech recognition and speaker recognition technology specifically for windows operating system. IVA incorporates the ability to recognize the user's voice to check for security violations and also provide a personalized account to the end user. IVA firstly checks if the user is an authorized user or not and if user voice is detected successfully, then it opens user personalized account to perform some of the common tasks such as playing audio/video files, searching through the web, setting alarms and scheduler, etc.

Keywords : IVA, Speech recognition, Speaker verification, pyttsx3, MFCC, GMM, python 3.7.2, pyqt5, Windows OS.

## I. INTRODUCTION

The term virtual assistant was coined in the 1950s, even prior to Siri, which was developed by Apple as a virtual assistant for Android. The term virtual assistant or virtual personal assistant is an application program capable of understanding natural human language, speaking natural language and completing an electronic task for the end user [5]. The main aim is to design a voice-based intelligent virtual assistant (IVA) that acts as a digital organizer to provide a variety of services to its master with the use of various machine learning algorithms, which accept voice input, process it and provide the desired output to the user.

This intelligence system is classified into three generations: First Generation based on Pattern Matching; Second Generation including techniques of Artificial Intelligence such as deep neural network; Third Generation indulges higher ordered,

sophisticated pattern matching techniques which are mostly based on AIML, a markup language for chatbots constructions which is based on XML [1].

The simplest and quickest way to communicate is through our own voice. Therefore, voice assistants are in great demand these days. Voice assistants are used in a wide range of areas such as chatbot, home automation, web search, map browsing, etc [4]. This method of interaction with technical apparatus makes lexical communication better than typographic communication. Speech recognition is the backbone of the voice assistant, facilitating the interaction between the system and the end user.

Voice recognition can be broken down into two categories: speech recognition and speaker recognition [7]. Speech recognition is the ability of a machine or program to identify words pronounced by the user and convert them into readable text. It works in three stages: speech to text, text to intention and intention to action. Speech recognition involves many fields of physiology, psychology, linguistics, computer science and signal processing, and is even related to the person's body language, and its ultimate goal is to achieve natural language communication between man and machine.

On the other hand, speaker recognition in its current phase is relatively immature and has very few applications. Its use can be seen in areas like surveillance, authentication and medico-legal recognition of speakers. Privacy is the most important aspect of voice assistants [6]. Speaker recognition can be integrated with voice recognition, enabling users to have a personalized experience, reducing the risk of malware. The voice of each individual has been different just like a fingerprint and can be categorized according to timbre, pitch, length of the vocal device, sound frequency, etc.

## II. LITEARTURE SURVEY

Below are some of the highlighted researches in speaker recognition and speaker identification field:

TABLE I: LITERATURE SURVEY TABLE

| Sr. No. | Paper Name | Advantages | Limitations |
|---|---|---|---|
| 1. | Domain Specific Intelligent Personal Assistant with Bilingual Voice Command Processing [2] | -Commands are processed in two languages- English and Bengali.<br>-Language processing performed using finite automata. | -Noise cancelling module cannot be implemented. |
| 2. | Artificial Intelligence-based Voice Assistant [8] | -understand command easily.<br>-Audio/Video files are easy to download. | -Security of user is at risk. |
| 3. | Application of Automatic Speaker Verification Techniques for Forensic Evidence Evaluation [10] | -Interpreted verification result in terms of probability.<br>-The difficulty of matching two vocal samples is eliminated. | -Low accuracy and reliability. |

## III. PROPOSED SYSTEM

To make our design easier to understand, we have shown the flow of information through the IVA figure-1; here voice input is the starting point of the system and IVA respondent is the end point.

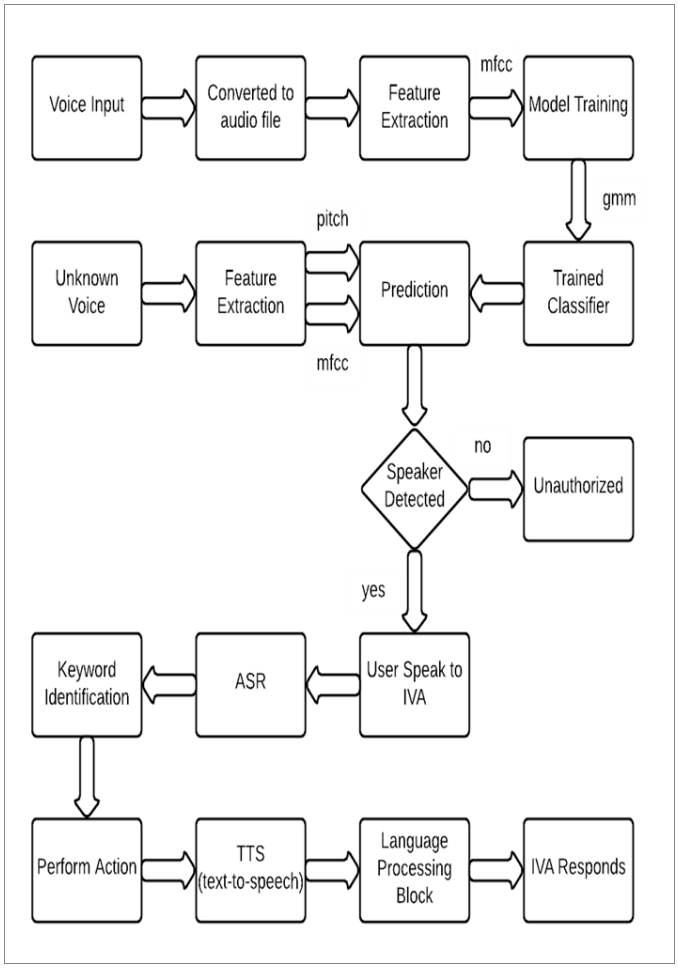



Fig-1: System Architecture of the IVA

## A. Audio Processing

Firstly, IVA greets user and ask if he/she is a new or old user. The user speaks into the microphone and if the response is an old user, then the user needs to say the complete phrase specified by the IVA. This audio is captured from the microphone and saved with an extension of .Wav. The recorded sound is subsequently used in the feature extraction phase. If the response is a new user, then the user should record his voice three times saying the same sentence which will generate three audio files. Depending on the recording device, the audio file may have features that cannot be processed through voice recognition engines [2]. Hence, the audio file's properties must first be converted to Mono Channels, 44100Hz Sampling Rate, and 1024 Chunk Size. This standardizes all the audio inputs to the speech recognition engine.

## B. Feature Extraction

Mel-Frequency Cepstral Coefficient (MFCC) is the most widely used algorithm for extracting features. Python provides a library known as python_speech_features that provides common features for ASR, including MFCCs and filter bank energies. This module can be used to compute MFCC features such as signal, sample rate, Winstep, numcep, etc. Audio files that are recorded for enrolment or testing go through feature extraction where the frequency of the audio signal is divided into sub-bands using the MEL scale. Then the Cepstral coefficient is extracted from the sub-bands by means of the Discrete Cosine Transform (DCT) [9]. The MEL scale in MFCC is based on the way humans distinguish between frequencies, making audio processing extremely convenient.

MFCC is based on a linear cosine transformation of a logarithmic power spectrum on a nonlinear Mel scale in the frequency range. The Mel scale is linear up to a frequency of 1kHz and then behaves logarithmically. In advancement to the Fast Fourier transform (FFT) parameters which were earlier used for feature extraction, in MFCC, the frequency bands are positioned logarithmically (on Mel scale) rather than being linearly spaced in case of FFT [10]. The MFCC flow chart is depicted in Fig. 2 and Algorithm-1 provides the step-by-step methodology for calculating it.

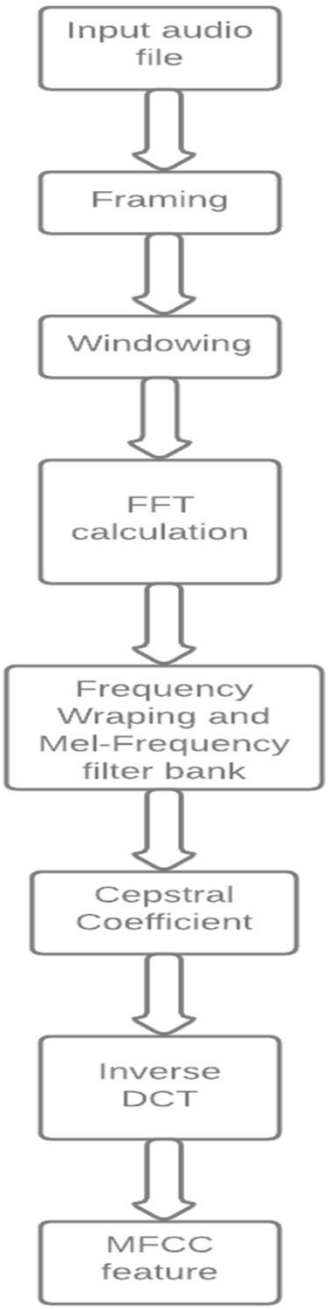



Fig 2: MFCC block diagram

**Algorithm-1: Algorithm for MFCC calculation**

**Steps:**

1. Sample speech signal at 16 kHz. Take N=400 (no of samples) and M=0.01 (overlapping factor),
2. Apply 0.025s Hamming window on each frame,
3. Take the 1200-point Discrete Fourier Transform of the frame,
4. Calculate the energy of the filter bank by multiplying each filter bank by the power spectrum and then summing the coefficients,
5. Apply signal on Mel filter bank for MFCC calculation. Convert frequency scale to Mel scale by using below formula, M(f) = 1125 1n(1 + L/700)
6. Apply the Discrete Cosine Transform (DCT) to calculate only the effective portion that is sufficient for the ASR and then the DCT is calculated.
7. We would obtain 12 delta coefficients, which would result in a characteristic vector of length 24.

### C. Model Training

We have used the speaker verification method based on suitable Gaussian mixture models (GMM) as the underlying technique, because this mode has a good recognition capability. One of the powerful attributes of the GMM is its ability to form a smooth approximation to the underlying long-term sample distribution of observations obtained from utterances by a given speaker [9]. A GMM is a probability distribution model. When base distributions such as the Gaussian or Cauchy distribution model a single peak, GMMs can model distributions with numerous peaks. This is achieved by adding many Gaussian together. Using a sufficient number of Gaussians, and adjusting their means and covariances as well as weights, almost any continuous density can be approached at arbitrary accuracy.

Python delivers the GMM package. This package is used to estimate parameters for a Gaussian mixture distribution. Parameters used in our system are: n_components: int, covariance_type {“diag”}, n_init: int. The n_components specify the number of mixture components, covariance_type specifies type of covariance parameters to use and n_init specifies the number of initializations to perform. Hence the gmm files are generated in the modelling phase. During the identification or verification stage, the extracted

characteristics are compared with the models stored in the speaker database. On the basis of these comparisons, the user is considered to be valid or invalid.

**Algorithm-2: Gaussian mixture models (GMM)**

**Steps:**

1. Import required files such as
   -numpy
   -cPickle
   -GMM from sklearn.mixture.
2. Now import audio files which contains recorded voice of user.
3. From imported audio files extract 40 dimensional MFCC and Delta MFCC features.
   Vector = extract_features(audio,sr)
4. Concatenate features of audio files recorded during enrolment phase.
5. If counter more than no. of audio files.
6. Initialize gmm parameters gmm = GMM(n_components, covariance_type, n_init)
7. Dump trained guassian model using cPickle library, set count=0
8. Compute log-likelihood function.
9. Put some convergence criterion
10. If the log-likelihood value converges to some value (Or if all the parameters converge to some values) then stop,
11. Else return to step 6

### D. Speech Recognition

Once a user is detected, an IVA can execute different user-directed tasks. Python provides a speech recognition package that includes speech_recognition module, which is used for converting speech into text. In our project, we installed the pyttsx3 engine package to make IVA talk like a regular human being. ASR will convert the audio received from microphone into readable text. This text is divided into segments and keywords are identified from these segments. These keywords are matched with the keywords mentioned in the queries and that program is executed finally. The activity performed by the system takes the form of a voice. Here pyttsx3 is used when converting text into speech.

## IV. TASK PERFORMED BY IVA

- Enrolls user voice with his/her name successfully.
- Search for any required content on Bing if prompted “Search for...”
- The user's voice can be converted to text and saved in a notepad.
- User can set alarm.
- Daily tasks can be scheduled by letting the system know the time, date and event.
- User can ask for any queries using chatbot feature.
- The system can be started or shut down with a simple user command.
- The system continuously asks for any task to be performed till user give a command like “stop working”.

## V. FUTURE WORK

This project mainly focuses on “Text-dependent recognition”. But we feel that the idea can be extended to “Text-independent recognition” and ultimately create a system where users can directly command to execute a given task and the system is able to recognize whose voice it is and also accomplish the given task. This will increase the robustness of the system. The system could be improved to work satisfactorily in various training and testing environments. Noise is a really big deal in both speaker recognition and speech recognition system. It is therefore advisable to use the noise filtration technique to reduce background noise. In addition, numerous features such as uploading a file to the user cloud, playing games, sending emails, etc. Can be applied to the system for greater reliability.

## VI. RESULT

The required packages of the Python programming language have been installed and the code was implemented using Spyder (IDE) and below are the few outputs which we have received in our AI-based voice assistant.

### A. Detecting valid or invalid user

As shown in below Fig:2, This is how our system window appears when user prompts command "Open IVA"

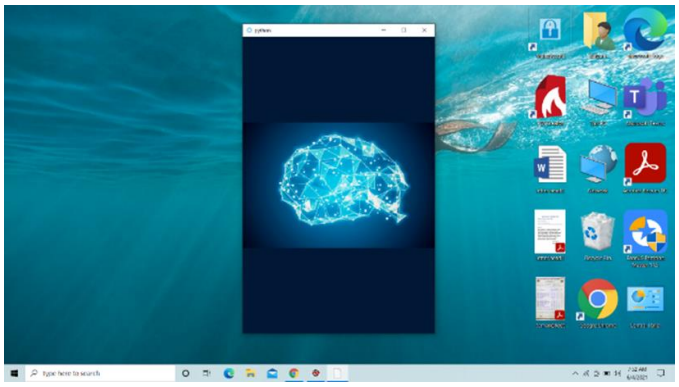


Fig 3: Opening GUI

### B. Detected valid user

As shown in below Fig:3, This is how our system window appears when the user is detected as a valid user. From here onwards user can ask the voice assistant to perform any function.

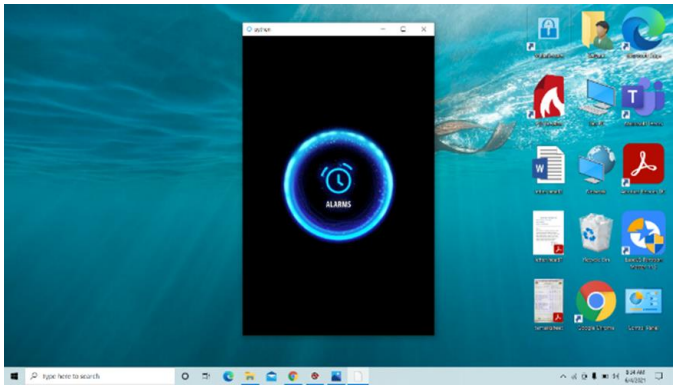


Fig 4: User Detected GUI

### C. Creating text documents using notepad

As shown in below Fig:4, When we can ask IVA to "open notepad". IVA ask for document name and content to write in the document.

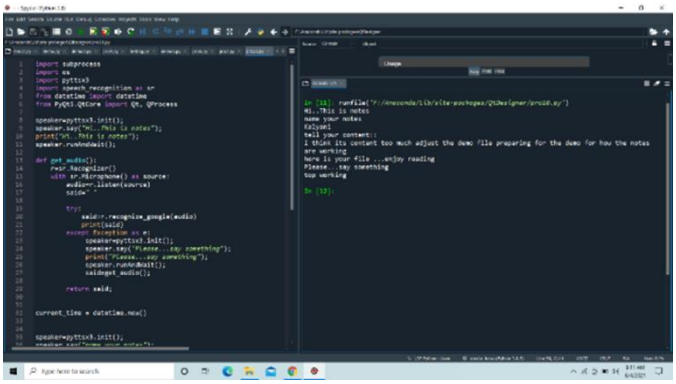


Fig 5: Create Notepad

### D. Search Output

As shown in below Fig:5, When we ask IVA to "search sci-fi movies", it receives the request and performs the action by searching over Bing.

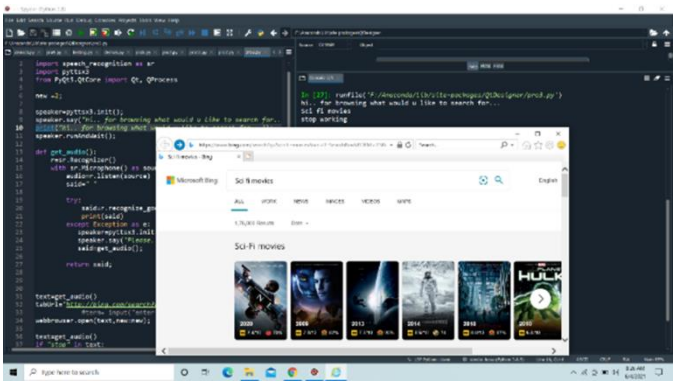


Fig 6: Browse

## VII. CONCLUSION

This paper introduces voice-based intelligent virtual assistant (IVA) specifically designed for windows operating system. In this system we have integrated both speech recognition and speaker recognition technology. This IVA system uses the voice communication mode to interact with people. The goal of this project was to create an integrated version of both the fields of voice recognition, thus by providing user with personalized access.

During this project, we discovered that the convolutional neural network (CNN) -based approach provides us with independent text verification, which is more preferable than MFCC and GMM. Furthermore, this system can be used in various areas such as home automation, medical assistance, auto automation, robotics and security access, business assistant on the PC [3], etc.

## VIII. REFERENCES


[1]. Ravivanshikumar Sangpal, Tanvee Gawand, Sahil Vaykar, and Neha Madhavi, of Computer Technology, Government Polytechnic Pen "JARVIS: An interpretation of AIML with integration of gTTS and Python" 2019 2nd International Conference on Intelligent Computing, Instrumentation and Control Technologies (ICICICT).

[2]. Saadman Shahid Chowdury, Atiar Talukdar, Ashik Mahmud, Tanzilur Rahman, "Domain specific Intelligent personal assistant with bilingual voice command processing", IEEE 2018.

[3]. Polyakov EV, Mazhanov MS, AY Voskov, LS Kachalova MV, Polyakov SV "Investigation and development of the intelligent voice assistant for the IOT using machine learning", Moscow workshop on electronic technologies, 2018.

[4]. Veton Kepuska and Gamal Bohota "Next generation of virtual assistant (Microsoft Cortana, Apple Siri, Amazon Alexa and Google Home)", IEEE conference, 2018.

[5]. Virtual assistant: What is it, 10 2017 [online] Available: www.searchcustomerexperiences.techtarget.com

[6]. Laura BURbach, Patrick Halbach, Nils Plettenberg, Johannes Nakyama, Matrina Ziefle, Andre Calero Valdez "Ok google, Hey Siri, Alexa. Acceptance relevant of virtual voice assistantS", International communication conference, IEEE 2019.

[7]. Satyam P. Todkar, Snehal S. Babar, Rudrendra U. Ambike, Prasad B. Suryakar Department of Computer Engineering Sinhgad College of Engineering Pune, India "Speaker Recognition Techniques: A review" 2018 3rd International Conference for Convergence in Technology (I2CT), Apr 06-08, 2018.

[8]. Subhash S, Prajwal N, Siddhesh S, Ullas A, Santosh B Department of Telecommunication Engineering Dayananda Sagar College of Engineering Bengaluru, India "Artificial Intelligence-based Voice Assistant", 2020 IEEE.

[9]. Shilpa S. Jagtap and D.G.Bhalke Department of Electronics and Telecommunication Engineering Rajarshi Shahu College of Engineering, Tathawade, Savitribai Phule Pune University, Pune, India "Speaker Verification Using Gaussian Mixture Model", 2015 IEEE.

[10]. A.M.T.S.B. Adikari, S. Devadithya, A.R.S.T. Bandara, K.C.J. Dharmawardane and K. C. B. Wavegedara Department of Electronic and Telecommunication Engineering University of Moratuwa Moratuwa 10400, Sri Lanka "Application of Automatic Speaker Verification Techniques for Forensic Evidence Evaluation", IEEE.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Fake Document and Image Detection

**Amit Lokre[1], Sangram Thorat[1], Chetan Gadekar[1], Pranali Patil[1], Prof. Yogesh Mali[2]**
[1]Department of Computer Engineering, SPPU, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India
[2]Assistant Professor, Department of Computer Engineering, Dr D Y Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

In the recent times, the rates of cybercrimes have been increasing tremendously. It has been proven incredibly easy to create fake documents with powerful photo editing software. Also, social media has proven to be the largest producer of fake images as well. Various malpractices have also been on surge with the help of producing digitally manipulated fake documents. Detection of such fake documents has become mandatory and essential for unveiling of the documents/images-based cybercrimes. The tampered images and documents will be detected using neural network. The output of the system will distinguish original document from a digitally morphed document. The system will be implemented using Neural Networks.

**Keywords** : Artificial Neural Network; GLMC Features; Graphical User Interface; Machine Learning; Support Vector Machine.

## I. INTRODUCTION

In the recent times the speed of cyber-crimes has been increasing tremendously it's been proven incredibly easy to make fake documents with powerful photo editing software Also social media has proven to be the most important producer of faux images also Various malpractices have also been on surge with the assistance of manufacturing digitally manipulated fake documents Detection of such fake documents has become mandatory and essential for unveiling of the documents/images based cyber-crimes The tampered images and documents are going to be detected using neural network The output of the system will distinguish original document from a digitally morphed document The system are going to be implemented using Neural Networks this is often an desktop application the rates of cyber-crimes are on a rise it's been proven incredibly easy to make fake documents with powerful photo editing software Documents and pictures are often scanned and morphed within minutes with the assistance of sort of software available On Investigation it States a foundation and it provides an answer to differentiate between original document and digitally morphed document Here the accuracy of system method has accuracy of 96 It is also possible to change metadata content making it unreliable here it's used as a supporting parameter for error level analysis decision . In, Xunyu Pan, Siwei Lyu proposed a scheme to detect the copy-move forgery in a picture, mainly by extracting the key points for extraction. The

difference between the normal method and proposed scheme is first segments the test into semantically independent patches before key point extraction. within the second stage, to refine an estimated matrix an EMbased algorithm is employed and to verify the existence of copy-move forgery. The methods are categorized in two types as active and passive forgery detection methods. The scope of system is restricted to review on passive forgery detection methods. System aims to present the study on different old methods of image forgery detection using different approaches like DWT (Discrete Wavelet Transform), SIFT, LBP (Local Binary Pattern). With the advancements in digital image acquisition, processing and reproduction technologies, the perfection has become easier with the fabrication of document. Document examiners examines the Composite copies which are produced for fraudulent purposes. The easy availability of those technologies to criminals leads to their application to preparation of fabricated photocopies or computer-generated hard copies. Such document is produced in court of law because the only available piece of evidence with an excuse the first document has been lost, eaten by moths or burnt during a fire etc. Superimposition is employed to detect counterfeed documents, mainly tampered with employing a photocopier. This study presents examination of machine generated questioned document consisting of fabricated and manipulated writing signatures using digital image processing and reproduction tools. However, such techniques have now become obsolete since forgery lately is digital, clean and indistinguishable to the human eye. Therefore, machines are a more viable option now. Most of the techniques want to detect those manipulations employ machine learning and pattern recognition. Image processing algorithms like DWT (Discrete Wavelet Transform) and SVD (Singular Value Decomposition) are one among the feature extraction methods that are used today to detect forged images Another devised scheme is to divide the image into overlapping blocks, thinking of them as vectors and find the manipulated region through radix sorting. Here method for detecting copy-move forgery over images tampered by copy move. To detect such sort of forgeries, the input image is split into overlapping blocks of equal size, feature for every block is then extracted and represented as a vector, radix sort is employed to extract all the features of vector. Finally, the medium filtering and connected component analysis are performed on the tentative detected result to get the ultimate result. Compared with other methods, employing the radix sort makes the detection far more efficient without degradation of detection quality. Another approach to detect tampered images is to form use block-based methods, but by using the non-overlapping texture blocks as a base for the graceful blocks, thus reducing the computational capacity. The algorithms then evaluate and compares supported their performances associated with a group of predefined parameters, this characterization is going to be used for further evaluation on the performance and efficient of a given blocked based cloning detection algorithms under the study. The result found after comparing them a user ready to select the foremost optimal forgery detection technique, counting on the user format and sort transformation it involves. Reflective SIFT based algorithms also are proficient in the detecting duplicated blocks in copy-move forgeries. due to this different detection techniques are suggesting. we'd like to require care of image forgery. the pictures are often scaled, rotated, and flipped (mirror reflected). SIFT (Scale invariant feature transform) is usually wont to match images. But it fails for flipped images. Mirror-reflection invariant feature transform (MIFT) is presented in framework. Here, we'll find out how MIFT improvise SIFT.

**Literature survey**: Morphing images digitally has experienced tremendous growth in past 10 years Now a days several software are available that are wont to

manipulate image in order that the image is appear as if as original Images are used as proof for authentication for any crime and if these images aren't genuine then it'll be a problem for acceptance System is employed to detect these sorts of forgeries to work out whether a digital image is original or manipulated may be a big challenge to seek out the traces of tampering during a digital image may be a challenging task this technique presents a number of the Image Manipulation detection techniques like contrast enhancement detection splicing and composition detection image tampering etc Comparison of those techniques concludes the higher approach for its future research Using neural network tampered images are detected which recognizes the morphed region of the image and unveils the segments of the first image It are often implemented on Android platform The compression ratio of the changed content during a fake image is different and is detected using Error Level Analysis(ELA) that of the first image . Results prove the great performance of the scheme by comparing it with the state-of-the-art schemes on the general public database. the most two types are (a) Copy-Move forgery (b) Image splicing forgery of image Copy-move tampering is most generally employed by attackers during which object of another image is copied and pasted in original image in nearly matching areas. Hence to detect such image threats, it's required to automatic computer vision-based method which may classify whether input digital image is original or tampered. there have been many methods introduced for copy move forgery detection from last 15 years.

## II. METHODS AND MATERIAL

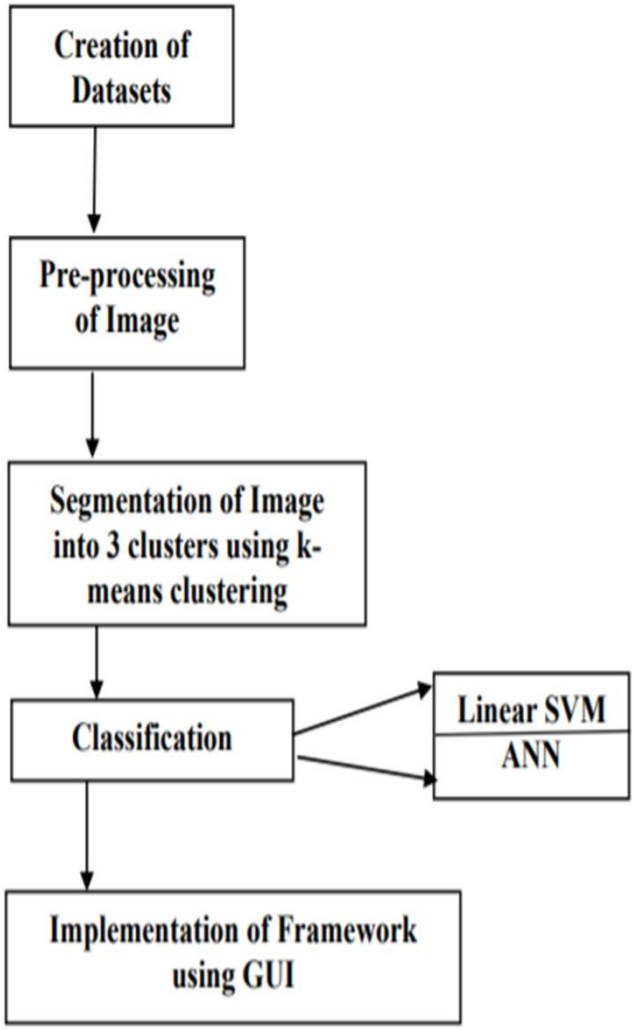



Fig 1.flowchart of methodology

### 1. Creation of dataset:

The images used for training this system are collected from various internet sources, college dataset and are morphed using photo editing tools. These images are edited using Adobe Photoshop CC 2017 to create a dataset of images- one original and its edited version.

### 2. Pre-Processing of Image:

To make the details of the images stand out more, the query image will be enhanced using histogram equalization. Histogram equalization: It is a necessary step because sometimes minute forgeries go undetected through the entire process. It is important that the machine gets most of the details in one go.

Histogram equalization, as the name suggests, is a method, where the intensities are adjusted using the histogram of the image. This technique is used here for contrast enhancement. Another essential stage in the pre-processing of an image is the removal of noise i.e., de-noising. Denoise: De-noising is again done so that the details of the image are sharper and are not missed while extracting the features of the image. Median Filter: A kernel of pixels is scanned over pixel matrix of the entire image. The median of a pixel values in the window is computed, and the centre pixel of the window is replaced with the computed median. Since the median value must actually be in the value of one of the pixels in the neighbourhood, the median filter does not create new unrealistic pixel values when the filter straddles an edge. For this reason, median filter is much better at preserving sharp edges.

### 3. Segmentation:

Segmentation will be performed using k-means clustering, in this the image will be divided into K segments and the appropriate image will be chosen upon the data contained it. For this the GLMC feature will be used and the frame or segment having highest of the mean will be chosen. The GLMC frames will be compared to the original image and it will be helpful in calculating the result as this value will be stored into some array and it will take into count at the time of results.

### 4. Extraction of Features:

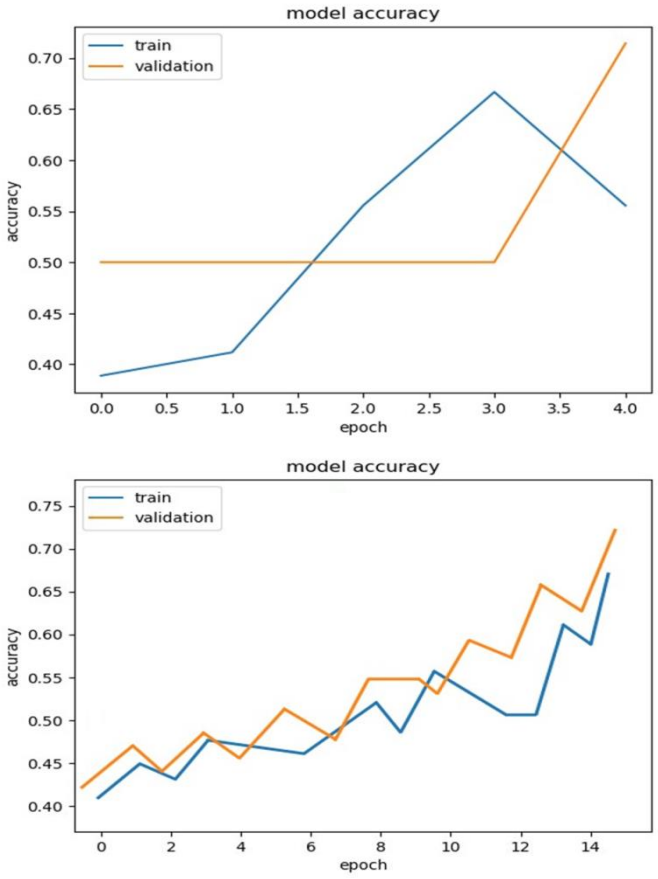
Feature extraction is a primitive type of pattern recognition and it is very important for pattern recognition. In this step we extract some GLCM features such as Entropy, Angular Second Moment, Contrast, Maximum Absolute Deviation, and Mean. Texture, shape and colour are features which are also extracted from an input image or document. Gray Level Co-occurrence Matrix is a tabulation of how often different combinations of pixel brightness values occur in an image. GLCM contains the information about the positions of pixel having similar gray level values. GLCM calculation units receive pairs of Gray level values as input. The GLCM calculation unit consists the different combinations of Gray values like a0b1, a2b3, a10b21 etc. This gives the deviation present in the image when compared with original image by predictive image.

### 5. Classification:

The interconnection of the network can be adjusted based on the number of available inputs and outputs making it ideal for a supervised learning. A linear kernel SVM will be one of the classifiers used for classification and the other one will be ANN.

## III. EXPERIMENTAL RESULTS

Fig. 1 Accuracy Models



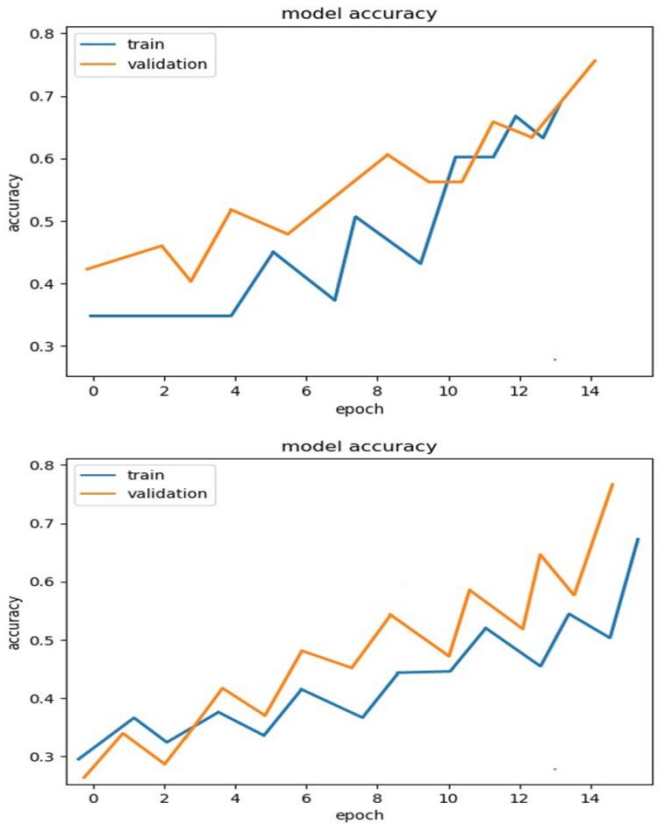



Fig. 2 Validation Accuracy

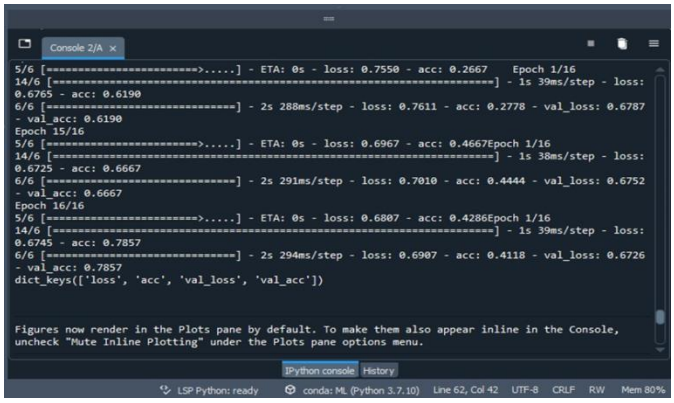



Fig. 3 Result Shown as “Original”.

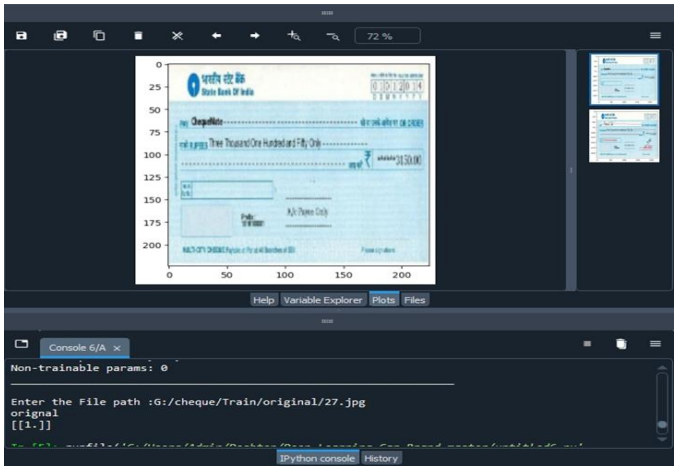
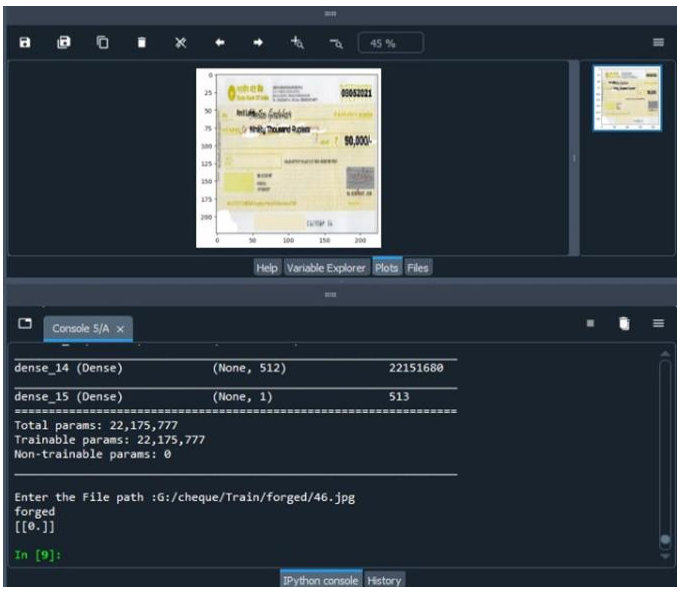



Fig. 4 Result Shown as “Forged”.




## IV. RESULTS AND DISCUSSION

This is the approach discussed in this paper executed successfully. The main purpose of the project was to inspect the handled computer legal documents for forensic testing using images. The processing technique that has been applied; the dataset required for the project was created by handling purchased images that no naked human eye could recognize it to handle image skill fully. After that, the feature information implemented by GALCM in MATLB, also provided by image processing toolbox R2015a examination and comparison required results between the original and the morphed legal document. Also HOG values were calculated but from the sort of matrix produced was very large trained in SVM so that they were eliminated.

TABLE I: Classifiers used and their results

| PARAMETERS | ANN | SVM |
|---|---|---|
| Accuracy | 96.4% | 87.6% |
| Sensitivity | 97.0% | 89.0% |
| Specificity | 95.0% | 86.0% |

Use of SVM, classification of differences between one between the above morphed and the original legal document the result would have been different meanwhile more property specific assets of two documents. Also, by other mathematics, the expression would have been more sophisticated consequences of splitting morphed documents more easily. The use of an ANN classifier provided high accuracy 96.4% less than linear SVM which gave less accuracy.

## V. CONCLUSION

Starting by editing images to create a dataset and then its morphing and then scientifically examining the results obtained. Use the transformation technique above morphed and original image and finally edit the texture, features are the same initially, it was planned. So, that was our intention purpose, such a method with good efficiency and accuracy will continue to refine procedures so that there are fewer loops in the analysis and hopefully this will come handy in the future.

## VI. REFERENCES

[1]. Shruti Ranjan, Prayati Garhwal, Anupama Bhan, Monika Arora, Anu Mehra,"Framework For Image Forgery Detection And Classification Using Machine Learning".2nd International Conference on Trends in. . . 2018. DOI: 10.1109/icoei.2018.8553924

[2]. Mohsen Zandi, Ahmad Mahmoudi- Aznaveh, Alireza Talebpour, "Iterative Copy-Move Forgery Detection Based on a New Interest Point Detector", Information Forensics and Security IEEE Transactions on, vol. 11, pp. 2499-2512, 2016, ISSN 15566013

[3]. Kushol, Rafsanjany Salekin, Md Sirajus Hasanul Kabir, Md Alam Khan, Ashraful. (2016). "Copy-Move Forgery Detection Using Colour Space and Moment InvariantsBased Features" .2016 International Conference on Digital Image Computing: Techniques and Applications (DICTA 1- 6.10.1109/DICTA.2016.7797027

[4]. Xunyu Pan, Siwei Lyu, "Region Duplication Detection Using Image Feature Matching", Information Forensics and Security IEEE Transactions on, vol. 5, pp. 857-867, 2010, ISSN 1556-6013.

[5]. Anil Dada Warbhe, Rajiv V. A Fast, Block Based, CopyMove Forgery Detection Approach Using Image Gradient and Modified K-Means"

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Implementation of WSN for Industrial Safety

**Shreyas Lokhande[1], Narendra Choudhary[1], Aniket Chaudhary[1], Suraj Pethekar[1], Prof. Ajita Mahapadi[2]**
[1]UG Student, Department of Computer Engineering, Dr. D Y Patil School of Engineering, Pune, Maharashtra, India
[2]Assistant Professor, Department of Computer Engineering, Dr D Y Patil School of Engineering, Pune, Maharashtra, India

## ABSTRACT

This paper provides a in effective study about the implementation of Wireless Sensor Network in Industrial environment to ensure the safety of the infrastructure and the employees. It also discusses the sensors as well as the console required for the smooth conduct of the project. The paper focuses on simplifying the implementation such that the project can be used in various industries and can be modified as per industrial requirement.

**Keywords :** Wireless Sensor Network,

## I. INTRODUCTION

We live in growing industrial environment, year after year all industries are seeing immense growth. With the higher demand, production rates and manufacturing rates of all the industries are rising every year. To cope up with the high demand, industries have to do all kinds of adjustments. From expanding number of factories to upgrading to the latest machinery, year after year the growth is unstoppable.

But with this growth comes a larger demand of employees, and with huge number of employees working with high end machines, many accidents are prone to occur. Safety of the employees and the entire working environment is very important.

This project will check various environmental factors inside the work space and help the administration to ensure the safety of everyone.

## II. THEORY

WSN: Wireless sensor network (WSN) can be called as a group of spatially dispersed as well as dedicated sensors that are useful for the purpose of monitoring and then recording the physical conditions of the environment and then centrally collecting the organized data.

WSN measures various kind of environmental conditions such as humidity, temperature, wind, sound, pollution levels, etc. The Wireless Sensor Network include interconnected nodes which can range from a few to even thousands.

Each sensor network node has several parts which includes a radio transceiver with a microcontroller, antenna (external or internal), an electronic circuit for the purpose of interfacing with the sensors and an energy source, which is generally a battery.

Arduino: Arduino Uno is a ATmega328P Microchip based open-source microcontroller developed by Arduino.cc. The board consists sets of analog and digital input/output (I/O) pins that can be interfaced to various boards as well as other circuits. The board has 14 digital Input Output pins, 6 analog I/O pins, and is programmable with the Arduino Integrated Development Environment, via a type B USB cable.
It can be powered by an external 9-volt battery or by the USB cable, though it accepts voltages between 7 and 20 volts.
Similar to Uno, there are the Arduino Nano and Leonardo.

Sensors: 1) Mq135 - MQ-135 gas sensor applies SnO2 which features a higher resistance within the clear air as a gas-sensing material. When there's a rise in polluting gases, the resistance of the gas sensor decreases along with that.

2) Dht11 - The DHT11 Sensor is factory calibrated and outputs serial data and hence it is highly easy to set it up. the data pin is connected to an I/O pin of the MCU and a 5K pull-up resistor is employed. This data pin outputs the worth of both temperature and humidity as serial data. If you're trying to interface DHT11 with Arduino then there are ready-made libraries for it which may provide you with a quick start.

## III. IMPLEMENTATION


Fig 1. Example of industrial setup

As shown in the sample figure above the sensor nodes will be installed in various part of the workspace according to the type of sensors as well as the work being carried out at that area. For example, the gas sensors can be installed near the chimney of the factory or the temperature sensor can be installed near some large machinery that tend to generate more heat.

By proper installation of the sensor nodes the first and the most important step is completed, this step is important because these will be our source of information.

The sensors will catch the data from environment where they are installed, each of the sensors will have specific functionality to collect the required data. Effective data collection at this point will guarantee in the best implementation of the system.

This collected data will be then sent to the controller, the controller will further send the data to the next node for the next process. This data transfer will be doing using transmitters.

Trans receiver on the other node will receive the data and move it and combine data of that controller.

This step will be repeated by all the nodes until it reaches the final node. This process of data transfer is done for the purpose of making the data reach its desired position from where it can easily be displayed.

This wifi module will be used to upload the data to the database. The database will help the administration to monitor the data and keep track on all the necessary parameters.

All the data that is collected will then be compared to the guidelines given by government authorities and then it will the administration to take the appropriate action.

## IV. ACTUAL SYSTEM

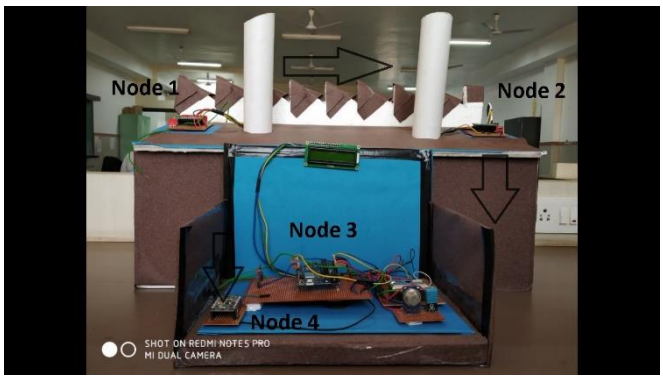



Fig 2. Sensors connected together for a dummy factory.

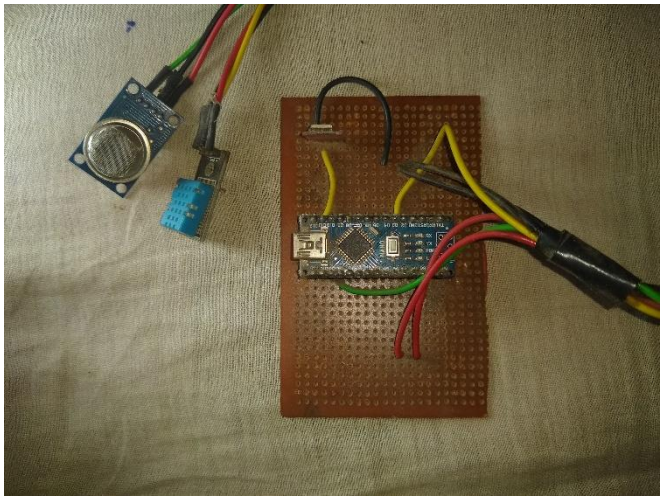


Fig 3. Transreceiver and Arduino UNO

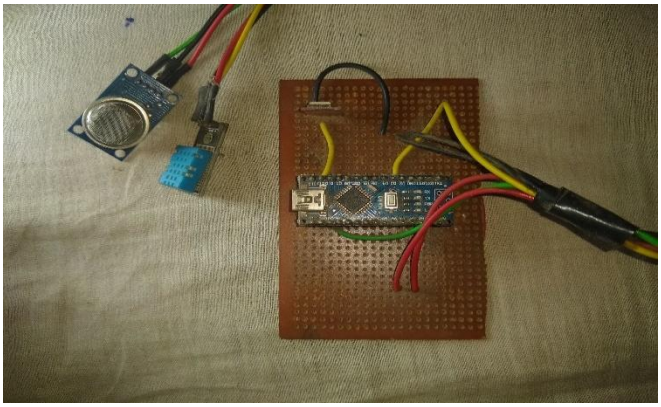


Fig 4. Arduino Nano and sensors

**Note: Due to the Covid-19 Global pandemic and the lockdown, all the sensors are not available when we are writing this paper. We will add all the other sensors as soon as they are available to us.**

## V. CONCLUSION

To conclude, we all know that safety is one of the most important things in everyone's life, considering all the accident-prone industrial scenarios it is high time to have a proper safety measure installed in the workspace. To help the society our project helps to make sure that no accident will take place by any of the environmental factors. The system has features of preventing gas-leakage, fire prevention, etc. It can effectively improve the safety management of the plat in the plant. By this use of technology, we can protect the factory employees and the safety of public property. The system will monitor the data continuously and help the administration.

## VI. REFERENCES

[1]. Design of Safety Monitoring and Alarming System for Petrochemical Plant Based on WSN by Wang R and Zhu L.

[2]. Survey On Security In Wireless Sensor Network by Faris Fazlic and Seyed Ali Hashemi

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Voice Based Email for the Visually Impaired

**Rahul Ahire[1], Poonam Bankar[1], Aniket Bhosale[1], Deepak Khette[1], Prof. Ajita Mahapadi[2]**

[1]Students, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India

[2]Assistant professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

E -mails are the foremost reliable approach of communication over net, for causing or receiving some necessary information. However, there's a special criterion for humans to access the net and also the criteria are you must be able to see. A survey shows that there are more than 285 million visually challenged people around the globe. That is, around 285 million people which is unaware of a way to use net or E-mail. So, forgiving an equal standing to visually challenged folks we've got return up with this project plan that provides the client (user) with ability to send mails using voice commands without the need of keyboard or any other visual things. This system can be used effectively by handicapped and illiterate people as it is based on TTS, STT CONVERSIONS and IVR technologies.

**Keywords :** TTS, STT CONVERSIONS and IVR

## I. INTRODUCTION

The Internet is a vast network which connects millions across the globe in various ways. So, talking about communication over the internet the first thing that comes to thought, is, E-mails. E-mails are extensively used form of online communication, both formally and informally as well. Despite social media, E-mails being the very traditional form of communication have still been the best to date. But the purpose of any service is to serve all mankind, and hence, E-mails should also be such that, they can be easily used by people from all races of life. But Traditional E-mail Systems are accessible to several but the visually impaired class on the globe, and also various other handicapped people. So, in order to remove this drawback, An E-mail System for the visually impaired individuals would be an incredible breakthrough. Hence, this application has been thought of. Talking of the application, the application will be a web-based E-mail System for visually impaired people. Using Interactive voice response (IVR), which would enable everyone to control their own mail accounts using their voice only and also, they would be able to read, send, and perform all the other user tasks which are offered by the traditional E-mail Systems. The system will prompt the user with voice commands to perform certain actions and the

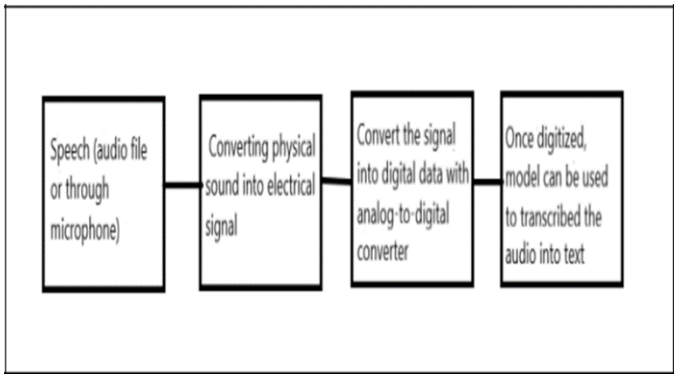
user will respond to the same with voice input. The main advantage of this system is the use of (text) keyboard is completely eliminated, which means, the user will have to respond through their own voice and mouse events only. Now you must be thinking that how will an impaired person will see the right position on the screen for doing mouse clicks event. But this system will perform actions based on the clicks only that is left or right click, it does not depend on the area(portion) of the screen where the cursor is placed before the click giving user the freedom to click anywhere on the screen.

## II. METHODS AND MATERIAL

### SPEECH TO TEXT:

Speech to Text conversion is that the method of changing spoken words into texts. This method is additionally known as Speech recognition.

Fig 1.1: Speech to Text Conversion Process.




A Speech-to-Text API synchronous recognition request is that the simplest technique for performing arts recognition on speech audio information. Speech-to- Text will method up to one minute of speech audio information sent during a synchronous request. Once Speech-to-Text processes and acknowledges all of the audio, it returns a response.

A synchronous request is obstructing, which means that Speech-to-Text should come a response before process succeeding request. Speech-to-Text typically processes audio faster than real-time, processing 30 seconds of audio in 15 seconds on average. In cases of poor audio quality, your recognition request will take considerably longer.

Speech recognition, as the name suggests, refers to automatic recognition of human speech. Many speech recognition libraries are developed in Python. However, SpeechRecognition library, that is that the simplest of all the libraries are used.

### TEXT TO SPEECH:

Text-to-speech (TTS) is additionally method that lets your laptop or phone browse the text out aloud to you. Text-to-speech is often used as a feature to assist those who have bother reading the text from screen, however it's conjointly convenient for people who need to be read on daily basis. People with visual and reading inabilities were the first adopters of TTS (Text-to-speech).

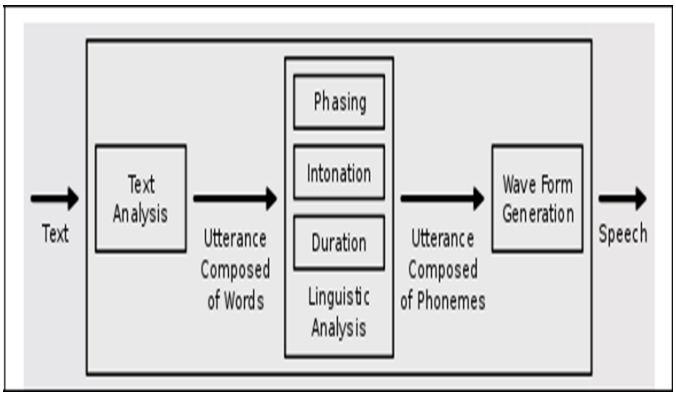



Fig 1.2: Text to Speech Conversion Process.

pyttsx3 is a text-to-speech conversion library in Python in contrast to various libraries, it works offline and is compatible with both Python 2 and 3. An application invokes the pyttsx3.init() works perform to urge a relevancy a pyttsx3. Engine instance. it is a very easy to use tool that converts the entered text into speech.

### SMTP:

SMTP stands for Simple Mail Transfer Protocol. SMTP may be a set of communication pointers that permit package to transmit an piece of email over the net is named as Simple Mail Transfer Protocol. It's a program used for exchanging messages to other laptops or users send emails. It provides a mail exchange between users on a similar or completely different computers. It will send one message to at least one or additional recipients. causing message will embrace text, voice, video or graphics. It may send the messages on networks outside the net.

The main purpose of SMTP is employed to line up communication rules between servers. The servers have some way of characteristic themselves and asserting what reasonably communication they're attempting to perform. They even have some way of handling the errors like incorrect email address for instance, if the recipient address is wrong, then receiving server reply with a mistake message of some kind.

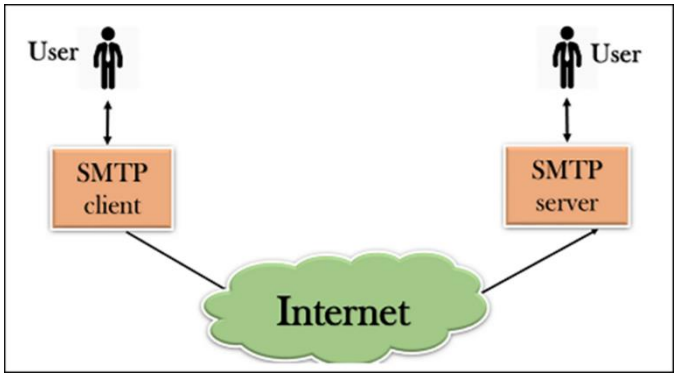



Fig. 1.3: SMTP

Python provides smtplib module, which defines an SMTP client session object that can be used to send mail to any Internet machine with an SMTP or ESMTP listener daemon. Here is that the detail of the parameters –

**--host** - this is often the host running your SMTP server. You'll be able to specify IP address of the host or a site name like gmail.com. this is often non obligatory argument.

**--port** - If you're providing host argument, then you wish to specify a port, wherever SMTP server is listening. Usually, this port would be 25.

**--local_hostname** – If your SMTP server is running on your native machine, then you'll be able to specify simply localhost as of this feature.

An SMTP object has an instance method called sendmail, which is typically used to do the work of mailing a message. It takes two parameters –

**The sender** – A string with the address of the sender.

**The receivers** – A list of strings, one for each recipient.

**IMAP:**

IMAP stands for Internet Message Access Protocol. It's associate in application layer protocol that is employed to receive the emails from the mail server. It's the foremost unremarkably used protocols like POP3 for retrieving the emails.

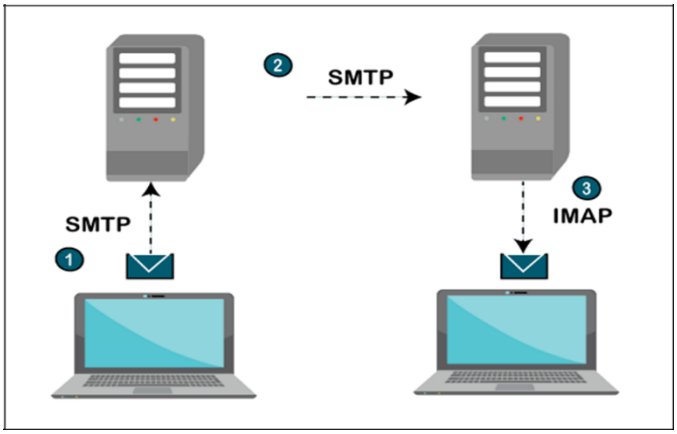



Fig. 1.4: IMAP

IMAP may be a client server protocol like POP3 and most different TCP/IP application protocols. The IMAP4 protocol functions only if the IMAP4 should reside on the server wherever the user mailboxes are set. In c the POP3 doesn't essentially need a similar physical server that has the SMTP services. Therefore, within the case of the IMAP protocol, the mailbox should be accessible to each SMTP for incoming mails and IMAP for retrieval and modifications. The IMAP

uses the Transmission management Protocol (TCP) for communication to confirm the delivery of knowledge and conjointly received within the order. The IMAP4 listens on a well-known port, i.e., port number 143, for an incoming connection request from the IMAP4 client. Python's client-side library called imaplib is used for accessing emails over IMAP protocol. IMAP stands for Internet Mail Access Protocol.

**FLASK:**

In order to register new users, and validate existing users during the login process, a database to store user details is required. This is created using Flask, SQLAlchemy. Flask-SQLAlchemy is a Flask extension that adds support for SQLAlchemy to the Flask application. SQLAlchemy, the Python Toolkit is a powerful OR Mapper, which provides application developers with the full functionality and flexibility of SQL. Object-relational mapping is a technique through which we can perform certain operation on RDBMS table. The ORM API provides a way to perform CRUD operations without writing raw SQL statements.

**OS module:**

The OS module in Python provides functions for interacting with the operating system. OS comes under Python's standard utility modules. This module provides a portable way of using operating system dependent functionality. The os and os.path modules include many functions to interact with the file system.

## III. OBJECTIVES

- To provide the visually impaired people, a Voice Based Mailing application, a platform using which they can easily receive or send emails without any third person's help or interference.
- Using Interactive Voice Response, people will control their mail accounts using their voice only and would be able to read, send, and perform all the other useful tasks.
- Use of keyboard is completely eradicated, the user will have to respond in the form of speech itself.

## IV. LITERATURE SURVEY

| Name of Paper | Author | Findings |
|---|---|---|
| Voice based Email system using AI Voice based Email system | Rijwan Khan, Pawan Kumar Sharma Prof. Manasi Choche | Basic understanding of how the existing email system work and how we can resolve drawback of existing e-mail system using Artificial Intelligence huge number of people who cannot avail services of various other applications as well as email services due to they being visually impaired, so this project is being developed keeping in mind the hurdles faced by these people |

## V. EXISTING SYSTEM

The Existing system does not support any voice commands or audio facilities and therefore it is not suitable for visually challenged people. Also, various existing search engine which take request in form of text from user and retrieve the relevant documents from the server and respond by displaying it in the form of text which is not accessible by the visually challenged people. All operations in existing E-mail systems are dependent on mouse click events.

## VI. PROPOSED SYSTEM

The Proposed system will make the Traditional E-mail systems easily accessible to visually challenged people and also be of great help to the society. The Proposed system is being implemented, while keeping one idea in mind that it should be easily accessible for all kind of individuals. This system is accessible by any individual, whether they be visually challenged or not in an efficient manner. The Proposed System will take care of user-friendliness of traditional users, and will also focus on user-friendliness of all kinds of individuals. In this system, the system is going to be prompting the user to perform specific operations to avail various services and if the user wishes to access various services then he/she has to perform that operation. Firstly, the user will have to register in the system through the registration form. The user goes to be assisted through voice commands, whereas while registering, all the mandatory fields to be filled are going to be scanned by the website; once the user would speak, it would get written automatically. After successfully registering, the user can log in by speaking the Username and Password when prompted by the system, this username and password will then be converted from speech to text and then the user will be authenticated by verifying the credentials with the database. Users can access various sections like Compose, Inbox, and Sent Mail after successful login.

## VII. SCOPE OF THE PROJECT

- This type of system has great scope in the domain of HCI (Human Computer Interaction).
- The system would be beneficial to visually impaired people and it will help them to use modern day applications with ease.
- The Voice based technologies and NLP could be used in different applications as well such as gaming, robotics etc.

## VIII. ARCHITETURE DIAGRAM

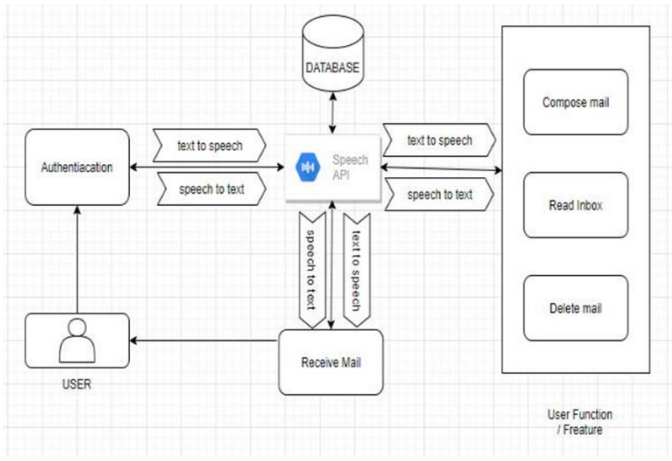
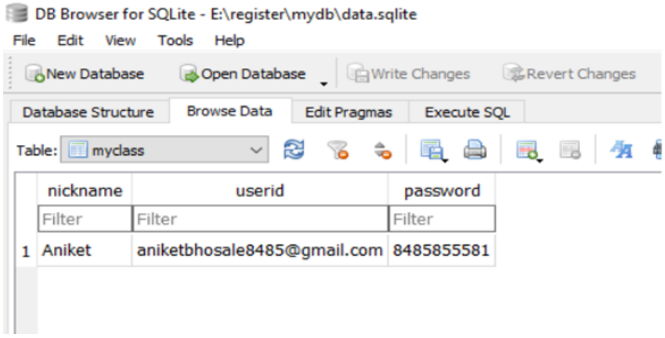



Fig 1.5: System Architecture

## IX. PROJECT IMPLEMENTATION

### MODEL 1

### REGISTRATION:


### MODEL 2

### LOGIN:

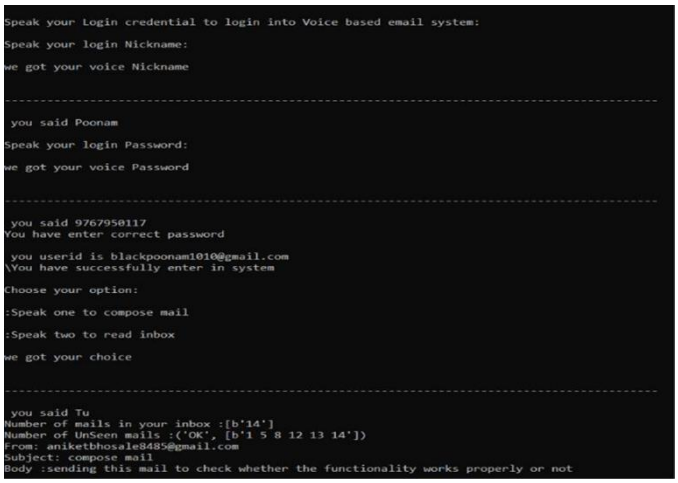

MODEL 3

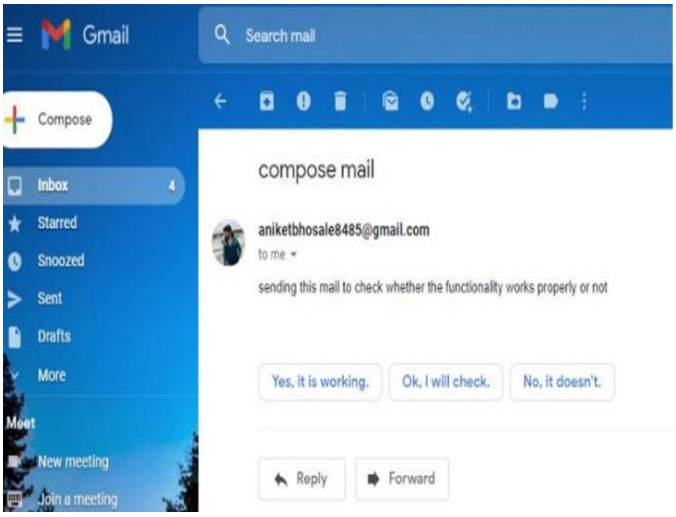
COMPOSE MAIL:



MODEL 4

READ MAIL:




## X. CONCLUSION

This E-mail system can be used by any user of any age group having any physical inabilities with ease access. It has the features of speech to text as well as text to speech conversions with speech reader which makes designed system to be handled by visually impaired people considerably easy and efficient.

## XI. REFERENCES

[1]. Voice based Email system using AI Rijwan Khan, Pawan Kumar Sharma

[2]. VOICE BASED EMAIL SYSTEM Prajakta Chavan, Devesh Jain, Pradnya Savant, Zeba Shaikh, Xavier Institute of Engineering, Mahim Jagtap Nilesh, Pawan Alai, Chavhan Swapnil and Bendre M.R.

[3]. "Voice Based System in Desktop and Mobile Devices for Blind People". In International Journal of Emerging Technology and Advanced Engineering (IJETAE), 2014 on Pages 404-407 (Volume 4, issue 2).

[4]. www.geeks.com

[5]. www.tutorialspoint.com

[6]. www.google.com

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Helmet Detection on Two Wheeler Riders using Machine Learning and Automatic Licence Plate Recognition for Identification

**Vaibhav Shankar Kharade, Rachana Jaykumar, More Pratik Mangesh, Mahendra Mahajan, Jayashree Chaudhari**
Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Motorcycle accidents are growing throughout the years in all the countries, as there is a difference in social, economical and the transport conditions differ from place to place. The motorcycle is one of the prominent means of transport used by middle-class people. Wearing a helmet is the main safety equipment of motorcyclists, which might not be followed by all drivers. The existing video surveillance-based methods are passive and require significant human assistance. In general, such systems are infeasible due to the involvement of humans, whose efficiency decreases over a long duration. Automation of this process is highly desirable for reliable and robust monitoring of these violations as well as it also significantly reduces the number of human resources needed.

This project aims at the prevention of accidents by automatically identifying the drivers not wearing helmets and storing their respective License Plates for future investigation. For this, we are using a classifier based on FasterR-CNN object detection architecture.

**Keywords :** Faster R-CNN, Motorcycle, OpenCV, Tensorflow, Object Detection

## I. INTRODUCTION

Two-wheel drive is a popular means of transportation in almost every country. However, there is a high risk involved due to limited protection. To reduce the risk involved, it is highly desirable for cyclists to use a protective helmet. Recognizing the use of helmets, governments have made it a crime to punish those who ride bicycles without a helmet and to use hand-to-hand tactics to catch criminals.

However, existing video viewing methods do nothing and require significant personal assistance. Often, such programs are not possible due to human involvement, whose performance decreases over time. The automation of this process is highly desirable in reliable and robust recognition of these violations and greatly reduces the amount of human resources required. Also, many countries use systems that include surveillance cameras in public places. Therefore, the solution is to find offenders using existing infrastructure and save money.

## II. METHODS AND MATERIAL

Both of these algorithms (R-CNN & Fast R-CNN) use selected search to find regional suggestions. Selected search is a slow and time-consuming process that affects network performance. Therefore, Shaoqing Ren et al. came up with an acquisition algorithm that removes the selected algorithm and allows the network to read regional suggestions.

Similar to Fast R-CNN, the image is provided as an inclusion in a convolutional network that provides a convolutional feature map. Instead of using the selected search algorithm on the feature map to identify regional suggestions, a different network is used to predict regional suggestions. The predicted regional proposals are then reconstructed using the RoI integration layer used to separate the image in the proposed region and to predict the offset values of the binding boxes.

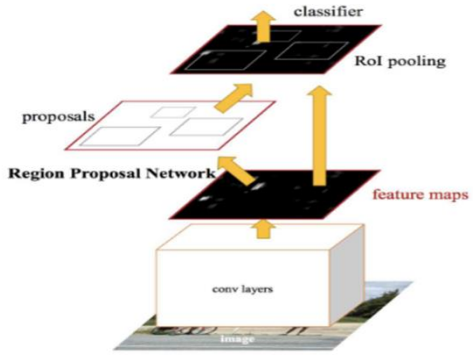



Figure 1: Working of Faster R-CNN

## III. METHODOLOGY

**Gathering Images**
**Label Images**
**Generate Training Data**
**Create Label Map and configure training**
**Run the training**
**Export Inference Graph**

### Gathering Images (Creating Data Sets)

Finding a bike rider with or without a helmet and license number. We need a lot of pictures of bike riders with helmets, bike riders without helmets and bike license plates. For this project, I use 627 images. Insert 20% of the images in the test guide and the remaining 80% in the train guide.

Figure 2 : Data Set

### Label Images

Label the all images inside the test directory and train directory with the help of LabelImg tool. In this project, BikeRider, Helmet, WithoutHelmet and LicensePlate four classes were created with the help of LabelImg tool. Create a .xml file corresponding to each image with the above following categories of classes.

### Generate Training Data

With labeled images, it's time to make TFRecords serve as a data entry in the TensorFlow training model. This tutorial uses xml_to_csv.py and generates_tfrecord.py documents from Raccoon Detector Dat Tran databases, with some minor modifications to work with our document framework. First, .xml image data will be used to create .csv files that contain all train and image data for testing. From the folder \ object_detection, uninstall the following command from Anaconda Prompt.

This creates a train_labels.csv and test_labels.csv file in the \images folder.

### Create Label Map and Configure Training

#### Label Map

The label map tells the trainer what each object is by defining a mapping of class names to class ID numbers.

#### Configure Training

Finally, the object detection training pipeline must be configured. It defines which model and what parameters will be used for training.

- Change num_classes to the number of different objects you want the classifier to detect.
- Change fine_tune_checkpoin to the path of the .ckpt file.
- change input_path and label_map_path.

#### Run The Training

If everything has been set up correctly, TensorFlow will initialize the training. The initialization can take up to 30 seconds before the actual training begins.

#### Export Inference Graph

Now that training is complete, the last step is to generate the frozen inference graph (.pb file).

```
python export_inference_graph.py --input_type image_tensor --
pipeline_config_path training/faster_rcnn_inception_v2_coco.config --
trained_checkpoint_prefix training/model.ckpt-21094 --output_directory
inference_graph
```

#### Bike-rider Detection Image

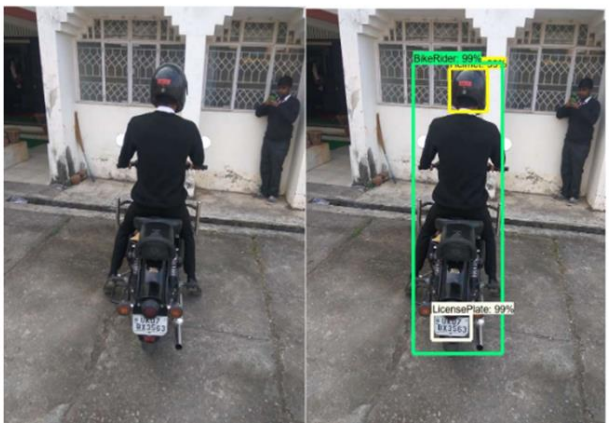



Figure 3 : Output Image

### IV. LITERATURE SURVEY

Before starting with this project we have done some prior research about existing work that has been done in this field. Below is the mentioned topics along with some level of limitations:

- **Helmet presence classification with motorcycle detection and tracking.**
  **J. Chiverton.**
  Author proposed an edge histogram based feature to detect motorcyclists. It performs well even in low light or low illumination. But as edge histograms used circular hough transforms to compare and classify helmets, it led to a lot of mis-classification problems.
- **Helmet detection on motorcyclists using image descriptors and classifiers: R. V. Silva, T. Aires, and V. Rodrigo.**
  Authors proposed a method in which a vehicle is tracked using the Kalman filter. It overcame mis-classification and had the ability to continue to track objects even if they were lightly occluded but when there were two or three motorcyclists Kalman failed. It only worked for linear state transition.
- **Automatic detection of bike riders without helmets using surveillance videos in real-time : K. Dahiya, D. Singh, and C. K. Mohan.**
  Authors proposed a system which first uses Gaussians mixture models to detect moving objects. It uses two classifiers in serial, one for separating motorcyclists from moving objects and another for separating without a helmet.
- **Vehicle Number Plate Detection System for Indian Vehicles : Hanit Karwal , Akshay Girdhar.**
  Authors proposed a system for detection of vehicle number plate in which it has used normalized cross correlation for template matching with an aim of addressing the problem of scaling and recognition of characters under

different positions but the drawback of this work was it has used fixed template matching.

- **A novel approach for Automatic Number Plate Recognition : Sahil Shaikh , Bornika Lahiri, Gopi Bhatt, Nirav Raja.**
  Authors proposed a system in which it has used image processing techniques such as edge enhancement, unsharp masking for detecting correctly the edges in an image and (OCR) Optical character recognition.

## V. RESULT AND DISCUSSION

In this section we will analyse how the License Plate has been extracted from an image. We will also discuss the challenges we have faced while automating this entire procedure.

### License Plate recognition

License plate recognition is one of the methods used for vehicle identification purposes. The sole purpose of this project is to find the most effective way to know the details of the registration in a digital photo (captured on camera). This process usually has three steps. The first step is the localization of the license plate, regardless of the size of the license plate and the shape. The second step is the separation of the characters and the last step is to recognize the characters from the license plate. Thus, this project reveals the basic concept of the various algorithms required to achieve character recognition from a license plate during template simulation.

### Steps to follow:

However, these steps are divided into a series of other steps whose effectiveness follows:

- Loading an RGB image
- Grayscale conversion
- Histogram equalization
- Binarization
- Dilation
- Edge detection
- Plate region extraction

All these steps can be carried out using the OpenCV. And after successfully extracting the license plate we will put that entry in our database. Further necessary actions will be taken based on policies of authority.

### Challenges

However, in order to adopt such automatic solutions certain challenges need to be addressed:

- **Real-time Implementation:** Processing a valuable amount of information in a timely manner is a challenging task. As such systems include functions such as segmentation, feature extraction, segmentation and compliance, where a certain amount of data needs to be processed in a short period of time to achieve the purpose of real-time implementation.
- **Occlusion:** In real-life situations, powerful objects are often compounded by the fact that something you like may be partially visible. Separation and separation become difficult for these materials in part.
- **Occlusion:** In real-life situations, powerful objects are often compounded by the fact that something you like may be partially visible. Separation and separation become difficult for these materials in part.
- **Temporal Changes in Conditions:** Over time, there are many changes in the natural environment such as lighting, shadows, etc. There may be subtle or rapid changes that increase the complexity of tasks such as creating a background model.
- **Quality of Video Feed:** Typically, CCTV cameras capture low-resolution video. Also, conditions such as low light, bad weather make it even more difficult. Because of such limitations, tasks such as

segregation, segregation and compliance become more difficult. As mentioned, a successful framework for a surveillance application should have useful properties such as real-time performance, fine-tuning, robustness to sudden change and forecasting. Keeping these challenges and desirable structures in mind, we suggest how to automatically get rid of cyclists without protective helmets using feeds from existing, real-time security cameras.

## VI. CONCLUSION

The proposed program and project concludes by creating a solution that is able to identify features using transfer learning from custom databases. Therefore, the system demonstrates the possibility of achieving the goal of automating the law enforcement process that enables additional performance such as record keeping while completely eliminating manual input. The main focus of future additions is to increase the accuracy of the system by training it to suit a wide variety of vehicles and to add processing of individual number plates to create a database of non-payers as collected by the system. The whole system provides the need for a comprehensive monitoring and verification system to avoid positive false charges being added to the database.

## VII. REFERENCES

[1]. Romuere Silva, Kelson Aires, Thiago Santos, Kalyf Abdala, Rodrigo Veras, Andr Soares, Automatic detection of motorcyclists without helmet, Latin America Computing conference,2013.

[2]. Prof. Chitte P.P. , Mr. Salunke Akshay S. , Mr. Thorat Aniruddha N , Mr. Bhosale Nilesh T ,Smart Helmet Intelligent Bike System, International Research Journal of Engineering and Technology (IRJET) Volume: 03 Issue: 05 - May-2016.

[3]. Chung-Cheng Chiu, Min-Yu Ku, Hung-Tsung Chen ,Motorcycle Detection and Tracking System with Occlusion Segmentation, International Journal of Trend in Research andDevelopment.

[4]. Fielding, R., Gettys, J., Mogul, J., Frystyk, H., Masinter, L., Leach, P., and Berners-Lee, " Hypertext Transfer Protocol HTTP," IEEE International Conference on Pervasive Computing and Communications Workshops (PERCOM Workshops), June 1999, pp. 45 - 46.

[5]. Anshu Singh Gautam, Mayank Mishra, Mohita Prabhat, SMART HELMET SYSTEM, Journal of Emerging Technologies and Innovative Research (JETIR), April 2015, Volume 2, Issue 4 ,JETIR.

[6]. Helmet presence classification with motorcycle detection and tracking- J. Chiverton

[7]. Helmet detection on motorcyclists using image descriptors and classifiers. -R. V. Silva, T. Aires, and V. Rodrigo

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Blockchain Based Covid and Humanitarian Aid Fund Manager

**Adesh Kolte[1], Prashant Chaudhari[1], Nihal Chhetri[1], Shavez Shaikh[1], Prof. Monika Dangore[2]**
[1]Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Donors have no hope of how money is utlised that they have donated. Currently, blockchain technology is in use in various fields. Blockchain technology lets you process the donation and transparent financial transactions. It's a single donation tracking platform that will track every information about donations, transactions and sponsors. This paper is processing the definition of implementation of a donation tracking platform based on blockchain technology. The program provides transparency calculation of service providers, service bases and recipients based on blockchain technology, it's a free platform which provide for public offering, empowering public users and sponsors to track and monitor where, when and to whom the financial aid is being provided.

## I. INTRODUCTION

The increase in corruption and apathy in various organizations has led to a decline in public confidence in these organizations. One of these organizations is charitable organizations that are intended to help others but have the same problem. Here the blockchain is introduced to create a digital online donation platform where all donors can easily donate and can track where donations are available and know how to use them at a lower level. This will increase people's faith in these organizations. Here the user has the auditing options and a smart contract system is presented here which is intended to automate, control or document events that are legally relevant in terms of the agreement. The primary objectives are to reduce mediation, mediation and enforcement measures, fraud losses and the reduction of risk and risk variations.

## II. METHODOLOGY

### A. Proposed System:

In the current system, the problem is that. No tracking of financial records, making things public

- Taxpayers do not know how their money is spent
- Fraudulent authorities exploit corruption
- Corruption by financial management and mediators.

These problems prevent taxpayers from paying due taxes or contributing to the campaign, as they are unsure of the legitimacy of the authorities in this series.

In the proposed program, the creators of the campaign will submit their donation campaign to the campaign and interested people will donate a fund to the campaign. Where it is postponed with the old Aid donation platform that all the money is now in digital currencies like ether, dai. All ether currencies will be recorded and stored on the blockchain. When the blockchain is an unbreakable ladder. The donor has a prepaid fee. A donor has full control over the money they donate. By giving control over the money donated trust is built.

## B. Flow Chart:

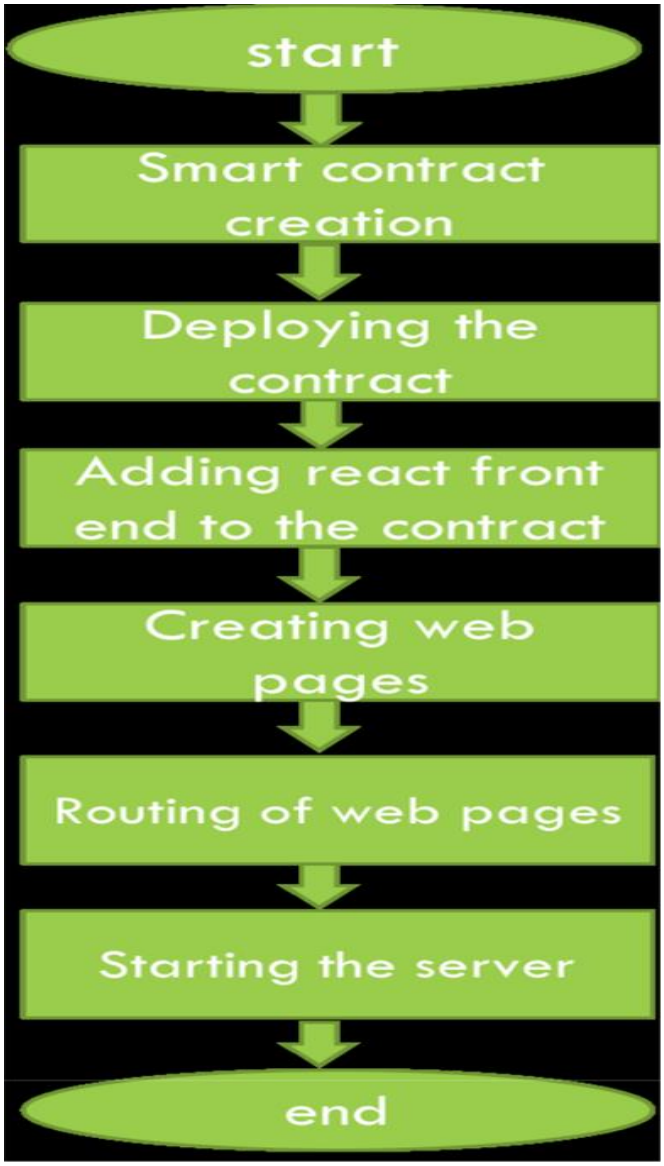



**Fig.1:** Flow chart of the project

Fig.1 represents the full flow of project implementation. The first smart contract is created according to our needs. The ABI code (Application Binary Interface) and the contract interface are then used to communicate with the contractor. The frontend is then inserted into the contract using reaction js. In this way all web pages are created and nextjs are used as a way to navigate these pages and provide them with a link. Finally the server has started. At localhost: 3000 we will find our web application running.

## C. Implementation:

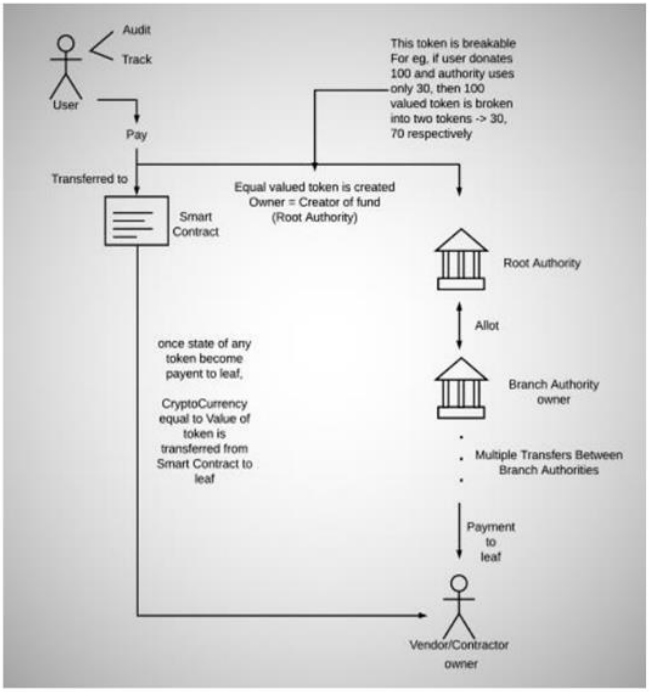



**Fig.1:** Flow of Aid Donation Tracking System

In order to use and operate a project there are certain software requirements that need to be installed and repaired as outlined below:

- **Metamask Wallet**

Metamask allows Ethereum applications to be used in the browser itself without the use of the full Ethereum node and is a wallet that automatically manages to

store, send, and receive Ethereum or ERC20 tokens. Allows you to create a number of accounts similar to bank accounts. The Metamask wallet should be installed in the chrome browser and the network should be set up in the Matic test network located in the options above the wallet. Then in order to test and run the project some fake Ethereum(currency) is transferred from Matic faucet to the account being used in the project by giving its address.

➢ **Infura key**

This key can be found on the infura.io website directly connected to the Matic test network to establish the Ethereum environment.

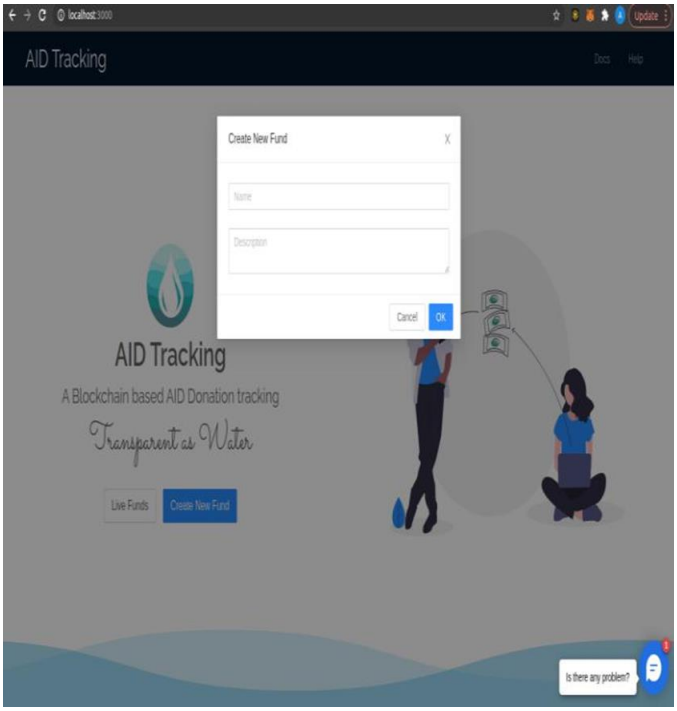
➢ **Matic**

Matic Network provides scalable, secure and instant Ethereum transactions using Plasma side chains and a Proof-of-Stake network.

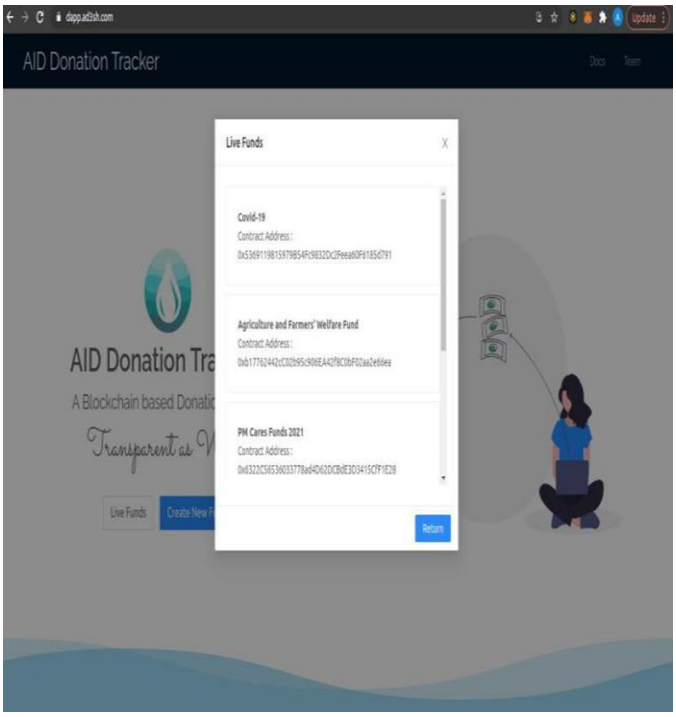
➢ **Matic Blockchain Key Features:**

- Scalability: Fast, low-cost and secure transactions on Matic sidechains with finality achieved on mainchain and Ethereum as the first compatible Layer 1 basechain
- High Throughput: Achieved up to 10,000 TPS on a single sidechain on internal testnet; Multiple chains to be added for horizontal scaling
- User Experience: Smooth UX and developer abstraction from mainchain to Matic chain; native mobile apps and SDK with WalletConnect support
- Security: Matic chain operators are themselves stakers in the PoS system
- Public Sidechains: Matic sidechains are public in nature (vs. individual DApp chains), permissionless and capable of supporting multiple protocols
- Solidity: Solidity is a high-level, formal programming language that's used to author Ethereum smart contracts.

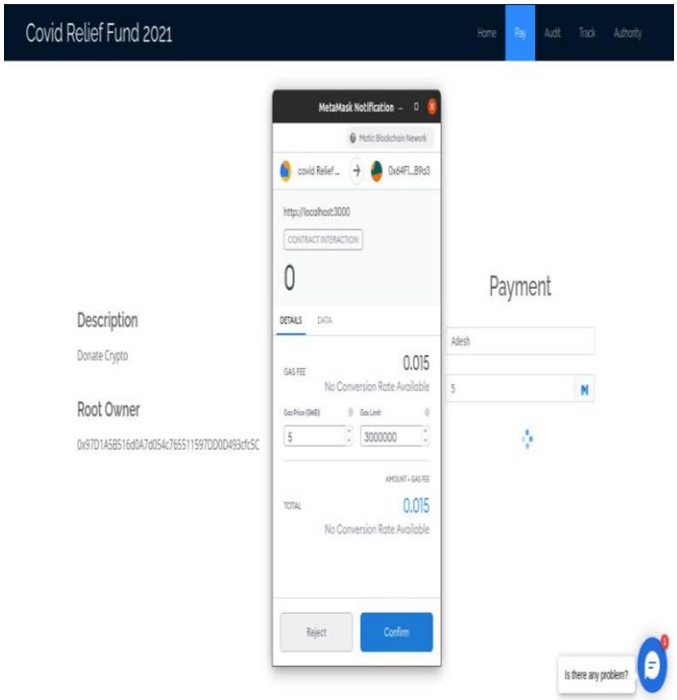
**D. Results:**



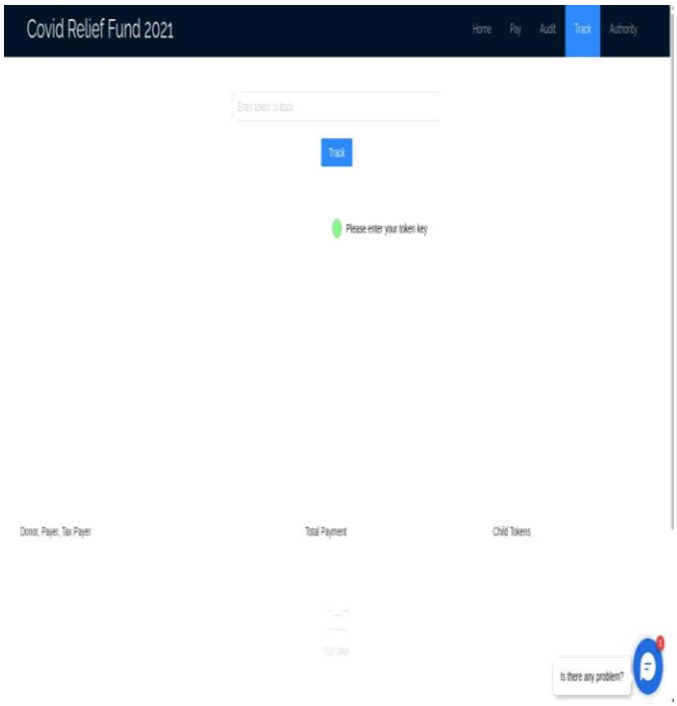

It is a first module of project where anyone can create new fund with using Metamask wallet and later it can receive donation from any person who want to donate.



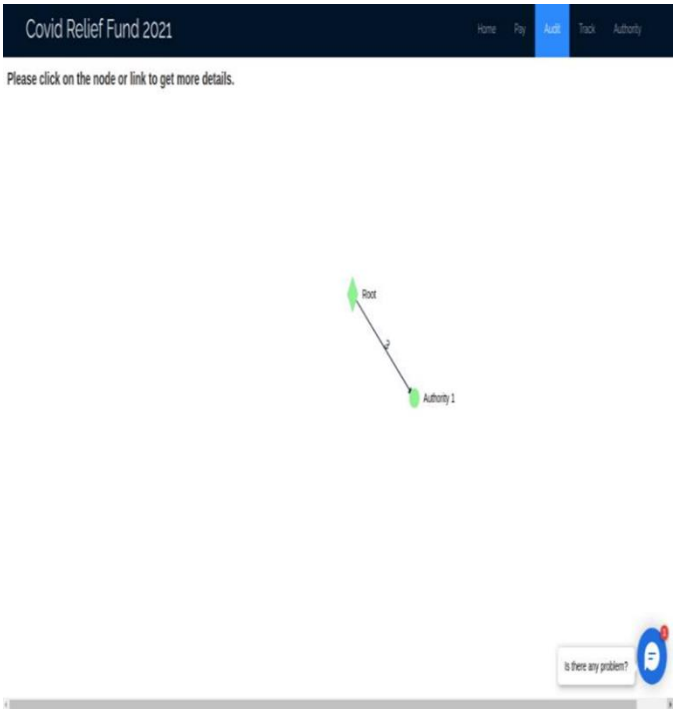
This module helps user to select Live funds where user wants to donate AID with the help of metamask wallet.



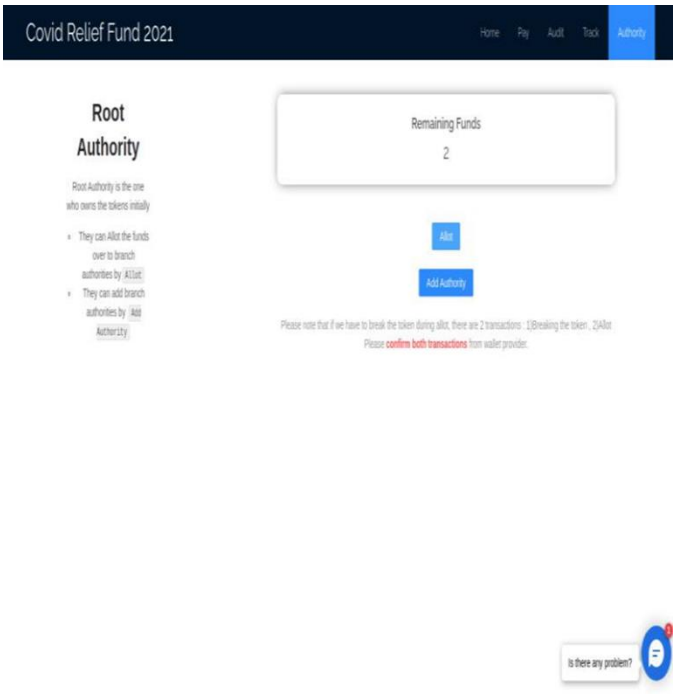

User can donate funds through Pay Module with the help of web3 metamask wallet with gas fees which further can be transferred to other istitutions or wherever it is required.



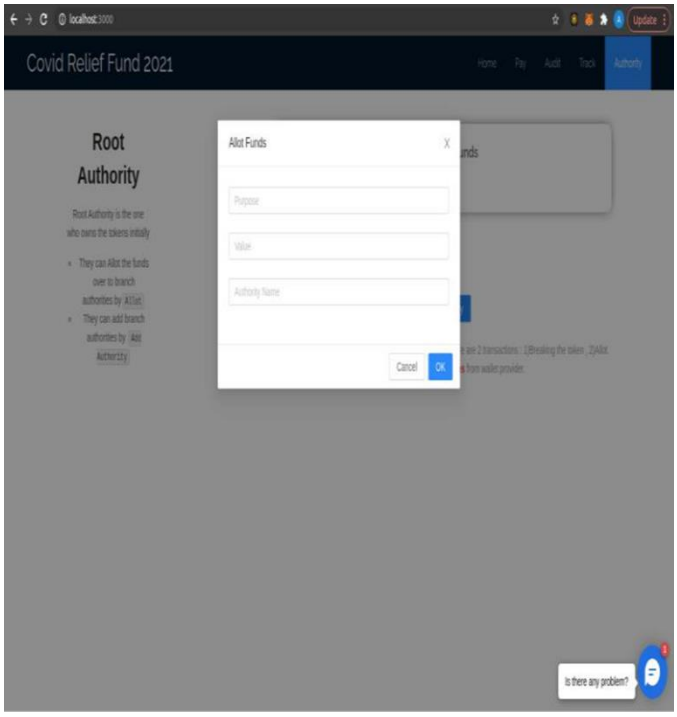

After donation user will get token key which user can use to track his funds through track module and know about their funds where it is being utilized.



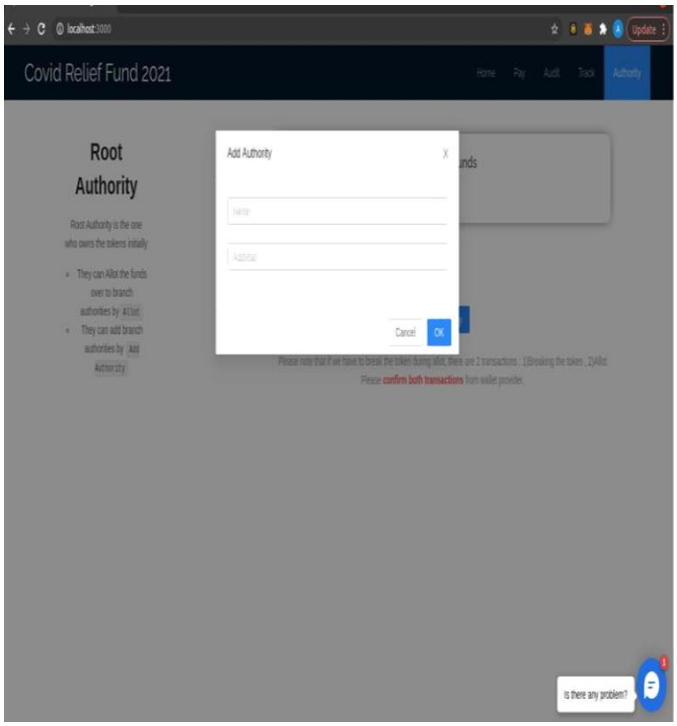

Anyone who have donated or have the token key generated after the fund donation can keep track of their funds and know about the spending of there funds.




Each creator of fund has only access to Authority module to allot and Add authority in given fund.




Authority can allot funds to other added authorities wherever donation is required and further the funds can be utilized.




Authority can add other Authorities to transfer the funds or to provide them donation funds.

## E. Algorithm

The proposed system is a web system and smart contracts are used using the language of the robust system. Solc is a dynamic connector used to integrate smart contracts and contract files in bytecode and abi. Bytecode will be used on the blockchain where abi is in JSON format and used

## III. CONCLUSION

Platform development for the handling and tracking of donations for financial assistance objectives using distributed registration technology. This work dedicated to one of the most important technologies - blockchain. Meanwhile, blockchain technology still exists, it is done in many places. There is one need, a platform for organizations that help sponsors to increase transparency as well easy to report. Analysis has shown that the use of blockchain technology in local charities, both individually and at the state level, have increased the effectiveness and reliability, and also have lead to make it more attractive to donors. It will also help increase revenue, or at least reducing the for front-end communication. The front-end is built using React Js, Next Js, and Semantic-UI. The user interface will be used for easy donation. Creator or campaign manager or authority to request donation money. In addition, the donor or payer can easily track; research the donations or the campaign. The authority then provides the donation to the seller. This will be recorded and stored in the blockchain.

Let's Assume input as a
{t}= token,
{N}: as amount of money (Cryptocurrency for eg: ether) user donates,
{T}: as a required amount allotted by authority to a vendor /contractor / owner Input: {N}
{N} is amount in Cryptocurrency donated by donor
{T}= {N-t}

(The token is breakable if user donates {N} and authority uses only {N}-{t} amount {N} valued token is broken into two parts) First Part: {T}={N}-{t}
Second Part: {t}={N}-{T} respectively.
amount of criticism from those who respond negatively toward donation taking organisations. Ethereum is currently used as a blockchain platform. Smart contracts are implemented using Solidity language. Server part in the platform is developed using JavaScript language on Node.js platform.

## IV. REFERENCES


[1]. Singh, A., Rajak, R., Mistry, H. and Raut, P., 2020, June. "Aid, Charity and donation tracking system using blockchain.", In 2020 4th International Conference on Trends in Electronics and Informatics (ICOEI)(48184) (pp. 457-462). IEEE.

[2]. de Vrij, Anna. "Blockchain in humanitarian aid: a way out of poverty and famine". Diss. Ph. D. thesis, 2018

[3]. Reinsberg, Bernhard. "Blockchain technology and the governance of foreign aid.", Journal of Institutional Economics 15, no. 3 (2019): 413-429.

[4]. Kumar, Randhir & Marchang, Ningrinla & Tripathi, Rakesh. (2020). "Distributed Off-Chain Storage of Patient Diagnostic Reports in Healthcare System Using IPFS and Blockchain." 1-5. 10.1109/COMSNETS48256.2020.9027313.

[5]. Saleh, Hadi & Avdoshin, Sergey & Dzhonov, Azamat. (2019). "Platform for Tracking Donations of Charitable Foundations Based on Blockchain Technology.", 182-187. 10.1109/APSSE47353.2019.00031.

[6]. Singh, Aashutosh & Rajak, Rohan & Mistry, Harsh & Raut, Prachi. (2020). "Aid, Charity and Donation Tracking System Using Blockchain." 457-462. 10.1109/ICOEI48184.2020.9143001

[7]. Nizamuddin, Nishara & Salah, Khaled & Azad, Muhammad & Arshad, Junaid & Habib ur Rehman, Muhammad. (2019). "Decentralized Document Version Control using Ethereum Blockchain and IPFS. Computers & Electrical Engineering." 76.10.1016/j.compeleceng.2019.03.014.

[8]. Lin, Chao & He, Debiao & Huang, Xinyi & Khan, Khurram & Choo, Kim-Kwang Raymond. (2020). "DCAP: A Secure and Efficient Decentralized Conditional Anonymous Payment System Based on Blockchain. IEEE Transactions on Information Forensics and Security. PP." 1-1. 10.1109/TIFS.2020.2969565.

[9]. I. Sukhodolskiy and S. Zapechnikov, "A blockchain-based access control system for cloud storage," 2018 IEEE Conference of Russian Young Researchers in Electrical and Electronic Engineering (EIConRus), Moscow, 2018, pp. 1575-1578, doi: 10.1109/EIConRus.2018.8317400.

[10]. C. V. N. U. B. Murthy, M. L. Shri, S. Kadry and S. Lim, "Blockchain Based Cloud Computing: Architecture and Research Challenges," in IEEE Access, vol. 8, pp. 205190-205205, 2020, doi: 10.1109/ACCESS.2020.3036812.

[11]. M. D. Karumanchi, J. I. Sheeba and S. P. Devaneyan, "Cloud Based Supply Chain Management System Using Blockchain," 2019 4th International Conference on Electrical, Electronics, Communication, Computer Technologies and Optimization Techniques (ICEECCOT), Mysuru, India, 2019, pp. 390-395, doi: 10.1109/ICEECCOT46775.2019.9114692.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Machine Learning Based Botnet Detection

**Shubham Gour[1], Yogesh Bhosle[1], Onkar Jagtap[1], Pratik Nirmale[1], Prof. Monika Dangore[2]**
[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Botnet term was coined when multiple networks of bots came into existence. It is a number of Internet-connected devices, which run single or multiple bots. Botnets can be used to perform Distributed Denial-of-Service attacks, sending spams, and allowing attackers to gain unauthorised access on connections Command and control software is used by the Owner (BotMaster) to control the botnet. This paper discusses the accuracy of the prediction of Botnet detection using different models.

**Keywords -** Botnet, XGBoost, NaiveBayes, DDOS, Decision Tree, Random Forest, Network Traffic.

## I. INTRODUCTION

A bot is an automated program which runs over the internet, some run automatically, while some run when they are triggered by specific input. Internet connected devices are infected with a piece of software that is bot. These internet connected devices are nothing but the botnet. After infection, these internet connected devices steer the instruction commanded by the owner of Botnet known as Bot Master/Bot Herder in 4 phases.

Following are the phases of the botnet infection:

### Phase 1 Infection Initialization

A- "Social media" posts targeted by cybercriminal, In the first instance cybercriminal will post a malicious link on social media websites like hoax advertisements, shammed icons etc. When users perform any action on these websites, their action proved to be erroneous, as the current page is redirected to a malicious website, where the software gets installed which was already planted by the BotMaster.

B- "Infection method" approach is followed by the cybercriminals. In this "Email Phishing" tactics are being used to lure users on malicious websites as the user gets redirected when a link is being clicked, and their system gets compromised.

C- "Email Attachments" cybercriminals embody malicious pieces of software with an email, which gets downloaded once clicked and infects the whole system.

### Phase 2 Connection to C2C Server

System manifests a connection with a command-and-control (C & C) server which establishes unauthorised connection periodically or may consummate upon infecting the system with malicious activity. Any infected machine liaising with a C & C server will comply to launch a coordinated attack. e.g P2P, TELNET, IRC

### Phase 3 Control

Cybercriminal (BotMaster) superintends the command and control of botnets for remote process execution by installing botnets on compromised machines. BotMasters uses Tor/shells to hide their tracks by hiding their identities via proxies to disguise their IP addresses.

### Phase 4 Multiplication

Attacks in the first 3 phases are incessanted by Botmasters to infect copious internet devices by malicious use of botnet by promulgating fraud, spam emails, DDOS, keylogger, Miria botnet etc. Most recent attack was the " Kashmir Black", an active botnet comprehending thousands of compromised systems across 30 countries and exploiting dozens of vulnerabilities by targeting their CMS. It is believed that the campaign of the "Kashmir Black" started around the end of November 2019 and was trained to target CMS platforms like Vbulletin, Opencart, Yeager, Joomla!, WordPress. Thus after knowing these vicious internet attacks which happen on a daily basis. We decided to counter this issue by implementing an ML model. In this paper we are going to fill up the canvass of loopholes and vulnerabilities with our ML model. To grasp the enormous nature of Machine Learning models let us first know about the basic model of Botnet. Figure 1 stages a basic model of botnet in which botmaster is directly or indirectly connected to every other entity such as server, bots, benign hosts through two way communication.

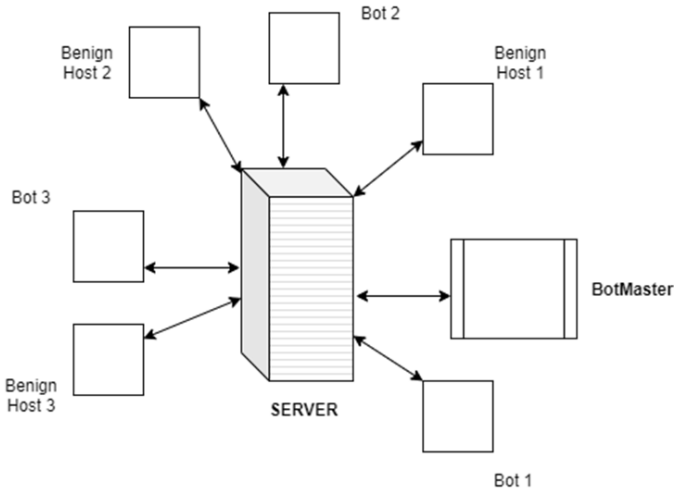



Fig 1.Model of Botnet

## II. METHODS AND APPROACHES

In order to detect a botnet we must apply the correct method and follow feasible approaches.

### A. XGBoost

Boosting is a sequential technique which follows the principle stated by the ensemble model. It has a set of weak learners which helps to ameliorate prediction accuracy. At any instant s model outcomes are weighed on previous instant t-1. outcomes which get predicted correctly assigned as first know about the basic model of Botnet. Figure 1 stages a basic model of botnet in which botmaster is directly or indirectly connected to every other entity such as server, bots, benign hosts through two way communication.

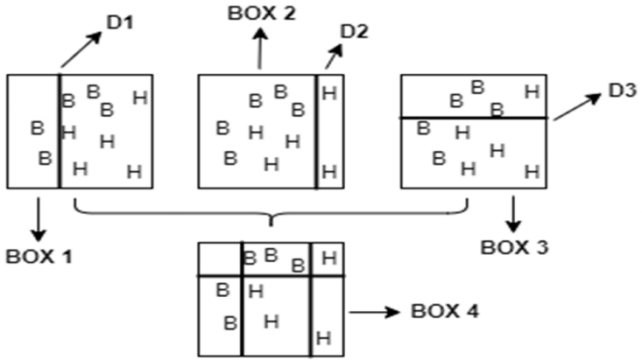



Fig 2.XGBoost

A lower weight and which got miss-classified weighted higher.

Four classifiers (in 4 boxes), shown above, are trying to classify bots B and Benign Host H classes as homogeneously as possible.

1. Box 1- First classifier ( a decision stump) makes a vertical line (split) D1. It says anything to the left of D1 is B and anything to the right of D1 is H. However, this classifier misclassified three B points. Decision Stump is a Decision Tree model which only splits off at one level, so the final prediction is based on only one feature.
2. Box 2: The second classifier gives more weight to the three B misclassified points (see the bigger size of B) and creates a vertical line at D2. Again it says, anything to the right of D2 is H and left is B. Still, it makes mistakes by incorrectly classifying three H points.
3. Box 3: Again, the third classifier gives more weight to the three H misclassified points and creates a horizontal line at D3. Still, the classifier fails to classify points correctly.
4. Box 4: Weak weighted classifiers combination of (Box 1, Box 2 and Box 3). It does a good job by classifying all points correctly. This is the basic idea how this algorithm will help us to identify botnets.

## B. Naive Bayes Algorithm

The Naive Bayes classifier is a probabilistic machine learning model that's used for classification task. The core of the classifier is based on the Bayes theorem

$$P(A|B) = (P(B|A)\,P(A))/P(B)$$

The Naive Bayes classifier is a probabilistic machine learning model that's used for classification tasks. The core of the classifier is based on the Bayes theorem.

It is mainly used in sentiment analysis, filtering the spam, etc. Naive Bayes is fast and easy to implement but the drawback of this is that the requirement is that the predictors need to be independent. In most of the real life cases, the predictors are dependent; this hinders the performance of the classifier.

## C. Decision Tree Algorithm

In machine learning Classification is a two-step process that is learning and prediction. The model is developed based on given training data in learning steps. The model is used to predict the response for given data in the prediction step. Decision Tree Algorithm (DTA) comes under Supervised Learning Algorithm (SLA). DTA can be used for solving regression and classification problems unlike other SLA. The goal of using a Decision Tree is to create a training model that can be used to predict the class or value of the target variable by learning simple decision rules inferred from prior data (training data). In Decision Trees, we start from the root for record from the prediction of a class label. We compare the values of the root attribute with the record's attribute. On the basis of comparison, we follow the branch corresponding to that value and jump to the next node.

## D. Random Forest

Random Forest is a popular machine learning algorithm which belongs to the technique of supervised learning. Random Forest Algorithm can be used for both Classification and Regression problems in Machine Learning. Random forest is based on ENSEMBLE LEARNING, which is a process of combining multiple classifiers to solve a complex problem and to improve the performance of the model. In simpler terms, Random Forest uses Decision trees in a randomized way. Random forest requires less training time as compared to other algorithms and high accuracy output can be produced using Random Forest. Even for the large dataset random forest runs

efficiently. Implementation Steps for random forest are as

1. Data Pre-processing
2. Fitting R.F algorithm to the Training set
3. Predicting the test result
4. Test accuracy of the result
5. Visualizing the test set result.

## ML Approach

Machine learning has various applications and methods to solve real world problems in discrete domains. This is possible due to abundant data spread across the network, significant furtherance of ML techniques, and advancement in computing capabilities. In the figure we discussed the components which are used to build a robust ML model for a given networking model.ML has been applied to dispense its flexible nature to solve real world complex problems in network operations and other sectors

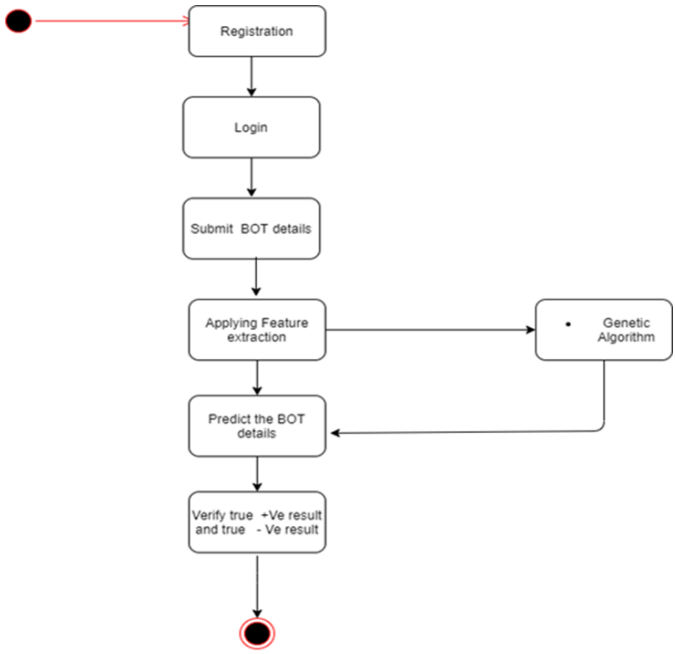



Fig 3. ML based solution.

In survey we found out that perplexed problems across different network technologies can be unraveled by using diverse ML techniques which is an injunction with diverse application of Machine Learning.There are fragments like QOE , QOS management, traffic prediction, congestion control, routing and classification management of networking which we have discussed in our paper to get the insights, scientific challenges and extent of ML in networking. Every effort is accountable and holds the responsibility to push the barriers of automatic network operations and their activities by using the features of ML in networking.

## III. RESULTS AND DISCUSSION

We propose a machine learning based botnet detection system that is shown to be effective in identifying P2P botnets. Our approach extracts convolutional versions of effective flow-based features, and trains a classification model by using a feed-forward artificial neural network. The experimental results show that the accuracy of detection using the convolutional features is better than the ones using the traditional features. It can achieve 94.7% of detection accuracy and 2.2% of false positive rate on the known P2P botnet datasets. Furthermore, our system provides additional confidence testing for enhancing performance of botnet detection. It further classifies the network traffic of insufficient confidence in the neural network. The experiment shows that this stage can increase the detection accuracy up to 98.6% and decrease the false positive rate up to 0.5%.

### STEP 1

Admin has to enter their login credentials in order to detect botnets using various models . This type of phase plays a crucial role to avoid any vulnerabilities of the system and also to strengthen the security and integrity of the system.

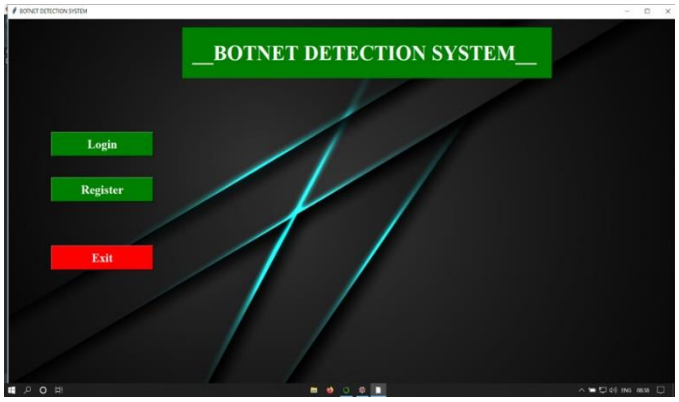



Fig 4.Registration Page

Once you register yourself in the Botnet detection system you are ready to Login with the information you provided in the Registration page .

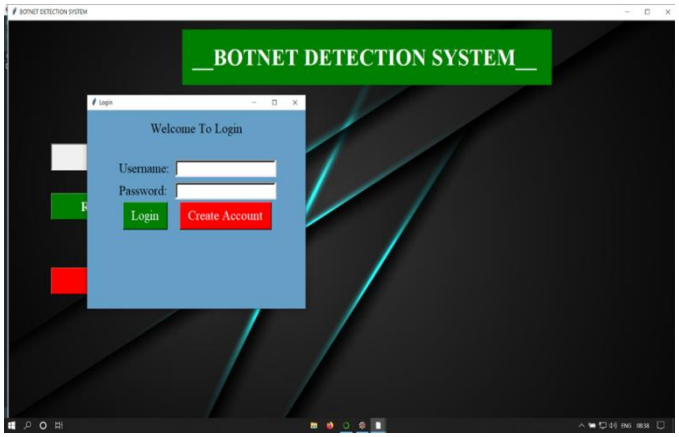



Fig 5.Login Page

## STEP 2

After being authenticated by the system you will be allowed to view the different models, which will help us to choose the better and feasible model to detect botnets.


Fig 6.Algorithms

## STEP 3

First we choose the Algorithms to train our model through the training phase which uses KDD_Cup Dataset. After selecting the algorithm and training the model we move towards the drop down list provided below in the Botnet detection page. We select the algorithm from the drop down list. To detect a Botnet, System must be assigned with a dataset which has plenty of fields with information full of network logs and traffic.

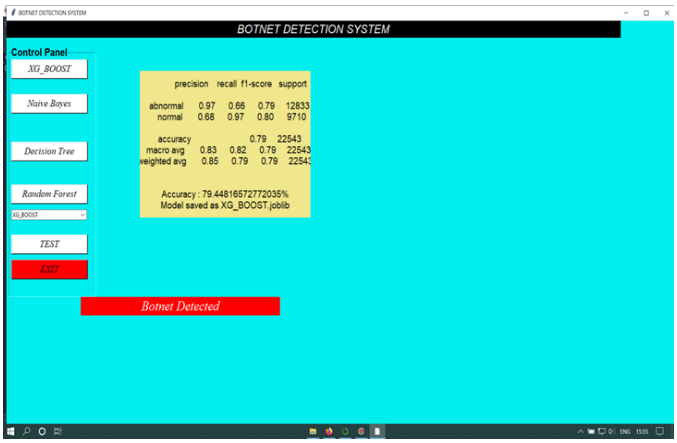



Fig 7.Result

Comparative analysis of botnets with different ML techniques gives us the idea that using a single model for detecting botnets is of no use as the technology will keep on growing and bots will become smarter. So to rely on a single model is not a smart move. We implemented different models so that we can demonstrate the different prediction accuracy achievable by using different algorithms.

XGBoost- 79.448%

Naive Bayes- 45.029%

Decision Tree-79.532%

Random Forest-76.227%

## IV. FUTURE SCOPE

We intend to implement this model on a larger scale by improving its detection to work in real time. The proposed model detects the botnet but is not capable of handling large datasets. Real time interpretation of

n/w logs and monitoring the accuracy in real time is yet to be achieved. As the technology improves and more and more new tools will be available to handle loads of data with high accuracy of predicting botnet detection.

## V. CONCLUSION

This paper examines various techniques and methods to deal with botnets under different situations over different networks and compares different algorithms and their accuracies. The main threat in bot detection is to avoid any loopholes or vulnerabilities in our own system while tracking them to terminate the bot's network before their vicious goal is achieved by their botmaster.We have successfully implemented the different models and achieved higher accuracy in prediction of existence of Botnet in a system. 80% of data is used to train the model and the remaining 20% of data is used to test the model

## VI. REFERENCES


[1]. Sudipta Chowdhury1*, Mojtaba Khanzadeh1, Ravi Akula1, Fangyan Zhang2, Song Zhang2, Hugh Medal1, Mohammad Marufuzzaman1, Linkan Bian1" Botnet detection using graph-based feature clustering".

[2]. Zhuang and J. M. Chang, "PeerHunter: Detecting peer-to-peer botnets through community behavior analysis".

[3]. S. Lagraa, J. François, A. Lahmadi, M. Miner, C. Hammerschmidt and R. State, "BotGM: Unsupervised graph mining to detect botnets in traffic flows," 2017 1st Cyber Security in Networking Conference (CSNet), Rio de Janeiro, 2017, pp. 1-8, doi: 10.1109/CSNET.2017.8241990.

[4]. Sara Khanchi, Ali Vahdat, Malcolm I. Heywood, A. Nur Zincir-Heywood,"On botnet detection with genetic programming under streaming data label budgets and class imbalance", Swarm and Evolutionary Computation, Volume 39, 2018, ISSN 2210-6502

[5]. Jeeyung Kim, Alex Sim, Jinoh Kim, Kesheng Wu," Botnet Detection Using Recurrent Variational Autoencoder".

[6]. Hagan, M., Kang, B., McLaughlin, K., & Sezer, S, "Peer Based Tracking using Multi-Tuple Indexing for Network Traffic".

[7]. Raouf Boutaba 1, Mohammad A. Salahuddin 1, Noura Limam 1, Sara Ayoubi 1, Nashid Shahriar 1, Felipe Estrada-Solano1,2 and Oscar M. Caicedo 2 "Survey on machine learning for networking: evolution, applications and research opportunities".

[8]. E. M. Hutchins, M. J. Cloppert, and R. M. Amin, "Intelligence-driven computer network defense informed by analysis of adversary campaigns and intrusion kill chains," Inf. Warfare Security Res., vol. 1, no. 1, p. 80,2011.

[9]. S. Chen, Y. Chen and W. Tzeng, "Effective Botnet Detection through Neural Networks on Convolutional Features," 2018 17th IEEE International Conference on Trust, Security And Privacy In Computing And Communications/ 12th IEEE International Conference On Big Data Science And Engineering (TrustCom/BigDataSE), New York, NY, 2018, pp. 372-378, doi: 10.1109/TrustCom/BigDataSE.2018.00062.

[10]. B. Alothman and P. Rattadilok, "Towards using transfer learning for Botnet Detection," 2017 12th International Conference for Internet Technology and Secured Transactions (ICITST), Cambridge, 2017, pp. 281-282, doi: 10.23919/ICITST.2017.8356400.

[11]. G. Vormayr, T. Zseby and J. Fabini, "Botnet Communication Patterns," in IEEE Communications Surveys & Tutorials, vol. 19, no. 4, pp. 2768-2796, Fourthquarter 2017, doi: 10.1109/COMST.2017.2749442.

[12]. H. Dhayal and J. Kumar, "Botnet and P2P Botnet Detection Strategies: A Review," 2018

International Conference on Communication and Signal Processing (ICCSP), Chennai, 2018, pp. 1077-1082, doi: 10.1109/ICCSP.2018.8524529.

[13]. C. Czosseck, G. Klein and F. Leder, "On the arms race around botnets - Setting up and taking down botnets," 2011 3rd International Conference on Cyber Conflict, Tallinn, 2011, pp. 1-14.

[14]. K. Alieyan, M. Anbar, A. Almomani, R. Abdullah and M. Alauthman, "Botnets Detecting Attack Based on DNS Features," 2018 International Arab Conference on Information Technology (ACIT), Werdanye, Lebanon, 2018, pp. 1-4, doi: 10.1109/ACIT.2018.8672582.

[15]. W. Zhang, Y. -J. Wang and X. -L. Wang, "A Survey of Defense against P2P Botnets," 2014 IEEE 12th International Conference on Dependable, Autonomic and Secure Computing, Dalian, 2014, pp. 97-102, doi: 10.1109/DASC.2014.26.

[16]. W. Sun and H. Gou, "The Botnet Defense and Control," 2011 International Conference of Information Technology, Computer Engineering and Management Sciences, Nanjing, Jiangsu, 2011, pp. 339-342, doi: 10.1109/ICM.2011.218.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Implementation Hand Sign Detection and Recognition with Help of Machine Learning

**Darshan Ganatra[1], Omkar Shelke[1], Forum Makwana[1], Shivam Mishra[1], Prof. Nilesh Mali[2]**
[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Addressing the issues of People with Hearing and Vocal Impairment through a single aiding system is a tough job. A lot of work in modern day research focuses on addressing the issues of one of the above challenges but not all. The work focuses on finding a unique technique based on the machine learning that aids the mute by letting them hear what is represented as text and its sound. The proposed system achieved the technique that takes the sign image through a web camera and applies to the image processing then analysis what exactly want to the mute people at end the text available to voice signals. All these three solutions were modulated to be in a single unique system. All these activities are coordinated using the Ubuntu system using python. The vocally impaired people are helped by the process in which the image to text and text to speech is given using machine learning.

**Keywords:** Image Processing, Tensor flow Algorithm, CNN Algorithm Process, Languages and compilers, Classification, Verification.

## I. INTRODUCTION

Dumber people can simply tilt the message by sign language which could not be understandable by other people. By this system we provide the solution for blind, deaf and dumb people. For blind people the image is converted to voice by using Tesseract software, the deaf people received their content by message as soon as the opposite person speaks out it displayed as a message. The dumb persons conveyed their message through text instead of sign language which is delivered via e speak. We have provided necessary steps to resolve the problems of those masses. Approximately 285 million people are judged to be visually impaired worldwide in which 39 million are blind and 246 are said have low vision. Approximately 90% of this world's vocall impaired is from the dispirited income people and 82% of people living with blindness aging persons and above. The numbers of people visually impaired from eye related diseases have been brought down in the past 20 years according to global estimated

work. In which 80% of all visual restitution can be prevented or cured. India is considered to be the home for the world's largest act of blind people. In this world, about 37 million are blind, in which 15 million are from India. There are so many researches have been getting along in this universe, but the visual impairment could not be broken for good. In lodge to facilitate these people we have developed

the assistive device for blind people who does not want the assistance of other neighbours.

Goal and Objective:

- The great challenge lies in developing an economically feasible system so that physically impaired people can communicate easily.
- Datasheet of all the hand gestures will be made beforehand.
- Then, using python programing the real time picture of sign will be captured and will be compared with the datasheet. (photo captured will be converted into binary image).
- Then python will give the output based on Ubuntu system will be in accordance with the matched picture.
- At the end there is a sound that is being used to generate the voice message.
- There is a speaker through which message can be easily heard.

## II. LITERATURE SURVEY

[1] Vigneshwaran S, Shifafathimam, "Hand Gesture Recognition And Voice Conversion System For Dump People", in this paper author Explain two major techniques available to detect hand motion or gesture such as vision and non-vision technique and convert the detected information into voice through raspberry pi.

Advantages: Easy to wear hardware, Easy to design

Disadvantage: Sometimes fail hardware, Take time to detection

[2] Trung-Hieu Le, Thanh-Hai Tran, Cuong Pham, "The Internet-of-Things based hand gestures using wearable sensors for human machine interaction" This paper introduces a new human hand gesture dataset which could be suitable for controlling home appliances. The dataset is captured with a low-cost and sensor plugable Internet of Things (IoT) device which is currently embedded with accelerometer and gyroscope sensors.

Advantages: Accelerometer and gyroscope sensors used, Easy to implement.

Disadvantage: Dataset used live predication not, sensor detection not work properly.

[3] Rajit Nair Dileep Kumar Singh Ashu Shivam Yadav Sourabh Bakshi, "Hand Gesture Recognition system for physically challenged people using IoT", In this research a gesture-based recognition system has been developed that recognizes gestures with a Web camera in real time. The framework developed is based on a machine learning features and gestures. In order to improve efficiency and precision, we employ a number of steps in order to process and segment the picture before submitting it to the HGR Program. Our measures in image processing will identify movements in real time with high precision.

[4] Vasileios Sideridis, Andrew Zacharakis, George Tzagkarakis, and Maria Papadopouli, "Gesture Keeper: Gesture Recognition for Controlling Devices in IoT Environments", This paper presents GestureKeeper which employs an accelerometer, gyroscope and magnetometer, from a wearable IMU, to first identify time-windows that contain a gesture, and then, recognize which specific gesture it is. GestureKeeper uses features based on statistical properties and acceleration samples. It can accurately recognize gestures from our 12-hand-gesture dictionary, exhibiting its best performance when the combination of features are used (e.g., about 96% mean accuracy). With

the noise addition and feature selection, the mean accuracy is increased to over 97%.

## III. PROPOSED SYSTEM

The great challenge lies in developing an economically feasible system so that physically impaired people can communicate easily.

- Datasheet of all the hand gestures will be made beforehand.
- Then, using python programing the real time picture of sign will be captured and will be compared with the datasheet. (photo captured will be converted into binary image)
- Then python will give the output based on Ubuntu system will be in accordance with the matched picture.
- At the end there is a sound that is being used to generate the voice message.
- There is a speaker through which message can be easily heard.

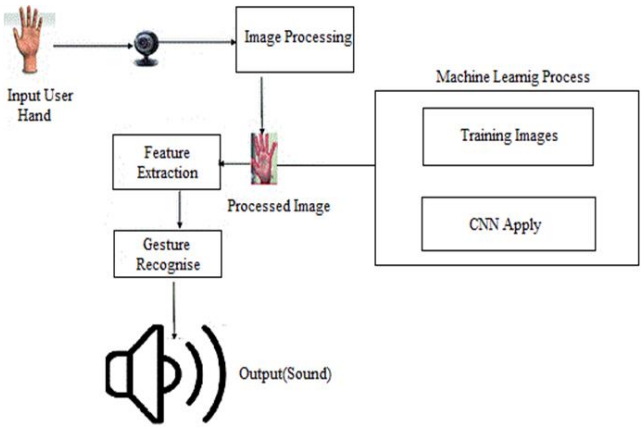



Fig1. System Block Diagram

Basic working algorithm of overall system is as follow

### A. Algorithm basic Step:

1) Start
2) Load Hand sign Dataset for analysis.
3) Capture hand sign image from web camera.
4) Apply the image processing for covert the image gray scale.
5) CNN algorithm Match Gestures based on train dataset.
6) Show Text Output On Monitor
7) Output In Form of sound

### B. Mathematical Model:

**Input-Output:**

U= {I, O, f, S, F}

Where,

I= {I1, I2,I3}

I1= {l1,l2…... ln} where n size of image and n>0

I2= i.e. image capturing using camera

I3= i.e. sign image

O= {O1,O2,O3}

O1= Image Preprocess

O2= Image Color Segmentation

O3 = Image Segmentation (gray scale)

O4 = Sign detection

O5 =Voice Generation

f= {f1,f2,f3,f4,f5}

f1= preprocess (image,I1, I2, I3)

f2 = color_segmentation (Image,O2)

f3 = image_segmentation(Image,O3)

f4 = detection(Image, f2)

f5 = voice(text, sound)

S: Success:

Image process successfully

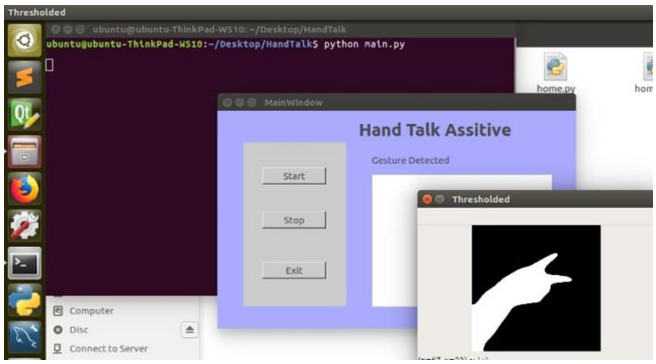
Sign detected properly

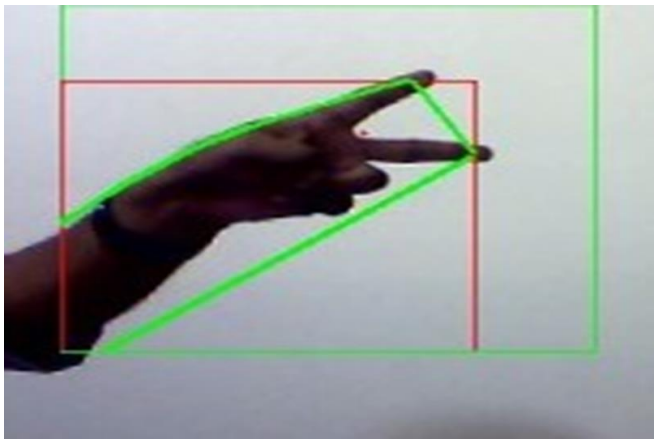
F: Failure:

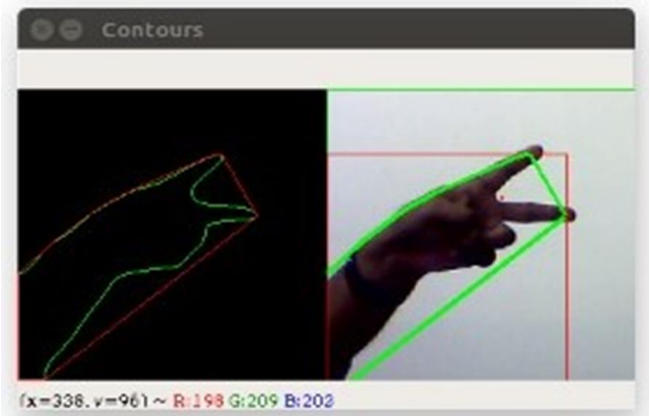
Algorithm not working properly

Voice command failure.

## IV. RESULT AND DISCUSSION






## V. CONCLUSION

The implementation of the proposed system aims to translate gestures into speech (voice). The scope of the project is to enhance the recognition capability for various lightning conditions and achieving more accuracy. Implementing and identifying the more number of gestures. The miniature of the system should be done.

## VI. REFERENCES

[1]. Vigneshwaran S, Shifafathimam, "Hand Gesture Recognition And Voice Conversion System For Dump People", IEEE 2019.

[2]. Trung-Hieu Le, Thanh-Hai Tran, Cuong Pham, "The Internet-of-Things based hand gestures using wearable sensors for human machine interaction" IEEE 2019.

[3]. Rajit Nair Dileep Kumar Singh Ashu Shivam Yadav Sourabh Bakshi, "Hand Gesture Recognition system for physically challenged people using IoT" IEEE. 2020.

[4]. Vasileios Sideridis, Andrew Zacharakis, George Tzagkarakis, and Maria Papadopouli, "Gesture Keeper: Gesture Recognition for Controlling Devices in IoT Environments", IEEE 2019.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Smart Trolley with Advance Billing System

**Niyamat Ujloomwale[1], Vaibhav Bandhu Manwar[2], Prince Kumar Singh[2], Patil Rohan Ranjeer[2], Saurabh Shankar Ovhal[2]**

[1]Assistant Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India

## ABSTRACT

The shopping centre is a spot where individuals get their regular necessities. In shopping malls, there has been an emerging market for fast and simple payment of bills. Very sometimes, shoppers are dissatisfied with finding the items on the shopping list while shopping in a store and no help is required. We have developed a smart trolley with a smartphone app to solve these issues. This paper offers an interface to help consumers locate the product's location. It also offers a consolidated and automatic billing system using NodeMCU's barcode scanner. Super markets will be issued with a barcode for each shopping mall commodity, to distinguish its type. A Product Identification System (PID) containing NodeMCU, the barcode reader, is used for each shopping cart. Purchasing product details on the shopping cart can be read by a barcode reader and presented in the mobile app that is linked to the device. The complete bill is passed to the PC by the processor at the billing counter.

**Keywords :** billing trolley, barcode, nodeMCU, shopping.

## I. INTRODUCTION

Since the dawn of civilization, people have continually produced creativity to support their demands. More independence can be the underlying explanation for success of creativity and this contributes to developing assignments and making them smaller and easier on a daily basis. Shopping is one crucial activity for individuals to expend the highest measure of energy. The shopping centre is a place where people get their everyday needs from food supplies, clothes, electrical equipment and so on. Most of the time clients have difficulties with the unspecific details concerning the object marked down and the abuse of the counters' superfluous time. Each grocery store and supermarket in this revolutionary world utilises shopping trolleys with a particular end purpose to help consumers pick and store the things they expect to purchase. Customers normally buy the necessary goods and put them in their carts and wait for bill payments at the counters thereafter. The paying of bills at the counters is a very troublesome and time-consuming procedure that raises the number of people at the counters. As demonstrated by a survey undertaken by the US Department Corporation, individuals regularly spend 1.4 hours

shopping on a daily basis.If the queue is too long, a large amount of customers would choose to leave the line. Two classifications (1) Shopping in-individual (2) Shopping in absentia can basically be defined as the new shopping environment. Shopping in absentia is maintained from multiple backgrounds, like web shopping, internet shopping, and so on, which would not entail physical keeping of the buyer at the counters. In-person buying requires an individual call at the place of purchasing and selecting products in view of various variables, including need, convenience, brand, and so on. The suggested keen shopping basket structure plans to assist person shopping to reduce the time spent shopping.In the normal time spent at the registers, continuous improvement is needed to boost the nature of the customers buying history. We also composed a shopping basket to solve these problems expressed above and to improve the present structure. This can be achieved by essentially adding barcode labels to the items in the shopping cart and the reader. Customers will provide details from this system relating to the cost of and thing that is within the cart and even the absolute cost of the item. With regards to the expense of the object, this structure would save time for shoppers and labour needed in the shopping centre.

### A. Problem Statement

Realistically, markets are used by a large number of people these days to secure most products. The purchase of goods relates to an uncertain process requiring time spent on passageways, items and checkout lines. Consumers typically face some challenges and difficulties when shopping. Such issues entail stressing that the money they carried would be inadequate for all bought products and dissipating a lot of time at the cashier as well. And also because of the impact of disagreement and also because of lack of equipment that isolates application designs, it is becoming an increasing challenge for the merchants to keep their shoppers consigned and to foresee 3 of their demands.In some cases, consumers have concerns with the insufficient knowledge about the discount item and hence the misuse of superfluous time at the counters in some cases. With the barcode tag, we can end this problem. We present the systematic definition of barcode based keen shopping cart in the field of retail stock to address the current problems.

### B. Objective:

The primary aim of this initiative is to introduce a smart shopping cart to improvise ordering with the aid of barcode technology. In the buying cart, the aim is to use the barcode-related monitoring deployment practise. The barcode is used in this plan to secure the purchase of commodities in shopping malls. If the product has been put in the shopping cart, the price of the product shows and the total amount is displayed accordingly, then if we want to delete the product from the trolley, the product will be taken away and the value of the particular product is deducted from the total amount.In this the equipment used is to purchase the goods, thereby increasing the efficiency and speed of protection when buying in shopping complexes. The technical goal of our presented issue in shopping complexes is the practise of barcode technology for the instinctive identification of goods within the shopping cart, thereby annihilating the shopper engaged in the buying and payment task of commodities. The key point of the suggested system is to include an invention that is minimally effort-oriented, easily adaptable, and efficiently viable to facilitate individual shopping. A lot of time can be saved at the billing counters with the help of this .

## II. LITRATURE SURVEY

A shopping market is a place where customers come to purchase their daily using products and pay for that. Hence, we are proposing to develop a smart electronic trolley for shopping malls that keeps the

track of purchased products and also helps the customer to pay the bill with the help of swiping machine provided in a trolley. So that the customer can save the time [1].

Here, we are using wireless sensor networks such as GSM to send the information read by the barcode reader to the main server of the shop and to the customers mobile[2]. Microcontroller based design has acquired the status of most happening field in electronics. This is specialized field that has power of integrating thousands of transistors on a single silicon chip. At billing counter customer has to pay and collect the bill. This smart eletronic trolley contains a barcode scanner and also a swiping machine on it, so that there is no need to go to the billing counter and pay the bill, instead customer can pay the bill by swiping his card. The total bill will be sent to the customers mobile, so that paper usage for billing can be reduced[3]. The developed system consists of three components (a) server communication component which contains connection with the cart and the main server, (b) user interface and display component, (c) automatic billing component[4]. The Smart Shopping Cart with Automated Billing System via RFID and Bluetooth was suggested. A Product Identification Package (PID) containing the Bluetooth module, EEPROM, RFID scanner, LCD and microcontroller [5] is inserted in each shopping basket within this system. Gangwal Udita et.al. Proposed Wireless Sensor Networks Smart Shopping Cart for Automatic Billing Purpose They portray the use of a secure, reasonable and cost-productive smart shopping cart using remote sensor networks in this article. For shops, such a system is ideal where it can support in-store laboratories and customers[6]. SudhirRupanagudi Rao et.al. A Novel Cost-Effective Savvy Trolley System based on Video Processing was proposed for supermarkets using FPGA. This depicts a new realistic technique to defeat the dilemma of being unable to find objects by attaching a web camera to the trolley[7]. A. Using GSM and adhoc wireless routing, Vijayaraj and R.Saravanan suggested Automatic EB Billing System Using GSM and adhoc wireless routing, they propose a mechanism in which power charging turns out to be entirely robotized and communication is conceivable through remote systems[8]. Suganya.R, and.al.Automated Smart Trolley using Arduino and Smart Billing. This device is based on RFID and Bluetooth [9] identification.

Radio-Frequency Identification, as stated in[10].

## III. BLOCK DIAGRAM

### A. Barcode reader:

The barcode reader (or barcode scanner) is an optical scanner which is capable of reading printed barcodes, interpreting barcode data, and transmitting data to a device. It consists of a light source, a lens and a light sensor, like a flatbed scanner, which converts optical impulses into electrical signals. In addition, almost all barcode readers provide decoder circuits that can interpret the image data given by the sensor in the barcode and transfer the content of the barcode to the output port of the scanner.

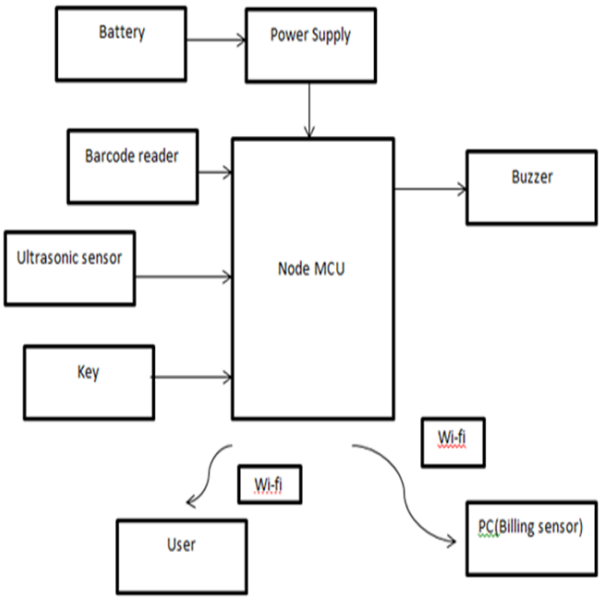



**Fig.no.1.Block diagram of design system**

### B. NodeMCU:

The production board for the NodeMCU ESP8266 comes with an ESP-12E package with an ESP8266 chip and a TensilicaXtensa 32-bit LX106 RISC microprocessor. This microprocessor supports RTOS and runs with a clock frequency adjustable from 80MHz to 160 MHz. For data and applications, NodeMCU has 128 KB of RAM and 4 MB of Flash memory. It is suitable for IoT ventures due to its high computing capacity and in-built Wi-Fi / Bluetooth and Deep Sleep Operating functions. The Micro USB jack and VIN pin (External Supply Pin) can be used to power the NodeMCU. It supports the interface between UART, SPI, and I2C.

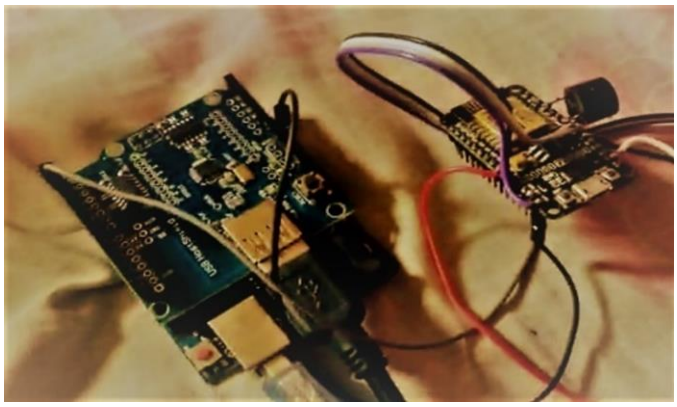


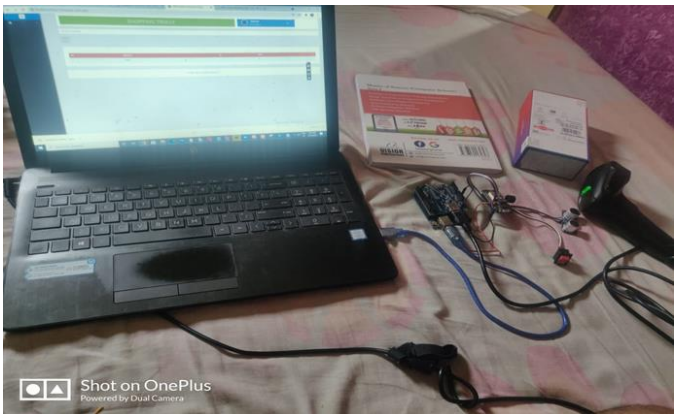
**Fig.no.2. NodeMCU ESP8266**

### C. 12v Battery:

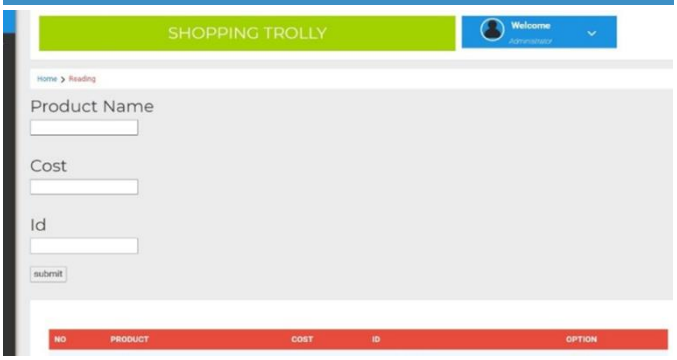
Choose one that suits the criteria until you have measured the total current (I). For eg, for the 600mA power supply, a 1Amp one. Now for our power transformer T, the rms secondary voltage (primary is whatever is compatible with your area) must be our desired output Vo PLUS, the voltage drops through diodes (two diodes). Vo1 must be adequate to provide the LM7805's minimum operating input requirements at all times (min 7.3v to max 25v). assume it has a central tap for a 24vac secondary output like the O.P.'s one (12vac from each terminal to the central tap, 24vac via terminals), so here the secondary output is taken from the central tap to one of the terminals. If it doesn't have a central tap and all you have is 24vac performance, due to the high Vp for this particular situation, it is advised to choose a different one.

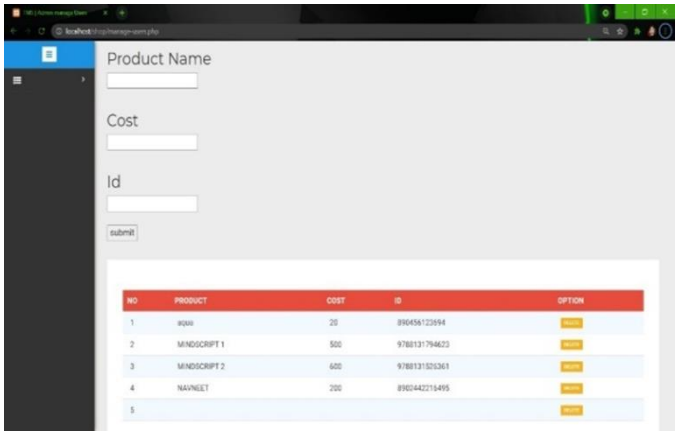

**Fig.no.3. 12V Li-ion Battery**

### 1. Outcomes and Screen Shots








## IV. CONCLUSION

In the built prototype model, the desired goals were successfully achieved. The product produced is convenient to use and economical. While the project shows the proof of principle, to make the smart shopping cart more stable, there are a few things that should be added. To begin with the latency of wireless communication with the server will need to be taken into account in this project.Secondly, it is not really safe to communicate. Sticking the barcode sticker on certain items is difficult. Conventional barcode scanning is more advanced in such situations. In comparison, a more advanced micro-controller and a larger display system can be used to offer a greater interface for users.

## V. FUTURE WORK

In the future we can use with the help of an optical sensor, motors, motor drivers, we will make trolleys in such a way that it will follow the customer which purchasing items and it maintains the safe distance between the Customer and itself.

## VI. REFERENCES

[1]. A. Farahzadi, P. Shams, J. Rezazadeh, and R. Farahbakhsh, “Middleware technologies for cloud of things-a survey,” Digital Communications and Networks, Elsevier, 2017.

[2]. D. Singh, G. Tripathi, and A. J. Jara, “A survey of internet-ofthings: Future vision, architecture, challenges and services,” in 2014 IEEE World Forum on Internet of Things (WF-IoT), March 2014, pp. 287–292.

[3]. A. Al-Fuqaha, M. Guizani, M. Mohammadi, M. Aledhari, and M. Ayyash, “Internet of things: A survey on enabling technologies, protocols, and applications,” IEEE Communications Surveys Tutorials, vol. 17, no. 4, pp. 2347–2376, Fourthquarter 2015.

[4]. A. Zanella, N. Bui, A. Castellani, L. Vangelista, and M. Zorzi, “Internet of things for smart cities,” IEEE Internet of Things Journal, vol. 1, no. 1, pp. 22–32, Feb 2014.

[5]. J. Rezazadeh, M. Moradi, A. S. Ismail, and E. Dutkiewicz, “Superior path planning mechanism for mobile beaconassisted localization in wireless sensor networks,” Sensors Journal, IEEE, vol. 14, pp. 3052–3064, 2014.

[6]. M. Hubert, M. Blut, C. Brock, C. Backhaus, and T. Eberhardt, “Acceptance of smart phone-based mobile shopping: Mobile benefits, customer characteristics, perceived risks, and the Impact of application context,” Psychology and Marketing, vol. 34, no. 2, pp. 175–194, 2017.

[7]. J. Rezazadeh, M. Moradi, and A. S. Ismail, "Efficient localization via middle-node cooperation in wireless sensor networks," in International Conference on Electrical, Control And Computer Engineering, June 2011, pp. 410–415.

[8]. M. Moradi, J. Rezazadeh, and A. S. Ismail, "A reverse localization scheme for underwater acoustic sensor networks," Sensors, vol. 12, pp. 4352–4380, 2012.

[9]. R. Nallanthighal and V. Chinta, "Improved grid-scan localization algorithm for wireless sensor networks," Journal of Engineering, Hindawi, vol. 5, no. 10, pp. 21–27, 2014.

[10]. P. Martin, B.-J. Ho, N. Grupen, S. Mu˜noz, and M. Srivastava, "An ibeacon primer for indoor localization: Demo abstract," in Proceedings of the 1st ACM Conference on Embedded Systems for Energy-Efficient Buildings, 2014, pp. 190–191.

[11]. J. Rezazadeh, M. Moradi, A. S. Ismail, and E. Dutkiewicz, "Impact of static trajectories on localization in wireless sensor networks," Wirel.Netw., vol. 21, no. 3, pp. 809–827, 2015.

[12]. J. Wang, P. Urriza, Y. Han, and D. Cabric, "Weighted centroid localization algorithm: Theoretical analysis and distributed implementation," IEEE Transactions on Wireless Communications, vol. 10, no. 10, pp. 3403–3413, 2014.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Emotion Detection to Prevent Suicide

**Tejashri Sawant[1], Manorama Shewale[1], Supriya Kiwade[1], Prof. Amruta Chitari[2]**
[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

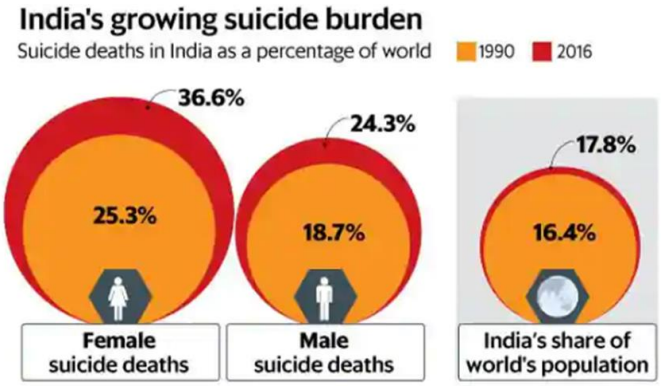
India, a land of marvels, is outstanding in many aspects, its culture, ecosystem, etc. Sadly, it also ranks among the top countries in the world to have an annual suicide rate. Suicide might be considered as one of the most serious social health problems in the modern society. Suicidal ideation or suicidal thoughts are people's thoughts of committing suicide. It can be regarded as a risk indicator of suicide. India is among the top countries among in the world to have annual suicide rate. Objective of Face Emotion Recognition (FER) is identifying emotions of a human for reduce the suicide rate. This system involves extraction of facial features, and threshold detection of stress using emotions expressed through face using the Convolutional Neural Network (CNN) algorithm. This system is basically used to classify positive and negative emotions and detects the stress based on usual threshold value.

**Keywords:** Suicide rate, Emotions, Convolutional Neural Network.

## I. INTRODUCTION

Suicide is an important issue in the Indian context. More than one lakh (one hundred thousand) lives are lost every year to suicide in our country. In the last two decades, the suicide rate has increased from 7.9 to 10.3 per 100,000. There is a wide variation in the suicide rates within the country. The southern states of Kerala, Karnataka, Andhra Pradesh and Tamil Nadu have a suicide rate of > 15 while in the Northern States of Punjab, Uttar Pradesh, Bihar and Jammu and Kashmir, the suicide rate is < 3. This variable pattern has been stable for the last twenty years. Higher literacy, a better reporting system, lower external aggression, higher socioeconomic status and higher expectations are the possible explanations for the higher suicide rates in the southern states.

In 2016 the number of suicides in India had increased to 230,314. Suicide was the most common cause of death in both the age groups of 15-29 years and 15-39 years. About 800,000 people die by suicide worldwide every year, of these **135,000** (17%) are residents of India, a nation with 17.5% of world population.




India reported an average 381 deaths by suicide daily in 2019, totaling 1,39,123 fatalities over the year, according to the latest National Crime Records Bureau (NCRB) data. A 3.4 per cent increase was observed in suicides during 2019 (1,39,123 suicides) as compared to 2018 (1,34,516) and 2017 (1,29,887), the data showed. The rate of suicide (incidents per 1 lakh population) rose by 0.2 per cent in 2019 over 2018, as per the data. According to the statistics by the NCRB, which functions under the Union Home Ministry, the suicide rate in cities (13.9 per cent) was higher as compared to all-India suicide rate (10.4 per cent) in 2019.

Suicide by ''hanging'' (53.6 per cent), "consuming poison'' (25.8 per cent), ''drowning'' (5.2 per cent) and ''self-immolation'' (3.8 per cent) were the prominent means of committing suicides during the year, the data showed.

India had the highest suicide rate in the South-East Asian region in 2016, a new report by the World Health Organization (WHO) has revealed. India's own official statistics, which map the number and causes of suicides in the country, have not been made public for the last three years, hindering suicide prevention strategies and efforts to execute the WHO's recommendations in this regard.

India's suicide rate stood at 16.5 suicides per 100,000 people in 2016, according to the WHO report. This was higher than the global suicide rate of 10.5.

The report presented suicide rates for countries and regions using data from the WHO Global Health Estimates for 2016. When classified according to region and income, India is part of the South-East Asia region and the Lower Middle-Income group of countries. India's suicide rate (16.5) was higher than the rate of its geographic region (13.4) and the rate of its income group (11.4).

### A. MOTIVATION

India reported an average 381 deaths by suicide daily in 2019, totalling 1,39,123 fatalities over the year, according to the latest National Crime Records Bureau (NCRB) data. A 3.4 per cent increase was observed in suicides during 2019 (1,39,123 suicides) as compared to 2018 (1,34,516) and 2017 (1,29,887), the data showed. The rate of suicide (incidents per 1 lakh population) rose by 0.2 per cent in 2019 over 2018, as per the data. According to the statistics by the NCRB, which functions under the Union Home Ministry, the suicide rate in cities (13.9 per cent) was higher as compared to all-India suicide rate (10.4 per cent) in 2019. The motivation behind designing this project is to reduce the increasing suicidal rate using technique of emotion detection.

### B. PROBLEM DEFINITION

To design system which involves extraction of facial features, and detection of stress using emotions expressed through face using the Convolutional Neural Network (CNN) algorithm and classify positive and negative emotions and detects the stress based on usual threshold value.

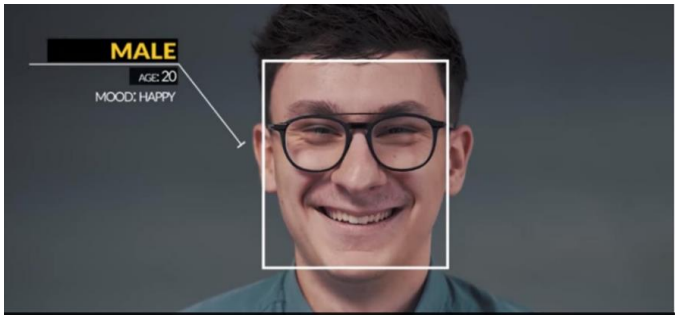
## II. METHODS AND MATERIAL

### 1. Face Detection

**Face Detection** is the first and essential step for **processing**, and it is used to detect **faces** in the images. A **facial detection** system uses biometrics to map facial features from a photograph or video.

It compares the information with a database of known **faces** to find a match. **Face detection** systems

use computer algorithms to pick out specific, distinctive details about a person's **face**.



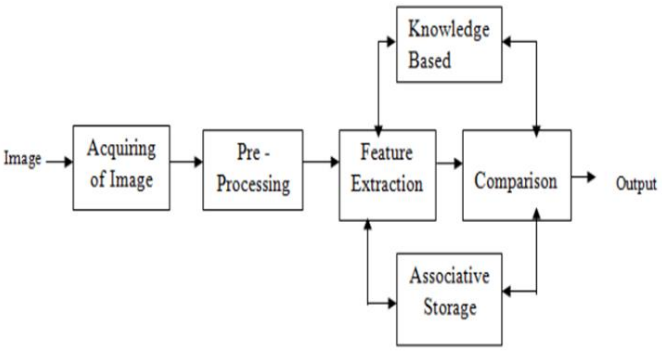

These details, such as distance between the eyes or shape of the chin, are then converted into a mathematical representation and compared to data on other **faces** collected in a **face** database.

## 2. Emotion Detection

**Emotion detection** is used to analyse basic facial expression of human. Emotion recognition system is constructed, including face detection, feature extraction and facial expression classification.


## 3. Methodology

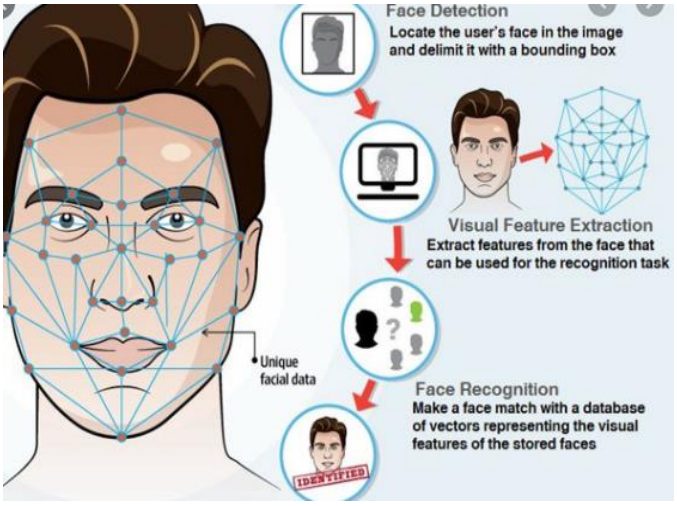
Face of the subject is captured using the camera module. This detected face is processed and the emotions are classified as either positive or negative emotions. The detected image is processed to identify the face of the subject using Convolutional Neural Network (CNN) algorithm.




This is plotted and an increase in the negative emotion can be inferred as increase in stress.

## 4. Feature Extraction

**Facial feature extraction** is the process of **extracting face** component **features** like eyes, nose, mouth, etc from human **face** image.

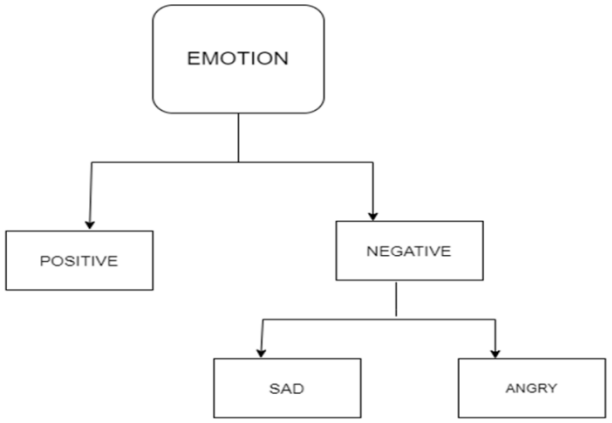



**Facial feature extraction** is very much important for the initialization of processing techniques like **face** tracking, **facial** expression recognition or **face** recognition.

## 5. Emotion Recognition

The emotions are to be extracted from the detected face. The image that is captured from the camera module, contains the facial features. The detected face is pre-processed (i.e.) cropped and resized. The detectors defined prior can be utilized to identify the emotion and sort them. It must be noted that viola-jones algorithm uses adaboost algorithm with cascading classifier, wherein a series of weak

classifier's classification with a satisfactory threshold is combined to give an acceptable outcome.




### 6. Set Stress Threshold

After the emotion is detected, it is plotted against the time axis. Over a period of time, it is observed and if it crosses an estimated threshold value, some action is performed.

## III. LITERATURE SURVEY

| Sr. No. | Paper | Author | Method |
|---|---|---|---|
| 1 | Emotion recognition and drowsiness detection using python | Anmol uppal, shweta tyagi, rishi kumar, seema sharma | K-nearest-neighbor (KNN) |
| 2 | Automatic facial expression recognition system | Balasubramani A, kalaivanan K vanan, karpagalakshmi RC, monikandan R | Neural networks |
| 3 | Short Research Advanced Project: Development of Strategies for Automatic Facial Feature extraction and Emotion Recognition | David Restrepo∗, Alejandro Gomez ´ | Neural networks |
| 4 | Facial emotion recognition in real-time and static images | Shivam Gupta | Support Vector Machines (SVMs) |
| 5 | A Literature Survey on motion Recognition System Using Facial Expressions | Rachoori Keerthi, A. Obulesh, Pallam Ravi, Deepika.S | K-nearest-neighbor (KNN) |
| 6 | Facial Emotion Recognition | Ma Xiaoxi, Lin Weisi, Huang Dongyan, Dong Minghui, Haizhou Li | Support Vector Machine (SVM) and Deep Boltzmann Machine (DBM) |

## IV. PROPOSED SYSTEM

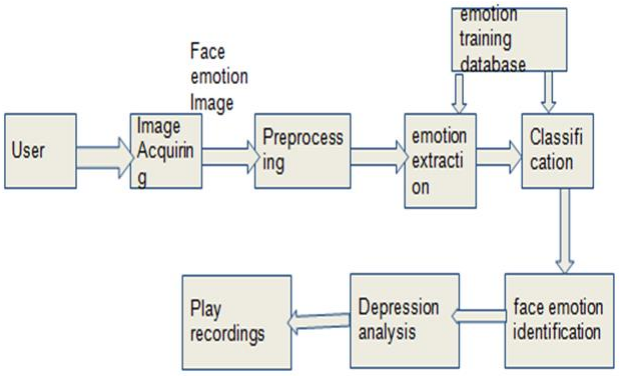



**Fig 1**. System architecture

### A. Mathematical Model

Receive input data, process the information, and generate output

**Step 1:** Load the input images in a variable (say X)

**Step 2:** Define (randomly initialize) a filter matrix. Images are convolved with the filter $Z1 = X * f$

**Step 3:** Apply the Relu activation function on the result $A = Relu(Z1)nf$

**Step 4:** Define (randomly initialize) weight and bias matrix. Apply linear transformation on the values

$Z2 = WT.A + b$

**Step 5:** Apply the Relu function on the data. This will be the final output $O = Relu(Z2)$

## V. SYSTEM REQUIREMENTS

Database Requirements

Dataset of user's face.

### A. Software Requirements

Operating System

Python 3

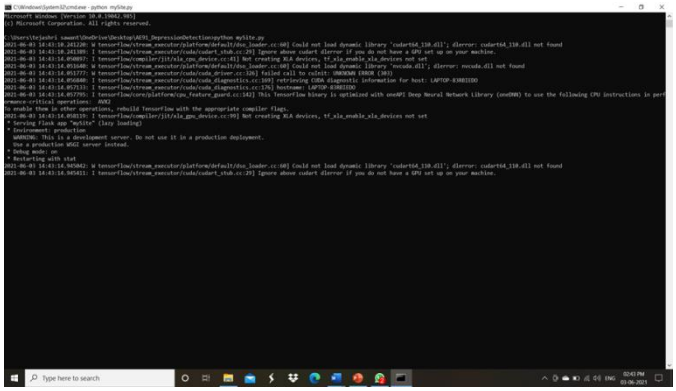
sublime

### B. Hardware Requirements

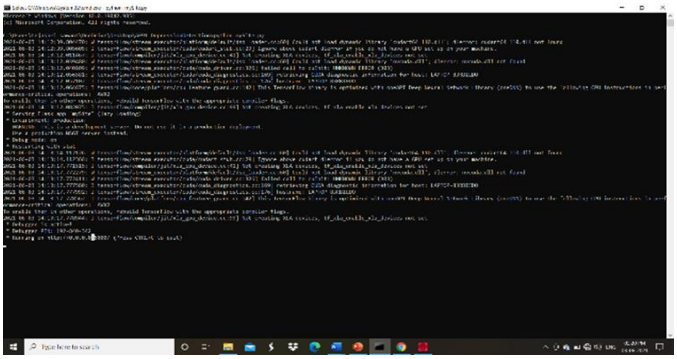
Pc/Laptop(4gb Ram/ above i3 processor)

## VI. RESULTS AND DISCUSSION

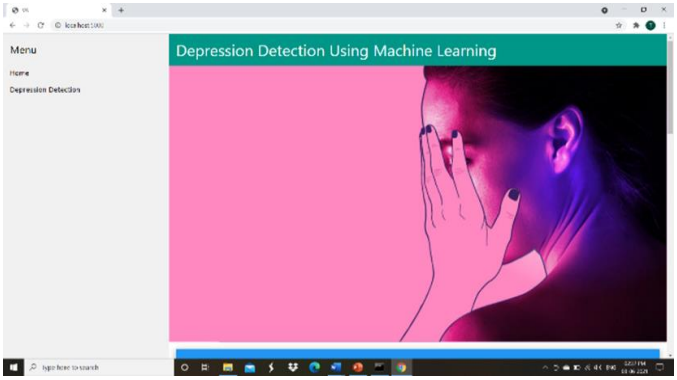
1. Face dataset created



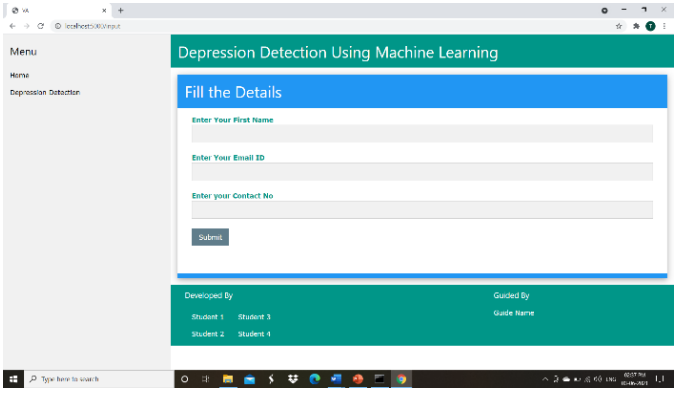
2. Trained the database



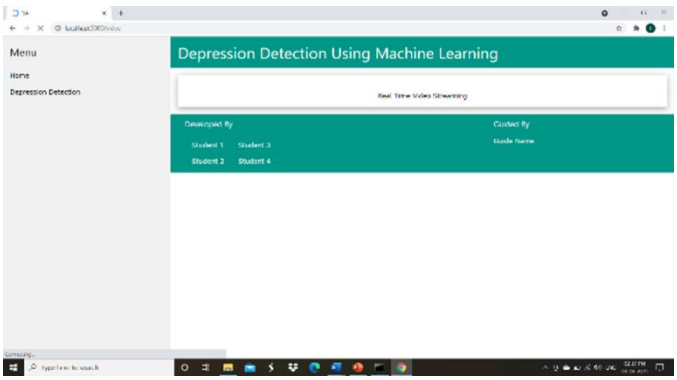
3. Home Page



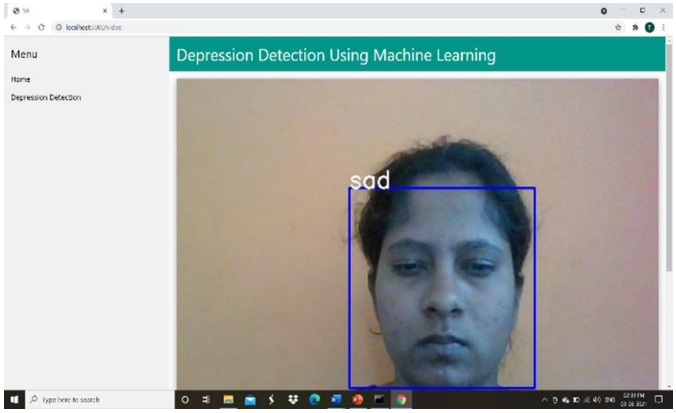

4. Fill User Details



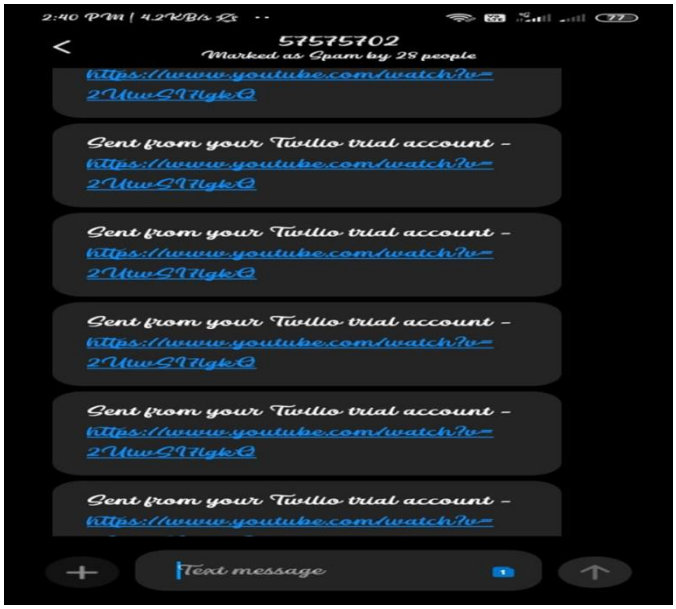

5. Real Time Video Start



6. Face Recognition




7. If it is Sad then Message send to user




## VI. CONCLUSION

In this project Depression detection is implemented by CNN using Keras that mainly focuses on detecting emotions that can reflect depression in an individual. Due to its efficiency or ease of implantation the above stated algorithms are selected for face detection and emotion recognition.

## VII. REFERENCES

[1]. Ekman, P. & Keltner, D. (1997). Universal facial expressions of emotion: An old controversy and new findings. In Segerstråle, U. C. & Molnár, P. (Eds.), Nonverbal communication: Where nature meets culture (pp. 27-46). Mahwah, NJ: Lawrence Erlbaum Associates.

[2]. Rajiv Radhakrishnan, Chittaranjan, "Suicide: An Indian perspective", Indian Journal of Psychiatry, (2012).

[3]. Soman C, Vijayakumar K, Ajayan K, Safraj S, Kutty V, "Suicide in South India: a community-based study in Kerala", Indian J Psychiatry, (2009), Vol.51, pp.261-264.

[4]. Deb, Esben Strodl, Jiandong Sun, "Academic Stress, Parental Pressure, Anxiety and Mental Health among Indian High School Students", International Journal of Psychology and Behavioral Science, (2015), Vol.5, Issue.1, pp.26-34.

[5]. P. Viola and M. Jones, "Rapid object detection was using a boosted cascade of simple features", CVPR, (2001), pp.511–518.

[6]. Damir Filko, Goran Martinovi´c, "Emotion Recognition System by a Neural Network Based Facial Expression Analysis", Automatika, (2013), Vol.54, Issue.2, pp 263–272.

[7]. Neha Gupta1 and Navneet Kaur, "Design and Implementation of Emotion Recognition System by Using Matlab", IJERA, (2013), Vol.3, Issue 4, pp.2002-2006.

[8]. Seyedehsamaneh Shojaeilangari, Wei-Yun Yau, Karthik Nandakumar, Li Jun, and Eam Khwang Teoh, "Robust Representation and Recognition of Facial Emotions Using Extreme Sparse Learning", IEEE Transactions on Image Processing, (2015), Vol.24, No.7, pp.2140-2153.

[9]. Bosker, Bianca, "AFFECTIVA's Emotion Recognition Tech: When Machines Know what you're feeling", (2013).

[10]. Vikramjit Mitra1etal, "Cross-Corpus Depression Prediction From Speech", ICASSP, (2015), pp.4769-4773.

[11]. Fuji Ren, Xin Kang, and Changqin Quan "Examining Accumulated Emotional Traits in Suicide Blogs with an Emotion Topic Model" IEEE Journal of Biomedical And Health Informatics, (2016), Vol.20, Issue.5, pp.1348-1351

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Online E-Voting System using Blockchain Technology

**Shubham Kumar[1], Abhishek Patil[1], Geeta Kotwani[1], Sharan Patil[1], Prof. Chaitanya Bhosale[2], Prof. Prashant Mandale[2]**

[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

India is the world's largest democracy with over one billion in population; India has over 668 million voters and 543 parliamentary constituencies. India is the largest democracy in the world. Voting is the bridge of government and governance. In recent years, the technology used in the voting process has been given a renewed focus. There are many security problems in the current voting system, and even simple security features are difficult to prove. There are many concerns about a voting system that can be proven right. There are some reasons why an electronic system is being used by the government to increase elections and reduce electoral expenses. There is still some scope for electronic voting systems, because there is no way to identify whether or not the user is authentic and to secure electronic voting machines from misconceptions by the electronic voting scheme. In order to increase safety and transparency between the users, the proposed system will develop a compatible high security voting machine with the help of Block-chain technology.

**Keywords:** Electronic Voting System, Voter ID, Security, Block Chain, Vote.

## I. INTRODUCTION

Voting, whether traditional ballet based or electronic voting (e-voting), is what modern democracies are built upon. In recent years' voter apathy has been increasing, especially among the younger computer/tech savvy generation. E-voting is pushed as a potential solution to attract young voters. For a robust e-voting scheme, a number of functional and security requirements are specified including transparency, accuracy, auditability, system and data integrity, secrecy / privacy, availability, and distribution of authority. A distributed network consisting of a large number of interconnected nodes supports Block-chain technology. Each of these nodes has their own copy of the distributed ledger that contains the full history of all transactions the network has processed. If the majority of the nodes agree, they accept a transaction. This network allows users to remain anonymous. A basic analysis of the block-chain technology suggests that it is a suitable basis for e voting and it could have the potential to make e-voting more acceptable and reliable.

## II. LITERATURE SURVEY

This paper [1], proposed secure voting system with fast voting results through RFID based biometric voting system. In this paper, there are two verification steps involved. First, RFID tag is used which contains the verification data, which is already stored in LPC 2148. Second, the Fingerprint scanner is used to check whether the RFID is belonging that particular person or not. The drawback of this paper is cost maximized due to use of RFID method.

In this paper [2], used of Aadhaar card provided by UIDAI with QR code present in it. Online instead of offline mode and storing the voting data to secured online server. Results can be displayed by admin after entering user id and password.

The proposed method [3] is to build a Smart voting system using fingerprint recognition technology that allows any voter in INDIA to cast the vote to their respective constituency from anywhere in INDIA by going to their nearest voting booth in the place of stay. In addition, to develop a secure smart voting system based on biometric recognition. Provides the voter to vote from any region within India to their Residential Constituency from the nearest Voting Booth with a secure voting process without neglecting to vote.

This paper [4], proposes protected voting system to avoid the unlawful voting. The authentication of an individual is made using biometric and capability of the voter is affirmed using the Aadhaar. In this system, the data stored in the Aadhaar card act main criteria for authentication and conformation. The security is provided through biometrics such as fingerprint. The fingerprint information stored in the Aadhaar is taken as the reference and used for authentication at the time of voting.

Basic electronic machine [5] which is used nowadays has some laggings like multiple vote casting from one member and invalidity of votes are checked automatically. To reduce these disadvantages, the smart automatically processed and fingerprints are used to reduce multiple vote casting in simple way.

This paper [6] has shown the possibility of establishing E-Voting protocol based on public-key encryption cryptosystem. The security of the proposed E-Voting depends on RSA public key encryption protocol. It allows the voter to vote from his/her own personal computer (PC) without any extra cost and effort. This protocol is proposed to replace the unreliable previous voting system, since voters feel justifiably confident that their votes will be counted.

This system [7] provides security from all type of attacks, when vote is travelling from voting client to voting server from their experimentation. These attacks include security threats from passive as well as active intruder. For authentication of voter instead of USERNAME, if we can use thumb impression of voter or capture photo of his/her face and compare it with photo stored in our database, it will be more secure.

In this paper [8], a block-chain-based voting system. It needs time to popularize block-chain for a voting system as it is a novel idea and voting itself is a crucial matter in a democratic country.

The proposed [9] model is more secure than other models and it is suitable for use in major elections on a large scale. After casting a vote with NCVVS system, the voter receives a confirmation email containing the ballot fingerprint (and also the fingerprint of the election) calculated by standard hash function SHA (256).

The proposed work [10] is based on the block-chain technology, which remove all the threats from the

communication link. It is a decentralized system, contain hashing and encryption concept for providing the security.

## III. PROPOSED METHODOLOGY

In our system Block Chain Concepts are applied to Online Voting System when we are developing a Smart E-voting system by taking advantage of block Chain concepts with web interface.

### - ECC (elliptic curve cryptography) Algorithm

Elliptic Curve Cryptography (ECC) is an approach to public-key cryptography, based on the algebraic structure of elliptic curves over finite fields.

ECC requires a smaller key as compared to non-ECC cryptography to provide equivalent security (a 256-bit ECC security have an equivalent security attained by 3072-bit RSA cryptography).

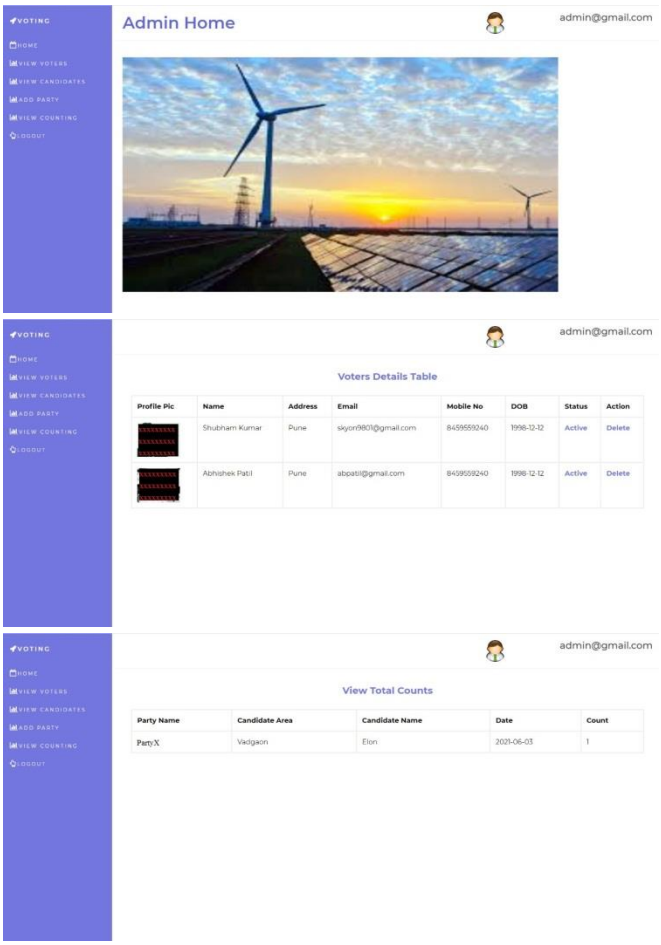
For a better understanding of Elliptic Curve Cryptography, it is very important to understand the basics of Elliptic Curve.

An elliptic curve is a planar algebraic curve defined by an equation of the form.

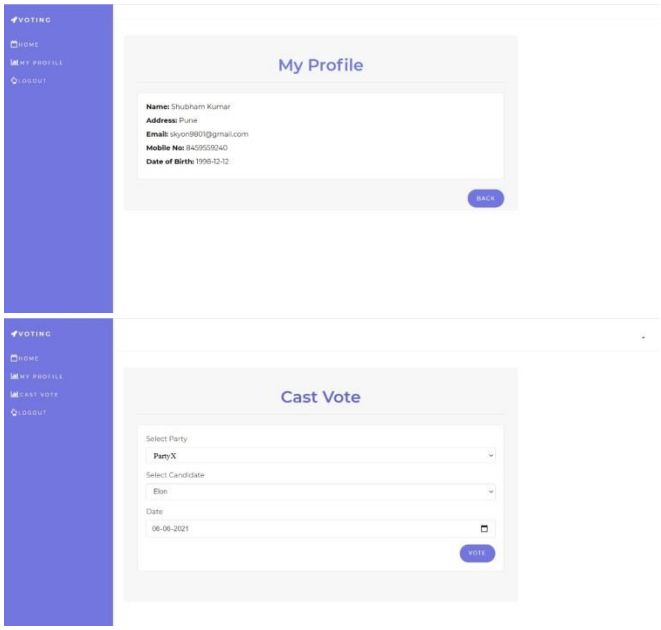
## IV. RESULTS & DISCUSSION

Experiments are done by a personal computer with a configuration: Intel (R) Core (TM) i3-2120 CPU @ 3.30GHz, 4GB memory, Windows 7, MySQL 5.1 backend database and Jdk 1.8. The application is web application used tool for design code in Eclipse and execute on Tomcat server.


The Home Page is very user friendly and can be easily understood by any average adult irrespective to his/her background. The Home Page acts as a common platform for the Voter, Candidate as well as the Admin. The voter and candidate can go ahead to their respective sections and register themselves accordingly, only to be verified and authorized by the admin from his login.




The Admin here acts as a supervisor as well as an arbitrator in the entire process. He/She is authorized to verify and authorize the voter as well as the candidate, only post authorization by the admin they are entitled to participate in the election process. The admin can also count the votes but he/she cannot control the voting process from his/her side neither he/she can trace back a particular vote to its voter.




The Voter once registered and authorized by the admin, can log into the system and view his/her details and cast his right: The Vote. While casting the vote he/she has 3 parameters to fill-up namely: Select Party (The Party he/she wants to vote), Select Candidate (The Candidate he/she wants to vote), and Date (The Date he/she is voting on).

**- Overall System Execution**

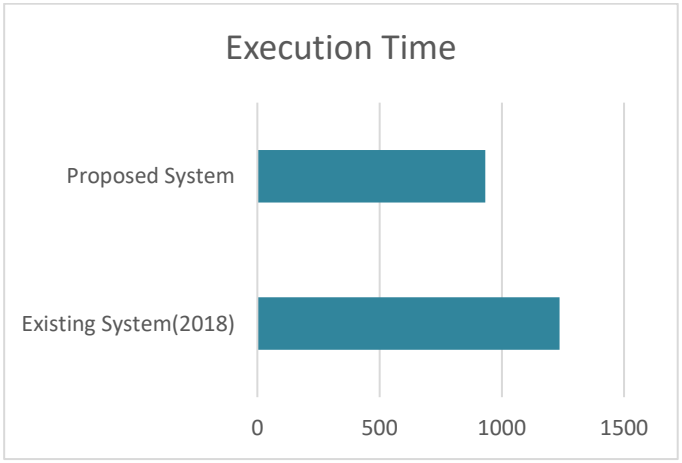



**Figure 1: Overall system execution graph**

| Existing System (2018) | Proposed System |
|---|---|
| 1236ms | 932ms |

**Table 1: Overall system execution table**

## V. CONCLUSION

This paper described, an electronic Voting system for small to medium sized Internet-based public opinion systems that provides privacy of vote, voter's authentication, auditability, security, double-voting prevention, fairness voting device from manipulating the authenticated voters voting choices.

## VI. ACKNOWLEDGEMENT

Special thanks to Dr. Pankaj Agarkar, HOD, Prof. Chaitanya Bhosale And Prof. Prashant Mandale, Department of Computer Engineering, Dr. D Y Patil School of Engineering for guidance and resource provision which helped in development of this project. Thanks to all associated faculties for providing all necessary help.

## VII. REFERENCES

[1]. J.Deepika, S.Kalaiselvi, S.Mahalakshmi, S.Agnes Shifani, "Smart Electronic Voting System Based On Biometric Identification-Survey", International Conference on Science Technology Engineering Management (ICONSTEM).

[2]. Ravindra Mishra, Shildarshi Bagde, Tushar Sukhdeve, J. Shelke, "Review on Aadhaar Based Voting System using Biometric Scanner", International Research Journal of Engineering and Technology(IRJET).

[3]. Girish H S, Gowtham R, Harsha K N, Manjunatha B, "Smart Voting System", International Research Journal of Engineering and Technology (IRJET).

[4]. K. Lakshmi, R. Karthikamani, N. Divya "Aadhar Card based smart e-voting system", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 8958, Volume-8, Issue-2S, December 2018.

[5]. G.Saranya, R.Mahalakshmi, J.Ramprabu, "Smart Electronic Voting Machine surveillance", International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 8958, Volume-8, Issue- 2S, December 2018.

[6]. Ashish Singh, Kakali Chatterjee, SecEVS: Secure Electronic Voting System Using Blockchain Technology, International Conference on Computing, Power and Communication Technologies (GUCON) Galgotias University, Greater Noida, UP, India. Sep 28-29, 2018.

[7]. Cosmas Krisna Adiputra, Rikard Hjort, and Hiroyuki Sato, A Proposal of Blockchain-based Electronic Voting System, Second World Conference on Smart Trends in Systems, Security and Sustainability.

[8]. Jena Catherine Bel.D, Savithra.K, Divya.M, A Secure Approach for E-Voting Using Encryption and Digital Signature, International Journal of Engineering Development and Research.

[9]. Abhijit J. Patankar, Kotrappa Sirbi, Kshama V. Kulhalli, "Preservation of Privacy using Multidimensional K-Anonymity Method for Non Relational Data", International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-8 Issue-2S10, September 2019.

[10]. Ashraf Darwish and Maged M El-Gendy, A New Cryptographic Voting Verifiable Scheme for E-Voting System Based on Bit Commitment and Blind Signature, International Journal of Swarm Intelligence and Evolutionary Computation.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# A Framework for Analyzing Real-Time Tweets to Detect Terrorist Activities

**Akshay Karale[1], Pranav Shinde [1], Pushpak Patil[1], Sanjay Parmar[1], Prof. Niyamat Ujloomwale[2]**

[1]Students, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India

[2]Assistant professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Terrorist organizations use different social media as a kind of tool for spreading their views and influence general people to join their terrorist activities. Twitter is one of the the most common and easy way to reach mass people within short time span. We have focused on the development of a system that can automatically detect terrorism-supporting tweets by real-time analyzation. In this system, we have developed a front-end system for real-time viewing of the tweets from twitter that are detected using this system. We also have compared the performance of the two different machine learning classifiers, Support Vector Machine (SVM) and Multinomial Logistic Regression and found that the first one works better than the second one. As our system is highly dependent on the data, for more accuracy we added a re-train module. By using this module wrongly classified tweets can be added to the training dataset and can train the whole system again for better performance. This system will help to ban the terrorist accounts from twitter so that they can't promote terrorism, their views or spread fear among general people in society.

**Keywords**—Social Media, Twitter, Terrorism, Real- Time Tweets, Machine Learning

**Problem Statement:** A Framework for Analyzing Real-Time Tweets to Detect Terrorist Activities.
The function of twitter data crawler module is to crawl real-time tweets from Twitter using Twitter Streaming API. The storage module stores the tweets temporarily.
Tweet classification module predicts the category of the tweet. The output module shows the output of the system. The training module builds the classification model which is used to predict the category of each tweet.

## I. INTRODUCTION

Internet technology has a lot of benefits. It is also recognized as the fundamental human right. The Internet has also proven to be highly dynamic means for the communication. One of the biggest technologies of the Internet is our social media technology. Social media comes in many forms

including blogs, photo sharing platforms, forums, business networks, social gaming, chat apps, social networks, etc.

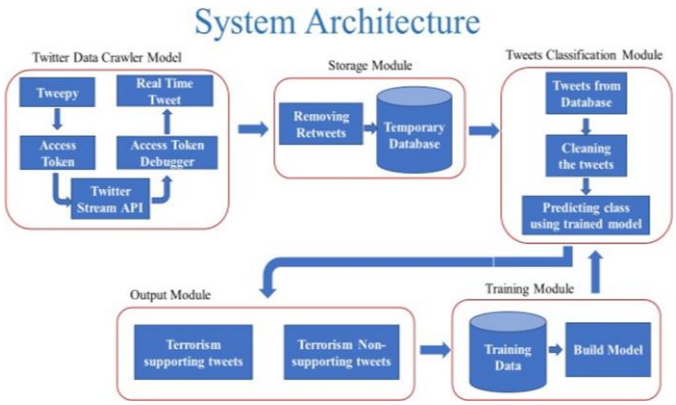



Figure 1: System Architecture

Terrorist organizations which are active on social media to promote their views and spreading propaganda are often leaderless. That makes tackling terrorist propaganda a difficult task. They used social media to recruit new members from all over the world. They also spread fear among the people of different countries by using Twitter and other social media platform. Among all social media platforms, Twitter is more public. When a tweet is posted on Twitter it can reach more people than other social media platforms. So, Twitter is the first choice of terrorist organizations to spread their views and propaganda. In the last two years, Twitter has suspended around million twitter account for spreading terrorism. Their approach of suspending an account is if someone reports any account, then they suspend the account if the account really promotes terrorism. It is a very time- consuming process. The motivation behind this project is to crawl tweets from the twitter in real-time and then analyze the tweets to determine the support of terrorism. This system will significantly improve the time to review the tweets supporting terrorism.

### A. The main features:

1. Countering terrorism and protecting human rights as mutually reinforcing goals.
1. Countering violent extremism and radicalization that lead to terrorism.
2. The development of co-operative, community-oriented approaches to counter terrorism.
3. Community policing as part of a comprehensive, human rights-compliant strategy to prevent terrorism.

## II. LITERATURE SURVEY

Rupali Patil al. [1] The procedure of sentiment analysis and its visualization is explained in detail concerning the topic Article 370. Sentiment analysis and opinion mining require detailed knowledge of how twitter and its python client Tweepy works to obtain the results. Python libraries like matplotlib and pandas are also used for simpler analysis and visualization of the tweets acquired. As a whole, from this paper it can be concluded that Pakistan is comparatively more concerned about the impact on its trade and has been somewhat more cynical when it comes to the sentiments of its Twitter users whereas India, on the other hand, is more concerned about increase in terrorism with a slightly positive attitude towards the revocation from the country's Twitter users. Therefore, the plots presented here accurately displays users' opinions during such a historical change in a Country's policy.

Babak Yadranjiaghdam [2] we have proposed a framework for real-time analysis of Twitter data. This framework is designed to collect, filter, and analyze streams of data and gives us an insight to what is popular during a specific time and condition. The framework consists of three main steps; data ingestion, stream processing, and data visualization. Data ingestion is performed by Kafka, a powerful message brokering system to import tweets, and to distribute it

based on Topics that it defines, and to make it available over consumers' nodes to be processed by analytical tools. Apache Spark is used to access these consumers directly and analyze data by Spark Streaming. This allows not only general processing tasks but more sophisticated and high-level data analytics and machine learning algorithms.

M. Ashcroft et al. [3] made an attempt to detect jihadist messages from Twitter. They used sentiment analysis to detect if a message supports ISIS or not. They used some keyword to extract tweets from the Twitter feed. The advantage of this work is it uses three different features such as Time-based features, Sentiment based features and Stylometric features to detect jihadist text. They got almost 90% accuracy using these features. One of the limitations of this study is they didn't use any real-time validation of their classification algorithm. Also, they didn't build any tools to detect jihadist text automatically.

Priyanka Harjule al. [4] Various techniques for both lexicon-based and machine learning based, have been applied in this project and the results are compared. It has been observed that for a totally new data/text machine learning based models trained over a related data are much more accurate than the classification based on standard dictionaries. This is because of the fact that the text that's being observed i.e the tweets are highly informal and do not use the standard grammar rules or the spelling and thus the data here is highly unstructured. The comparison results can be clearly observed among different machine learning algorithms also. As of now, among the algorithms used, RNN is observed to have the highest accuracy.

Walid M. et al. [5] studied to predict future support or opposition for ISIS from tweets. In this study, the authors used Twitter data to study the ISIS support of users. They used the bag of words model as feature vector which included individual terms, user mentions and hashtags. They used SVM with a linear kernel to train a classifier to predict the support or opposition of ISIS. They obtained about 87% accuracy using the SVM classifier model. One limitation of their approach is, they didn't consider real-time validation of their method.

S. Azrinaet al. [6] studied to detect terrorism from text using sentiment analysis. The advantage of their study is they did a comparative analysis on several techniques to detect terrorism from the text. They did a comparative analysis of Neural Network, Support Vector Machine, Sentiment Analysis with Naive Bayes and Lexicon based approach. Then they finally adopted and improved Naive Bayes method for their research. One of the limitations of this study is it uses user behavioral analysis to improve the accuracy of Naive Bayes algorithm as it shows medium level accuracy compared to other algorithms. But it is not always possible to analyse a user's behavior if he doesn't have that much of tweet history on Terrorism.

Lisa K. [7] studied to classify tweeps and tweets as being multipliers of jihadism. They used Machine Learning to build a classifier that can analyze a tweet to find multipliers of jihadism. They used AdaBoost classifier to train a model. They analyzed both Arabic and English tweets. They obtained about 84% accuracy for Arabic tweets and 98% accuracy for English tweets. They didn't test their model in a real-time environment.

Pooja W. et al. [8] studied to classify radical tweets in the categories such as Media, War terrorism, Extremism, Operations, Jihad, Country and Al-Qaeda. They built a dictionary to classify the tweets into different categories. They built the dictionary by looking at tweets containing hashtags like Al-Qaeda, Jihad, Terrorism, and Extremismand by collecting relevant words for their purpose. They built a process based on the presence of the word in the dictionary. Their process obtained about 90% accuracy. Their study is proof that keywords can be used successfully in classifying tweets.

Lee S. et al. [9] compared four text mining methods: Latent Semantic Analysis (LSA), Probabilistic

Latent Semantic Analysis (PLSA), Latent Dirichlet Allocation (LDA), and Correlated Topic Model (CTM) using topic model and spam filtering. They concluded that PLSA shows the highest performance and next to LDA, CTM, and LSA in order. One of the limitations of this study is they only considered statistical approach and didn't extend their study to syntactical and morphological approach. A work on topic discovery based on text mining techniques was presented by Pons P. et al. [10]. They proposed a hierarchical clustering algorithm that combines partitioned and agglomerative approaches to produce topic hierarchies. They considered document place, time reference, and textual contents. This resulted in less time complexity while detecting a new topic. The accuracy of their proposed method is not satisfactory

## III. SYSTEM ARCHITECTURE AND DESIGN

The system architecture of Twitter Terrorism Detection Framework comprises five basic modules:

1) Twitter data crawler module
2) Storage module,
3) tweet classification module
4) Output module,
5) Training module.

### A. Crawling Data from Twitter

We have crawled real-time tweets from the twitter by using twitter streaming API. To do this we have provided four keys that we have collected from the Twitter developer website.The 4 keys are:

1. Access Token
2. Access Secret Key
3. Consumer Token
4. ConsumerSecret Key.

These 4 key are needed to get access to Twitter API. Using these 4 key we can set up a twitter real listener. This listener will allow us to collect real-time tweets from Twitter. As we have used python to build our framework, we have used a python library that helped us getting access to the Twitter streaming API. We have used a python library 'Tweepy' API.Algorithm 1 illustrates the Twitter. While collecting real-time tweets we have made sure to handle all kinds of error that would break the connection the connection breaks, the crawler module will stop working. That's why we have checked for several exceptions such database exception, limit exceeded exception etc

**Algorithm 1: Crawl Real-Time Tweets**

**Input:** Developer Access keys
**Require:** Real-Time tweets streaming from twitter

1. Begin
2. Call Twitter API
3. Call Twitter Streaming API
4. SetaccessTkn = ""
5. Set accessTknSec = ""
6. SetconsumerKey = ""
7. SetconsumerSec = ""
8. tweets = STREAM-LISTENER(accessKeys)
9. Create a table named all_tweets having the field username, tweet, tweet_id, type
10. if tweets != null then
11. if tweets['retweet'] = False then
12. Insert tweets['text'] , tweets['username'] and tweets['tweet_id'] into the database
13. End

### B. Pre-Processing Crawled Data

After data is crawled from the twitter the tweets are in raw form using algorithm 2. We can't use these tweets to classify or train. So, we have cleaned the tweet before using n classification or training. To handle the special component of a tweet, we have done the following pre- processing tasks.

1. URL is removed
2. Any user mention is removed
3. Hash (#) from the hashtag is removed
4. Contracted words are converted to their long form
5. Tokenized the tweet

**Algorithm 2: Cleaning raw tweets.**

**Input:** raw tweets
**Require:** clean the raw tweets

1. Begin
2. remove url from raw tweets
3. remove hash (#) symbol of hashtags from raw tweets
4. remove user mentions form raw tweets
5. remove retweet symbol RT from raw tweets
6. convert the raw tweets into lowercase form
7. search for contracted from in tweets
8. if contracted form found then
9. replace it with long form
10. search for stop words in tweets
11. if stop words found then
12. remove the stop words
13. tokenize the tweets
14. apply stemming on the tweets
15. End

### C. Building Model and Generating Output

To predict the class of the tweet we needed a mathematical model which can classify the tweets based on their features. We have used two classification algorithm. These are SVM (Support Vector Machine) and Logistic Regression. Using our training dataset we built a model that can classify the tweets accurately. By using the model that we have built in the previous steps, we can classify a tweet. The classification result is 0 or 1 or 2. According to this result, we can show the type of tweets. Algorithm 3 is used to classifyreal-time tweets.

**Algorithm 3: Classification of real-time tweets**

**Inputs:** model file
**Require:** Classification of the tweets

1. Begin
2. classifier = load(model)
3. for each tweets in the all_tweets table in the database
   do
4. clean the tweets
5. type = classifier.predict(clean_tweets)
6. if type = 0 then
7. result = “Terrorism Supporting”
8. elseiftype = 1 then
9. result = “Terrorism Non-Supporting”
10. elseif type = 2 then
11. result = “Random”
12. show the result
13. End

## IV. IMPLEMENTATION DETAILS

In this section, we have provided the implementation of our proposed system in details. In order to start crawling from Twitter, we to the twitter developer portal to get access tokens and consumer secrets. An Application Programming Interface (API) is a standardized system of programming instructions that allows web platforms to access and share information from one another. Like many other web tools, almost every social network has released its API for researchers and other web developers to use. We have used Twitter Streaming API to crawl data from Twitter. API (Application Platform Interface) will allow us to authenticate acc by the authority of the social network. If the API keys are valid, the crawler program can access the Twitter API and crawl tweets from the twitter. If the API keys are not valid then the API will send an API access error.

To get the API access keys first we have opened an account on the Twitter developer website. In the website, we have created an app named

"TwitterCrawlerFramework". This provided us with the access tokens.

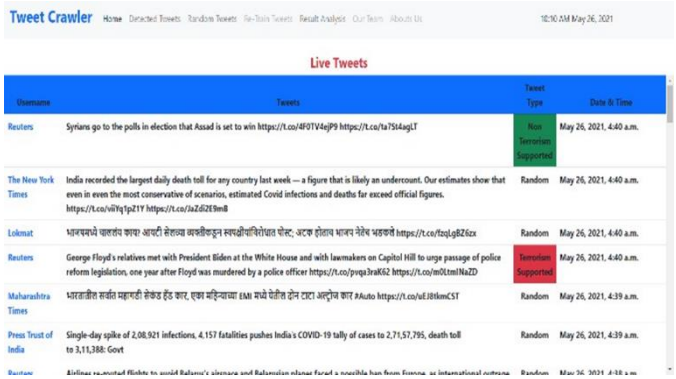



Figure 2: Home.

Fig. 2 shows the screen where live tweets are shown. Each tweet which is random, terrorism supported or terrorism non shown here with respective level. Random tweets are shown as normal box while the terrorism supported are shown using the red color box and non- terrorism supporting tweets are shown using green color box.


Figure 3: Detected Tweets.

Fig. 3 shows the screen of the detected terrorism supported tweets.

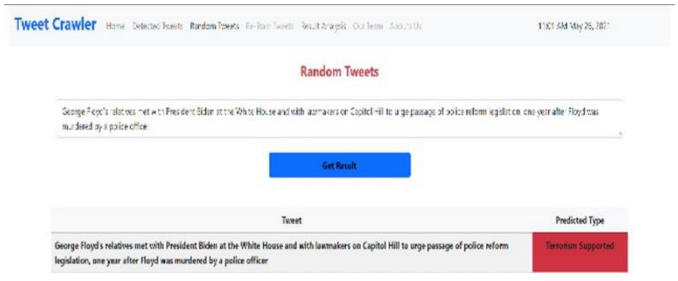



Figure 4: Random Tweets Classification.

Fig. 4 shows the Random Tweets Classification . The Random Tweets tab gives a helping feature to the user to manual enter any random tweet and check it's nature i.e whether it's terrorism supported tweet, non-terrorism supported tweet or it's just a normal random tweet.


Figure 5: Re-Train Tweet.

Fig. 5 shows the Re-Train Tweets. If model predicts wrong output then we can again re-train tweet model using re-train function.

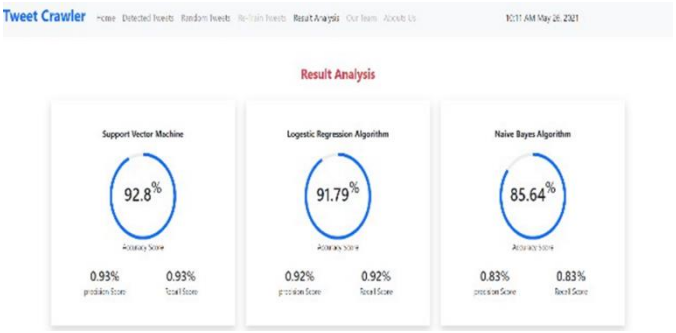



Figure 6: Result Analysis.

Fig. 6 shows the Result Analysis Tab. The Result Analysis tab show the efficiency of the system. It shows the precision of Support Vector Machine (SVM), Logistic Regression Algorithm and the Naïve Bayes Algorithm.

## V. IMPLEMENTATION RESULT AND ANALYSIS

### A. Experimental setup

The developed Twitter Terrorism Detection System has been implemented on a machine having the windows 10, 3.40 Core i5-8250U processor with 8GB

RAM. The detection system has been developed with Python and the user interface is developed with Bootstrap CSS, HTML, JavaScript, jQuery and AJAX. We have also used postgres database to store our data and used django framework to populate the user interface with data from database. For coding , we have used Virtual Studio Code software for coding .

### B. Performance Evaluation

#### a) Crawling Mechanism of Dataset

We crawled tweets from Twitter to make our dataset. We have collected tweets to make our dataset in three different ways. These are:

1. Collected random real-time tweets.
2. Collected tweets by using some keywords related to Terrorism.
3. Collected tweets from some known terrorist twitter Account.

After collecting all the tweets we manually analyzed the tweets and divided them into three different classes and finally put them in a CSV file. In the CSV file, there are two columns one is tweets and another type. Tweets column contains the tweets and the type column contains the type of that tweet in numeric form. We have used the numeric form to represent the type of tweet because the classifier algorithm needs the type to be in the numeric form so that it can predict the outcome of a tweet.

TABLE 1. Summary of collection method

| Collection Type | No. of Tweets |
|---|---|
| Randomly from Real-Time Tweet Stream | 21482 |
| Using Terrorism-Related Hashtags | 20557 |
| Crawling Terrorist Profiles | 18105 |
| Total= | 60144 |

In Table 1, the number of tweets collected using different collection methods are shown. These tweets are further analysed and categorized into different classes to make our dataset.

TABLE 2. Summary of the Training dataset

| Types of Tweets | Numerical value in Dataset | No. of Tweets |
|---|---|---|
| Terrorism Supporting | 0 | 9397 |
| Terrorism Non-Supporting | 1 | 21650 |
| Random | 2 | 29097 |
| | Total= | 60144 |

In Table 2, a number of tweets of different types in our training dataset are given. Using this dataset we have trained our classifier to build a model

## VI. CONCLUSION

In this Paper, We have discussed Twitter Terrorism Detection framework to detect tweets that support terrorism from real-time tweets stream. Our framework collects real time tweets by using twitter streaming API and analyses every tweet. It can categorize the tweet into three different classes and based on the category of the tweet, it is stored and shown in the different screen of our web application. We have also created a re-train module which will be used to retrain our model so that it can perform more accurately. Our framework has a user- friendly interface. The overall accuracy of our proposed system is 92% and 91.7% for SMV and Regression respectively.

## VII. FUTURE SCOPE

In our study, the framework is limited to collect and analyze tweets that are written in English. So, further research can be done to extend this study to support other languages. The accuracy of the proposed system can be enhanced by analyzing shared images or videos on Twitter by users. Our framework will falsely detect sarcastic text as a terrorism-supporting tweet. So, further research can include detecting sarcastic tweets which actually doesn't support terrorism. The System should also provide access to the users if the user doesn't have the access to the twitter API.

## VIII. REFERENCES


[1]. Twitter Data Visualization and Sentiment Analysis of Article 370 ,2019.Author: Rupali Patil , Nishant Gada ,Krisha Gala

[2]. Developing a Real-Time Data Analytics Framework for Twitter Streaming Data,2017.Author: Babak Yadranjiaghdam , Seyedfaraz Yasrobi , Nasseh Tabrizi

[3]. M. Ashcroft, A. Fisher, L. Kaati, E. Omer, and N. Prucha, "Detecting jihadist messages on twitter," in Intelligence and Security Informatics Conference (EISIC) European, Sept 2015, pp. 161–164.

[4]. Text Classification on Twitter Data,2020.Author:Priyanka Harjule , Astha Gurjar , Harshita Seth , Priya Thakur

[5]. M. Walid, D. Kareem and W. Ingmar, " #FailedRevolutions: Using Twitter to Study the Antecedents of ISIS Support," in Monday, 2015.

[6]. S. A. Azizan and I.A. Aziz, "Terrorism Detection Based on Sentiment Analysis Using Machine Learning," Engineering and Applied Sciences 2017.

[7]. K. Lisa, "Detecting multipliers of jihadism on twitter." International Conference on Data Mining Workshop (ICDMW) IEEE, 2015.

[8]. P.Wadhwaand M. P. S. Bhatia, " Case study in Computing Achievements and Trends, Radical Messages onTwitter Using Security Associations 273. 2014.

[9]. P.P. Aurora, R.B. Llavori, and based on text mining techniques." &management, vol-43, no-3, pp.752

[10]. M. Trupthi, S. Pabboju and G. Narasimha, "Sentiment Analysis on Twitter Using Streaming API", Computing Conference, 2017.

[11]. S. Lee, J. Baker, J. Song and comparison of four text mining methods". In International Conference on 2010.

[12]. Tweepy, Streaming With Tweepy [online] Tweepy.readthedocs.io. Available at: http://tweepy.readthedocs.io/en/v3.5.0/streaming_how_to.html 2017

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Advanced Driver Assistance System for Autonomous Vehicle

**Divya Sathe[1], Sayali Mhaske[1], Kunal Milkhe[2], Swapnil Nangare[3]**
[1]UG Student, Department of Computer Engineering, Dr DY Patil School of Engineering, Pune, Maharashtra, India
[2]HOD, Department of Computer Engineering, Dr DY Patil School of Engineering, Pune, Maharashtra, India
[3]Assistant Professor, Department of Computer Engineering, Dr DY Patil School of Engineering, Pune, Maharashtra, India

## ABSTRACT

Autonomous vehicles are increasing day by day and have become more important as several techniques and sensors being applied for vehicle control. Autonomous vehicles, Intelligent and Advanced Driving Assistant Systems are promising and reliable solutions to enhance road safety, traffic issues and passengers' comfort. As increasing safety of the people and reducing road accidents and thereby saving lives is one of important concern in the context of Advanced Driver Assistance Systems. The most complex and challenging task of autonomous vehicles is road lane detection and road boundaries detection. Lane detection is the most difficult problem because of the varying road conditions. Such applications require advanced algorithms that demand powerful computers with high speed processing capabilities. Keeping intelligent vehicles on the road until it reaches its destination, remains a great challenge in some cases, particularly when someone is driving at high speed. The very first task in autonomous vehicles is the navigation that is based on system vision which will acquire RGB images of the road for advanced processing. The second task is the dynamic controller of the vehicle according to its position, speed and direction. In this paper we did the survey of various approaches and the algorithm techniques.

**Keywords :** Advanced Driving Assistant Systems, lane detection, Autonomous road vehicles.

## I. INTRODUCTION

At present, the number of vehicle owners is increasing and the cars with autonomous driving function have attracted more and more attention. Self-driving vehicles are expected to outnumber conventional vehicles by 2050, most of them capable of autonomous driving at all times. Fully self-driving vehicles projected to hit widespread adoption by 2035 . Society of Automotive Engineers (SAE) classifies full automation as vehicles able to (a) Complete a journey from point A to point B without any input from the driver beyond setting the destination, (b) Drive at least as well as an average person, on any road, adhering to all the traffic laws of its time and (c) Handle any extreme situation without the driver taking over, thus foregoing the need to include any manual controls, i.e. a wheel and pedals.

With the demand on reducing traffic accidents, congestion, energy consumption and emission Autonomous Driving technology has been recognized as one of the promising solutions to these critical, social and environmental issues. In real time lane detection system for autonomous vehicles, a lane detection and changing system is to warn and notify the vehicle driver when the vehicle is about to cross the lane and its dedicated path without the signal to turn. These terms are designed in such a way that it can reduce accidents, traffic and other circumstances where the driver is not paying attention or is distracted by phone call or other things. These mechanisms are totally beneficial for road management and traffic controlling at a greater part. In this paper, we have introduced a computer vision-based technique that can perfectly detect the lanes in any suitable environment. Since most lanes on the road have clear lines whereas most of them are straight lines so that it is easy to detect the lanes and the lane detection technology for proper roads has reached a high milestone during these recent years. However, due to irregular surface and curved shape of the roads, and the unstructured roads are vulnerable to light, shadow, water and other factors that result in poor detection performance.

One of the earliest and most widespread adaptations of lane detection is in lane departure warning systems. The component alerts the driver when the car starts steering outside the lane, be it for the reason of drivers getting distracted or sleep deprivation. It is especially useful on highways where the monotony of driving may exacerbate inattention. Out of 13.5 lakh people who die each year in road accidents globally India accounts 1.5 lac deaths. According to the crashes caused by human factor including speeding, distractive driving alcohol and other behaviours take up to 93% of total crashes. By minimizing the involvement of human operation Autonomous vehicles have the potential to reduce car crashes.

## II. PROBLEM DOMAIN AND MOTIVATION

As mentioned previously, the most appealing feature of self-driving cars is the ability to transport passengers and/or cargo, from point A to point B, autonomously in a safe manner. In order to achieve this goal, the vehicle should have some form of road following system, traversing through both rural and busy urban streets while abiding all the existing traffic laws. Two common ways for a car to follow a road, without modifying existing roads or attaching various sensors on other cars, is to either use GPS tracking or machine vision. According to the U.S. government, the accuracy of a GPS tracking unit is approximately 7.8m at 95% confidence level.

Lanes on average are between 2-4m width, so the accuracy of a GPS is not good enough to keep a car within its lane reliably. The other approach, machine vision, would rely on lane markings and other road features extracted from the footage of an on-board camera to enable lane detection and subsequent following. However, lane markings may not be always clearly defined, the camera view may get obstructed by on-road traffic or other obstacles and various weather and light conditions could affect the visibility of the camera.

Nevertheless, this approach provides the most accurate horizontal position of a car within a road and with well-thought algorithms and hardware add-ons, the aforementioned problems can be alleviated or downright eliminated. Ideally, you would use both methods to get to set point B, machine vision and other sensors to keep the car on its lane and avoid obstacles, and GPS tracking to identify the vehicle's position in relation to the set final destination and derive a path to it.

The lane following discipline also includes intersection scenarios, missing lane markings and obstacles on the road. The parking discipline may also require lane following for the purpose of keeping the car in the middle of its lane.

| | |
|---|---|
| Lane Detection | Extract and identify observed lane markings correctly. |
| Lane Following | based on the extracted lane markings or other approximations. The trajectory should lead to the middle of the lane the car is located in. |

## III. METHODOLOGY

The block diagram of a proposed lane detection system is shown in the figure below:

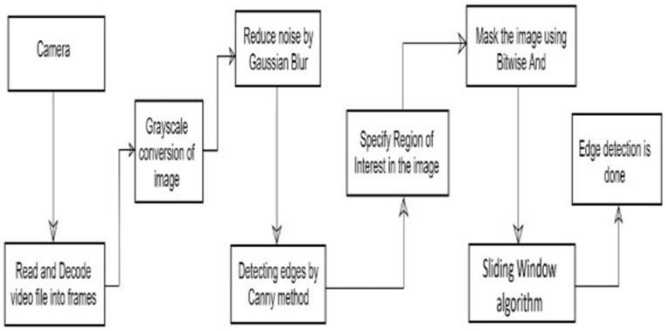



Figure 1: Block diagram of Lane Detection System

Each blocks of a block diagram are explained one by one below:

1. **Capture input image:** Hardware like Camera is used to take input image.

2. **Image Pre-processing:** To enhance the quality of image, we need to pre-process it. The processes like noise reduction, edge detection, contrast and colour management are applied.

3. **Region of interest:** In determining the computational complexity of lane identification and LDI system, ROI plays important role to detect it. Here only the selected are as is detected or taken for the next level of processing. These selected ROI images are then used for lane detection using a proposed algorithm. The selection of ROI reduces the processing time of the frames.

4. **Slide Window Search:** The sliding window algorithm will be used to differentiate between the left and right lane boundaries so that we can fit two different curves representing the lane boundaries.

   The algorithm itself is very simple. Starting from the initial position, the first window measures how many pixels are located inside the window. If the amount of pixels reaches a certain threshold, it shifts the next window to the average lateral position of the detected pixels. If not enough pixels are detected, the next window starts in the same lateral position. This continues until the windows reach the other edge of the image.

5. **Lane Detection:** Here, the Lane will be marked with a separate color. Two important algorithms Canny Edge Detection and Hough Transform are used to implement Lane Detection System which are explained below:

Two important algorithms Canny Edge Detection and Slide Window Search are used to implement Lane Detection System which are explained below:

❖ **Canny edge detection:**

Canny edge detection is a multistep algorithm that can detect edges with noise supressed at the same time. Smooth the image with a Gaussian filter to reduce noise and unwanted details and textures.

The Process of Canny edge detection algorithm can be broken down to 5 different steps:

1. Apply Gaussian Filter to smooth the image in order to remove the noise
2. Find the intensity gradients of the image.

3. Apply non-maximum suppression to get rid of spurious response to edge detection.
4. Apply double threshold to determine potential edges
5. Track edge by hysteresis. Finalize the detection of edges by suppressing all the other edges that are weak and not connected to strong edges.

### ❖ SLIDE WINDOW SEARCH.

Sliding window is one naive but effective approach to detect the objects in the surroundings. What we actually do is, we run a scan over the image and pick parts of it and then we input that portion of the image to a pre-trained classifier to check if it observes in it, what it is trained to observe.

A sliding window approach is used to detect lanes and their curvature. It uses information from previous histogram function and puts a box with lane at the center. Then puts another box on top based on the positions of white pixels from the previous box and places itself accordingly all the way to the top of the frame. This way, we have the information to make some calculations. Then, a second degree polynomial fit is performed to have a curve fit in pixel space. From each peak on the histogram, we initialize windows and then slide them vertically. Each window is horizontally centered in the end of each iteration by its detected pixels inside. Depending on the number of windows whose number of pixels inside requiring a minimum population, we can predict a confidence level of detected line to say if it's a line or not.

### ❖ IMAGE PROCESSING

**readVideo()**

First up is the readVideo() function to access the video file drive.mp4 which is located in the same directory.

**processImage()**

This function performs some processing techniques to isolate white lane lines and prepare it to be further analyzed by the upcoming functions. Basically, it applies HLS color filtering to filter out whites in the frame, then converts it to grayscale which then is applied thresholding to get rid of unnecessary detections other than lanes, gets blurred and finally edges are extracted with cv2.Canny() function.

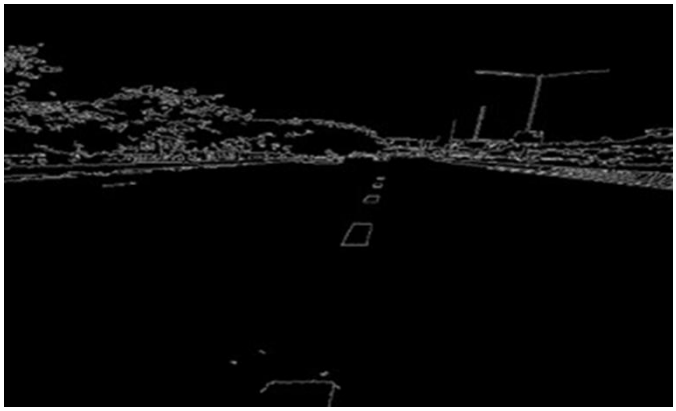
**perspectiveWarp()**

Now that we have the image we want, a perspective warp is applied. 4 points are placed on the frame such that they surround only the area which lanes are present, then maps it onto another matrix to create a Birdseye look at the lanes. This will enable us to work with a much refined image and help detecting lane curvature.

## IV. RESULTS

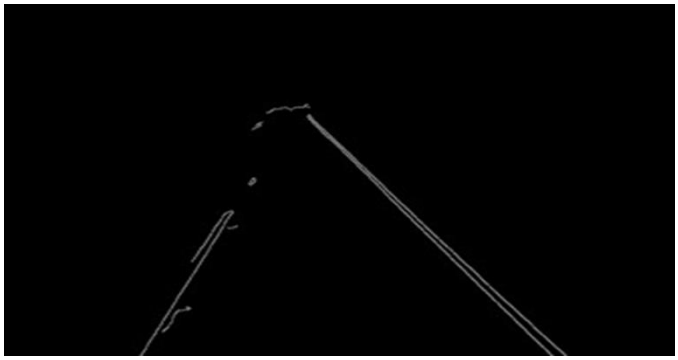
ORIGINAL IMAGE

GRAYSCALE IMAGE



CANNY IMAGE

REGION OF INTEREST



BITWISE AND

FINAL IMAGE

## V. CONCLUSION

So in this paper we have given the full implementation details of the project Lane line Detection for autonomous vehicles. This project was created to demonstrate how a lane detection system works on cars equipped with a front facing camera. Finding a place in more and more vehicles, this system is an essential part of the advanced driver assistance systems used in autonomous / semi-autonomous vehicles. This feature is responsible for detecting lanes, measuring curve radius or tightness of a curve and monitors the offset from centre. With this information, the system significantly improves safety by making sure the vehicle is centered inside the lane lines, as well as adds comfort if it is also configured to control the steering wheel to take gentle curves on highways without any driver input. This is a simplified version of what is used in production vehicles, and best functions if good conditions are provided clear lane lines, stable light conditions.

## VI.ACKNOWLEDGEMENT

It gives us a great pleasure and immense satisfaction to present this research Paper on “Advanced Driver Assistance System For Autonomous Vehicle” which is the result of unwavering support, expert guidance and focused direction of our guide " Pankaj Agarkar, HOD Computer” to whom we express our deep sense of gratitude and humble thanks, for his valuable guidance throughout the paper work. The success of this paper has throughout depended upon an exact blend of hard work and unending co-operation and guidance, extended to me by the superiors at our college. Furthermore, I am indebted to our coguide Prof. Pooja Shinde, and Principal Dr. Ashok Kasnale, whose constant encouragement and motivation inspired me to do my best. Last but not the least we sincerely thank to our colleagues, the staff and all others who directly or indirectly helped us and made

numerous suggestions which have surely improved the quality of our work.
Divya Sathe, Sayali Mhaske
Kunal Milkhe, Swapnil Nangare

## VII. REFERENCES

[1]. Liang D, Guo YC, Zhang SK et al. Lane detection: A survey with new results. JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY 35(3): 493–505 May 2020.
[2]. Gurveen Kaur,"Lane Detection Techniques: A Review International Journal Of Computer Applications (0975-8887) Volume 112-No 10, February 2015
[3]. M. Aly, "Real time detection of lane markers in urban streets," IEEE Intelligent Vehicles Symposium, pp. 7-12, June 2008.
[4]. Zu Andras F. Cela, Luis M. Bergasa, Franklin L. Sánchez and Marco A. Herrera, "Lanes Detection Based on Unsupervised and Adaptive Classifier", 978-0-7695- 5042-8/13 $26.00 © 2013 IEEE.
[5]. Zu Whan Kim, Member, IEEE, Robust Lane Detection and Tracking in Challenging Scenarios", IEEE transactions on intelligent transportation systems, Vol. 9, No. 1, March 2008.
[6]. Hyo-Kyun Jeong, Yong-Jin Jeong, IEEE, and YiFan Lin, "Design of Hough transform hardware accelerator for Lane detection", 978-1-4799- 2827-9/13/$31.00 ©2013 IEEE. A
[7]. Borkar, M. Hayes, M. Smith, and S. Pankanti, "A layered approach to robust lane detection at night," in Proc. IEEE Workshop Comput. Intel. Vehicles Veh. Syst., 2009, pp. 51-57.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Detection of Depression

**Chaitanya Suryawanshi[1], Taufik Tamboli[1], Saurav Tayade[1], Prashant Yeole[1], Prof. Niyamat Ujloomwale[2]**
[1]Department of Computer Engineering, Savitribai Phule Pune University, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Depression is ranked as the largest contributor to global disability and is also a major reason for suicide. Still, many individuals suffering from forms of depression are not treated for various reasons. Previous studies have shown that depression also has an effect on language usage and that many depressed individuals use social media platforms or the internet in general to get information or discuss their problems. In particular, a convolutional neural network based on different word embeddings is evaluated and compared to a classification based on user-level linguistic metadata. An ensemble of both approaches is shown to achieve state-of-the-art results in a current early detection task. Furthermore, the currently popular ERDE score as metric for early detection systems is examined in detail and its drawbacks in the context of shared tasks are illustrated. A slightly modified metric is proposed and compared to the original score. Finally, a new word embedding was trained on a large corpus of the same domain as the described task and is evaluated as well.Social networks have been developed as a great point for its users to communicate with their interested friends and share their opinions, photos, and videos reflecting their moods, feelings and depressions. This creates an opportunity to analyze social network data for user's feelings and depressions to investigate their moods and attitudes when they are communicating via these online tools.

**Keywords :** Social network, Emotions, Depression, Depression analysis

## I. INTRODUCTION

According to World Health Organization (WHO), more than 300 million people worldwide are suffering from depression, which equals about 4.4% of the global population. While forms of depression are more common among females (5.1%) than males (3.6%) and prevalence differs between regions of the world, it occurs in any age group and is not limited to any specific life situation. Depression is therefore often described to be accompanied by paradoxes, caused by a contrast between the self-image of a depressed person and the actual facts . Latest results from the 2016 National Survey on Drug Use and Health in the United States report that, during the year 2016, 12.8% of adolescents between 12 and 17 years old and 6.7% of adults had suffered a major depressive episode (MDE). Precisely defining depression is not an easy

task, not only because several sub-types have been described and changed in the past , but also because the term "being depressed" has become frequently used in everyday language. In general, depression can be described to lead to an altered mood and may also be accompanied. The proliferations of internet and communication technologies, especially the online social networks have rejuvenated how people interact and communicate with beach other electronically.

The applications such as Facebook, Twitter, Instagram and alike not only host the written and multimedia contents but also offer their users to express their feelings, emotions and depressions about a topic, subject or an issue online. On one hand, this is great for users of social networking site to openly and freely contribute and respond to any topic online; on the other hand, it creates opportunities for people working in the health sector to get insight of what might be happen in gat mental state of someone who reacted to a topic in a specific manner. In order to provide such insight, machine learning techniques could potentially offer some unique features that can assist in examining the unique patterns hidden in online communication and process them to reveal the mental state (such as 'happiness', 'sadness' , 'anger', 'anxiety', depression) among social networks' users.

## II. LITERATURE REVIEW

Previous studies have already shown that depression also has an effect on the language used by affected individuals. For example, a more frequent use of first person singular pronouns in spoken language was first observed in 1981. An examination of essays written by depressed, formerly-depressed, and non-depressed college students at University of Texas confirmed an elevated use of the word "I" in particular and also found more negative emotion words in the depressed group. Similarly, a Russian speech study found a more frequent use of all pronouns and verbs in past tense among depression patients. A recent study based on English forum posts observed an elevated use of absolutist words (e.g. absolutely, completely, every, nothing1) within forums related to depression, anxiety, and suicidal ideation than within completely unrelated forums as well as ones about asthma, diabetes, or cancer. The knowledge that language can be an indicator of an individual's psychological state has, for example, lead to the development of the Linguistic Inquiry and Word Count (LIWC) software. By utilizing a comprehensive dictionary, it allows researchers to evaluate written texts in several categories based on word counts. A more detailed description of LIWC. With a similar purpose, Differential Language Analysis Toolkit (DLATK) an open-source Python library, was created for text analysis with a psychological, health, or social focus. Driven by the growing availability of data, for example through social media, and the technological advances that allow researchers to work with this data, ethical considerations are becoming more and more important in the field of Natural Language Processing (NLP). Based on these developments, NLP has changed from being mostly focussed on improving linguistic analysis towards actually having an impact on individuals based on their writings. Although Institutional Review Boards (IRBs) have been well-established to enforce ethical guidelines on experiments that directly involve human subjects, the authors note that NLP and data sciences in general have not constructed such guidelines. They further argue that language "is a proxy for human behaviour, and a strong signal of individual characteristics" and that, in addition, "the texts we use in NLP carry latent information about the author and situation".

A more detailed description of LIWC. With a similar purpose, Differential Language Analysis Toolkit (DLATK) an open-source Python library, was created for text analysis with a psychological, health, or social focus. Driven by the growing availability of data, for example through social media, and the technological advances that allow researchers to work with this

data, ethical considerations are becoming more and more important

| Year | authors | Data |
|---|---|---|
| 1981 | University of Texas | more frequent use of first person singular pronouns in spoken language |
| 2017 | Almeida, H., Briand, A., Meurs, M.J | Detecting early risk of depression from social media user-generated content. In: Proceedings Conference and Labs of the Evaluation Forum CLEF |
| 2018 | Cacheda, F., Fernandez, D., Novoa, F., Carneiro, V.: | Artificial intelligence and social networks for early detection of depression. |
| 2017 | Trotzek, M., Koitka, S., Friedrich, C.M | Linguistic metadata augmented classiers at the clef 2017 task for early detection of depression. In: Proceedings Conference and Labs of the Evaluation Forum CLEF |
| 2014 | Prieto, V.M., Matos, S., Alvarez, M., Cacheda, F., Oliveira, J.L.: | Twitter: a good place to detect health conditions. |
| 2017 | Aldarwish MM, Ahmad HF | Predicting depression levels using social media posts. In: 2017 IEEE 13th international Symposium on Autonomous decentralized system |

**Table 1.** Summary of Literature review

## III. DEPRESSION ANALYSIS

### 3.1. DEFINITION

Depression and Subjectivity are mainly context and do- main dependent. Not only the changes in vocabulary are the reason behind that but one more reason is the dual meaning or depressions of same expression in different domains. Consider the example of expression 'go and read the book'. In case of book reviews this expression gives the positive polarity about the product but in case of movie review the same expression gives negative polarity about the product. Depression Analysis is more focused on extraction of polarity about a particular topic rather than assigning a particular emotion to the text. Opinion Mining and Depression Analysis are the branches of Text Mining which refer to the process of extracting nontrivial patterns and interesting information from unstructured script documents. We can say that they are the addition to data mining and knowledge discovery. Opinion Mining and Depression Analysis focus on polarity detection and emotion recognition correspondingly. Opinion Mining has more marketable potential higher than data mining as it the most natural form of storing the information in text format. It is much complex task than data mining because it has to deal with unstructured and fuzzy data. It is a multi-disciplinary area of research because it constitutes adoption of techniques in information retrieval, text analysis and extraction, auto-categorization, machine learning, clustering, and visualization.

Though Depression Analysis and Opinion Mining might look the same as the fields like traditional text mining or fact based analysis, it varies because of following facts. Depression Classification is the binary polarity classification which deals with a relatively small number of classes. Depression classification is easy task compared to text auto-categorization. While Opinion mining exhibits many additional tasks other than depression polarity detection like summarization and all.

### 3.2. LEVELS

We can divide depression analysis in following levels. [5]

#### 3.2.1. Document

The task at this level is classifying the depression for document. The document is on single topic is considered. Thus texts which comprise comparative learning cannot be considered under this level.

#### 3.2.2. Sentence

The task at this level goes to the sentences; it deters-mines whether each sentence expresses a positive opinion, negative opinion, or neutral view. If a sentence states no opinion means it is a neutral. This level of analysis is closely related to subjectivity classification. The subjective statement displays the polarity of an entity in affirmative-negative terms i.e. good-bad terms. Hence it is easy to obtain depression from it. But Objective statement does not give separation directly by affirmative-negative terms.

These are abstract sentences which are fact based.

### 3.2.3. Entity or Aspect

Aspect level gives detailed analysis. The core task of entity level is to identification of aspect of the text [1]. For example in a review of mobile if a customer says," Sound is good but the handset is not handy." In this review the aspect are sound and handiness. Here depression analysis becomes two level task i.e. finding the aspects in the text and then classifying in respective aspect. Aspect level depression analysis is superior to Document and Sentence level depression analysis. Depression analysis of topic or body which may or may not be hidden in the document is done. Thus comparative statements are also part of entity level depression analysis [6].Comparative study of detection analysis of depression is included in this paper.

## 3.3. APPROACHES

We can do opinion mining and depression analysis in following ways: keyword spotting, lexical affinity, statistical methods.

### 3.3.1. Keyword Spotting

In this technique the text is categorized based on the presence of fairly unambiguous words present in it. Thus the words or keywords present in the text have the importance with respect to depression analysis.

### 3.3.2. Lexical affinity

For a particular emotion, Lexical affinity assigns arbitrary words a probabilistic similarity.

### 3.3.3. Statistical methods

It calculates the valence or target of affective keywords and word co-occurrence frequencies on the base of a large training corpus. In early work it was aim to classify entire document into overall affirmative or negative. These systems mainly depend on supervised learning approaches which depend on manually labeled data. The examples of such systems are movie or product review databases. Many times depressions are not restricted to document level texts. It can be extracted from sentence level text. In such cases depression analysis can be done using detected opinion-bearing lexicon items. Or depressions are not limited to particular target, they can contrary towards same topic or multiple topics can be present in the same document [7]...

## 3.4. FEATURES

Depression features are as follows:

### 3.4.1. Terms presence and frequency

These features are nothing but individual words or word n-grams and their frequency counts. It either uses the term frequency weights or gives binary weighting to the words.

### 3.4.2. Parts of speech (POS)

It set up finding adjectives from the text, as they are important indicators of opinions.

### 3.4.3. Opinion words and phrases

These words themselves express opinion about the product or service in the text. For e.g. good or bad, like or hate. Some phrases also express opinions without using opinion words.

Negations: the presence of negative words may change the opinion orientation like not good is equivalent to bad.

## 3.5. METHODOLOGIES

Depression Classification techniques can be roughly divided into Lexicon based approach, Machine Learning approach and hybrid approach. The Machine Learning Approach (ML) applies the famous ML

algorithms and it uses linguistic features. The Lexicon-based Approach depends on a depression lexicon. Lexicon is a collection of known and precompiled depression terms. It is again divided into dictionary-based approach and corpus- based approach which use semantic or statistical methods to find depression polarity of the text. The Hybrid Approach combines both approaches and it is very common with depression lexicons playing a key role in the majority of methods.

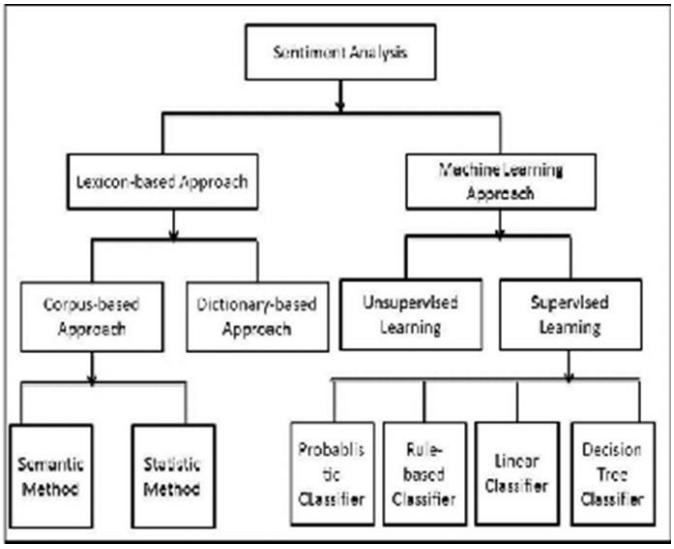



**Fig. Depression Analysis Techniques [8]**

Nearly all companies need Depression Analysis and Opinion Mining for different applications in different scenarios. In many product review websites like Yelp, Opinions reviews and feedbacks are explicitly asked in their web interfaces.

Depression Analysis is not only limited to product reviews but expands it wing to many fields like political/governmental issues. Opinion Mining can increase capabilities of Customer Relation- ship Management (CRM) and Recommendation Systems by collecting positive and negative depressions of the consumer. By using Depression Analysis techniques wired systems displaying advertisements can detect web pages that contain sensitive content inappropriate for trailers placement.

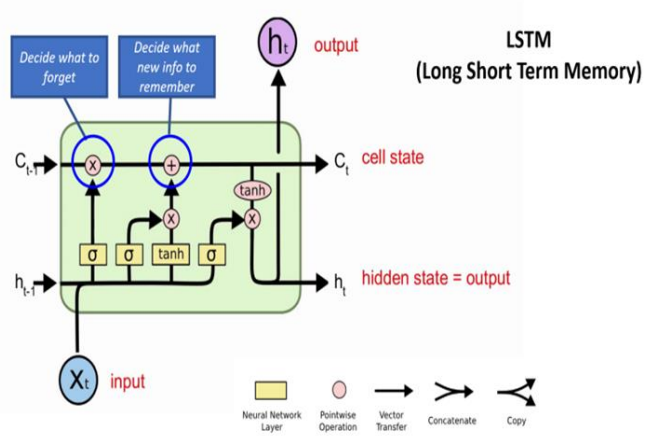
Companies are applying different marketing strategies like collecting opinions of general public about the products and services.

These depressions can be mined using Depression Analysis for Business Intelligence. Not only the commercial market but government intelligence also uses opinion mining to monitor the negative communications over social media.

## IV. SYSTEM ARCHITECTURE

There are a number of ways to analyze the information, but the reality is that mental health, specifically depression, is a subjective and complex topic. While it may be possible to quantify the degree to which one might be depressed based on a Tweet, the only real question that matters for this project is, is an individual exhibiting linguistic markers indicative of depression? Knowing the question and the subjective nature of mental illness, a binary classification model made the most sense for this project. While a logistic regression model made sense as a benchmark model, a Long Short Term Memory network (LSTM) model wound up being the most robust for the project at hand. A recurrent neural network allows information to be passed from one step of a network to another, and are ideal for sequences, lists, and other language processing problems. A LSTM is capable of learning long-term dependencies and work incredibly well on a large variety of problems. The LSTM + CNN model takes in an input and then outputs a single number representing the probability that the tweet indicates depression. The model takes in each input sentence, replaces it with its embeddings, and then runs the new embedding vector through a convolutional layer. The convolutional layer passes the structure that it learns from the sequential data into a LSTM layer. The output of the LSTM layer is then fed into a Dense model for prediction.

Once the model was designed and built, the issue then became refining the model to achieve the best results.




The system will send the tweets to be analyzed and stored the results in the database. The tweets will be analyzed in all three models. The system will return the predicted depressions which are Positive, Negative or Neutral. When the system returns two Positive results and one Negative or Neutral result, the system will take the Positive predicted depression as for the Overall Predicted Depression, same as for two Negative results and two Neutral results. The tweets are then analyzed using three different techniques which are Naïve Bayes Classifier technique, NLP techniques and Deep Learning technique.

After the depression of each user tweets is calculated, the depression percentage is then calculated based from the total positive and total negative tweets. If the users have a high percentage of positive tweets, it will classify the users as an optimistic person that implies the user is no depression related. Meanwhile, users that have a high percentage of negative tweets, it will classify the users as an optimistic person that can implies the users might be depression related.

## V. DEPRESSION ANALYSIS IN TWITTER

Depression analysis is all about extracting opinion from the text. There are various aspects, reasons, orientation of extracting these emotions according to reason behind the analysis. Event detection, location detection etc. tasks can be done on tweets.

When this task is accomplished on twitter data, the framework or architecture to do depression analysis varies according to what type of result one want to achieve from the tweets. One more important factor behind the varying nature of flow of twitter depression analysis is use of different methodologies and techniques.

Many times researchers derive their own framework or flow to do depression analysis to increase efficiency of the result. Some of common steps in twitter depression analysis and the keywords in it are defined below:

### 5.1. PREPROCESSING

Despite of these generalized orientation of framework of twitter depression analysis, we can frame up this topic into the following workflow. Thus the generalized steps involved in this framework are as follows:

Before starting depression analysis, the data preprocessing need to be done.

#### 5.1.1. Removal of Non-English Tweets

When the tweets are extracted from big datasets like TREC or Clue web dataset, it contains English as well as non-English tweets.

Therefore, we have to run language identification on each tweet, and have to delete from our collection all tweets that are assigned a 0-probability of being English.

### 5.2. FEATURE SELECTION

#### 5.2.1. Lexicon Features

Based on the subjectivity of the word we can classify the words into positive, negative and neutral lexicons. We have to compare each word with predefined word net libraries.

#### 5.2.2. Part-of-speech Features

Parts-of speech features i.e. nouns, adverbs, adjectives, etc. in each tweets are tagged.

#### 5.2.3. Micro-blogging Features

By creating binary features we can detect the presence of positive, negative, and neutral emotions. By the presence of abbreviations and intensifiers we can classify tweets in positive, negative and neutral. Online available slang dictionaries can be used for emotions and abbreviations [11].

#### 5.2.4. Steps to Extract Features

##### 5.2.8.1. Case Normalization

In this step entire document is converted into lowercase.

##### 5.2.8.2. Tokenization

Tokenization is splitting up the systems of text into personal terms or tokens. This procedure can take many

#### 5.2.5. Removal of Re-tweets

We have to delete any text that followed an RT token (as well as the RT token itself), since such text typically corresponds to quoted (retweeted) material.

#### 5.2.6. Conversion to ASCII

Many tweets contain unusual or non-standard characters, which can be problematic for down-stream processing. To address these issues, we have to use a combination of BeautifulSoup5 and Unidecode6 to convert and transliterate all tweets to ASCII.

#### 5.2.7. Removal of Empty Tweets

After completing all of the other pre-processing, we have to delete any empty tweets.

#### 5.2.8. Restoration of Abbreviations

We can restore popular abbreviations used in the tweets, to their corresponding original forms using a lexicon of abbreviations (e.g. “wknd" to “week-end").Punctuations are kept since people often express depression with tokens such as “:)”, “:-)". These emotions can also be used for depression classification [10]. types, according to the terminology being examined. For English, effective tokenization technique is to use white space and punctuation as token delimiters.

##### 5.2.8.1. Stemming (Snowball)

Stemming is the procedure of decreasing relevant to-kens into a single type of token. This procedure contains the recognition and elimination of suffixes, prefixes, and unsuitable pluralizations.

##### 5.2.8.2. Generate n-Grams

Character n-grams are ‘n’ nearby figures from a given feedback sequence. For example, a 3- gram of a phrase ’FORM’ would be ‘_ _ F’, ’_FO’, ‘FOR’, ‘ORM’,

## VI. PROJECT SNAPSHOTS

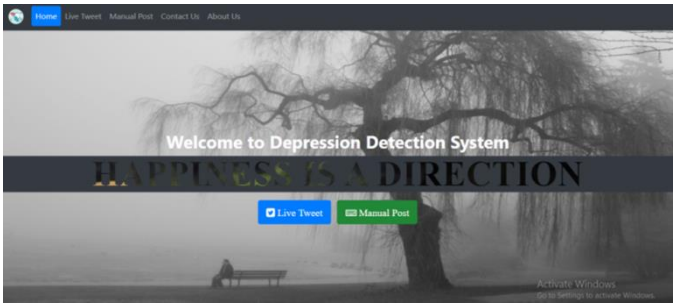



Fig. represents Homepage

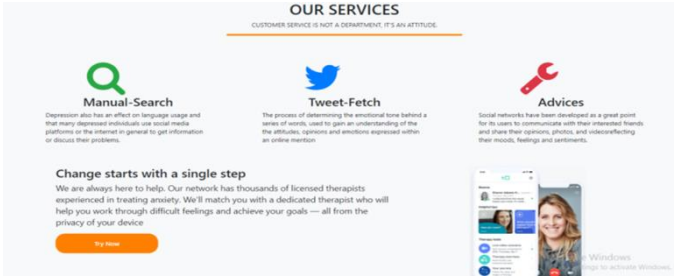



Fig. represents Our Services

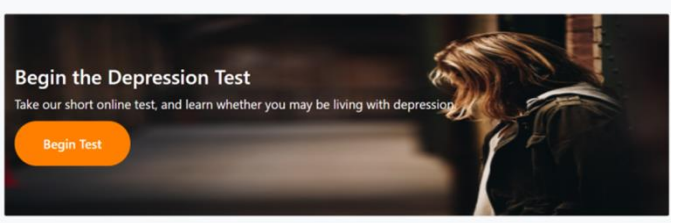



Fig. represents Depression Test

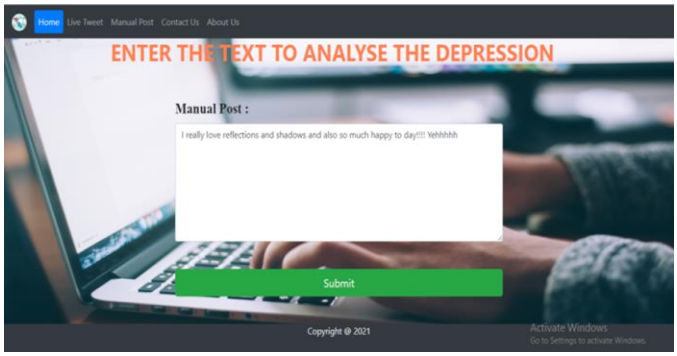



Fig. represents Manual Post

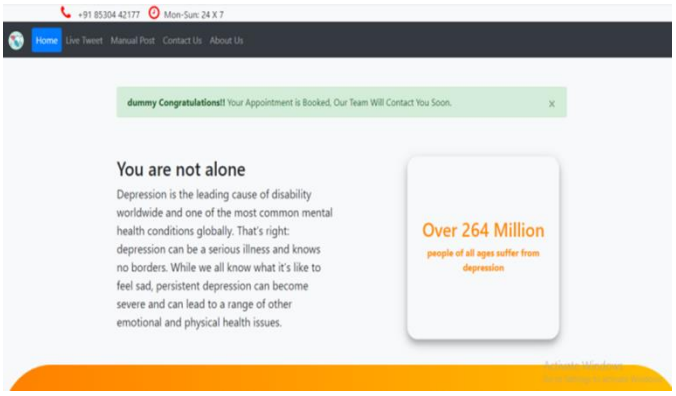



Fig. represents Appointment

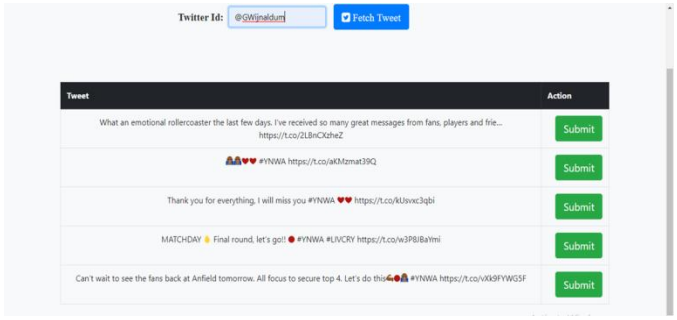



Fig. represents Twitter posts

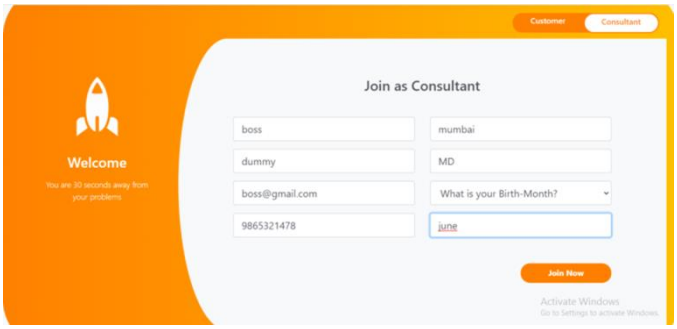



Fig. represents Consultant Registration

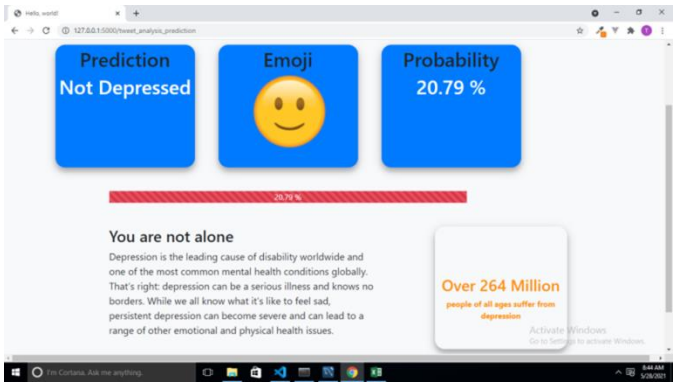



Fig. represents result

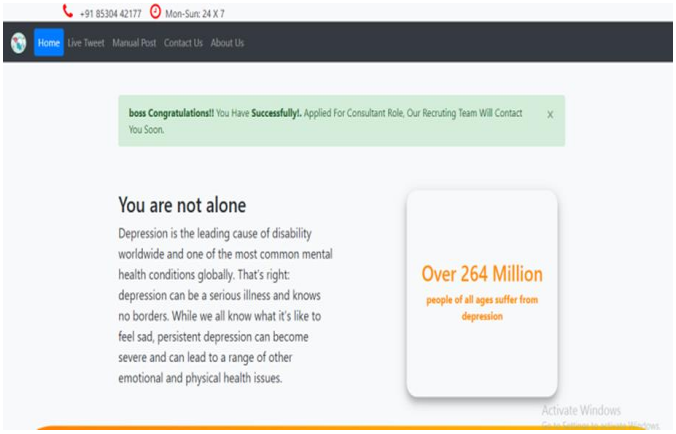



Fig. represents Consultation result

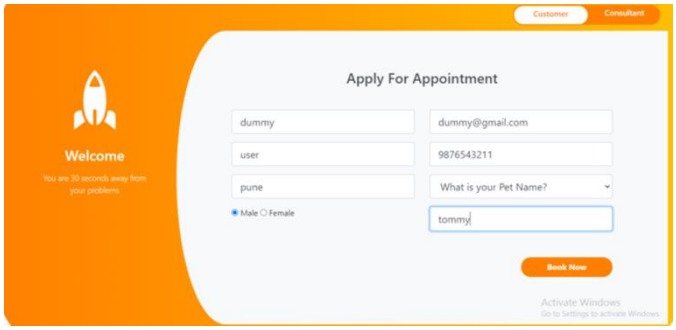



Fig. represents Appointment Registration

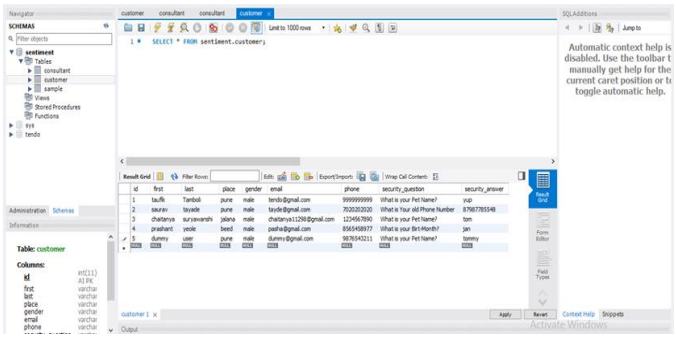


Fig. represents Appointment Database

## VII. FUTURE SCOPE

The propose approach is currently incapable of interpreting sarcasm. It can be overcome by exhaustive study of fundamentals in depression detection. Currently not feasible to develop a multi-language base system.

It can be overcome by further study.

In the future, depression detection will deliver deeper, beyond the concept of the number of likes, comments, and shares in a post, to reach and comprehend the significance of social media conversations and what they reveal about consumers.

As a result, depression detection tools like Bytes View are becoming necessary for these businesses to survive in such a competitive market.

Right now we have worked with only the very simplest unigram models; we can improve those models by adding extra information like closeness of the word with a negation word.

We could specify a window prior to the word (a window could for example be of 2 or 3 words) under consideration and the effect of negation may be incorporated into the model if it lies within that window.

The closer the negation word is to the unigram word whose prior polarity is to be calculated, the more it should affect the polarity.

For example if the negation is right next to the word, it may simply reverse the polarity of that word and farther the negation is from the word the more minimized ifs effect should be.

## VIII. CONCLUSION

In this paper exhibited the capability of using or measuring and detecting major depression among its users. To give a clear understanding of our work, numbers of research challenges were stated at the start of this paper. The analytics performed on the selected dataset, provide some insight on the research challenges: What depression is and what are the common factors contributing toward depression. While we feel moody, sad or low from time to time, few people encounter these emotions seriously, for drawn out stretches of time (weeks, months or even years) and in some cases with no apparent reason. Despondency is something other than a low state of mind—it's a genuine condition that influences someone's physical and emotional feelings. Depression can influence any of us anytime. However, some phases or events make us more vulnerable to depression. Physical and emotional changes associated with growing-up, losing a loved one, beginning a family, retirement may trigger some emotional influx that could lead toward depression for few people. What are the factors to look for depression detection in social networking comments?

It is important to remember that depressive emotions have several signs and symptoms spread across various categories as reported in Based on signs and symbols divided dataset into 5 emotional variables (positive, negative, sad, anger, anxiety), 3 temporal categories (present focus, past focus and future focus), 9 standard linguistic dimensions (e.g., articles, prepositions, auxiliary verb, adverbs, conjunctions, pronoun, verbs and negations)How to extract these factors from social sites comments? To extract the above-mentioned factors, we applied Linguistic Inquiry and Word Count (LIWC) on our dataset. The LIWC2015 Dictionary is the heart of the text analysis strategy. It processes our comments on a 'line by line' basis within and across columns of spread sheet and accesses a single text within a spread sheet and analyse each line sequentially and reads one target word at a time.

What is the relationship between these factors and attitudes toward depression?

The relationship between the above-mentioned issues with the attitudes towards depression are varies from person to person. When is the most influential time to communicate within depressive Indicate Facebook user? In this study, got 54.77% depressive indicative

Facebook users communicate with their friends from midnight to midday and 45.22% from midday to midnight.

Depression can influence any of us anytime. However, some phases or events make us more vulnerable to depression.

## IX. REFERENCES


[1]. Depression and Other Common Mental Disorders: Global Health Estimates. World Health Organization, 2017.

[2]. A. T. Beck and B. A. Alford, Depression: Causes and Treatment. Second Edition. University of Pennsylvania Press, 2009.

[3]. Key Substance Use and Mental Health Indicators in the United States: Results from the 2016 National Survey on Drug Use and Health. Rockville, MD: Centre for Behavioural Health Statistics and Quality:Substance Abuse and Mental Health Services Administration,2017. [Online]. Available: https://www.samhsa.gov/data/

[4]. E. S. Paykel, "Basic concepts of depression," Dialogues in Clinicaln Neuroscience, vol. 10, no. 3, pp. 279–289, 2008.

[5]. Global Health Estimates 2015: Deaths by Cause, Age, Sex, by Country and by Region, 2000-2015. World Health Organization, 2016.

[6]. J. Alonso, M. Codony, V. Kovess, M. C. Ange rmeyer, S. J. Katz, J. M. Haro, G. De Girolamo, R. De Graaf, K. Demyttenaere, G. Vilagut et al., "Population level of unmet need for mental healthcare ineurope," The British Journal of Psychiatry, vol. 190, no. 4, pp. 299

[7]. P. S. Wang, M. Angermeyer, G. Borges, R. Bruffaerts, W. T. Chiu, G. De Girolamo, J. Fayyad, O. Gureje, J. M. Haro, Y. Huang et al., "Delay and failure in treatment seeking after first onset of mental disorders in the world health organization's world mental health survey initiative," World Psychiatry, vol. 6, no. 3, p. 177, 2007.

[8]. A. Rahman, S. U. Hamdani, N. R. Awan, R. A. Bryant, K. S. Dawson, M. F. Khan, M. M.-U.-H. Azeemi, P. Akhtar, H. Nazir, A. Chiumento et al., "Effect of a multi component behavioural intervention in adults impaired by psychological distress in a conflict affected: A randomized clinical trial," JAMA, vol.316, no. 24, pp. 2609–2617, 2016.

[9]. G. Schomerus, H. Matschinger, and M. C. Angermeyer, "Them stigma of psychiatric treatment and help-seeking intentions for depression," European Archives of Psychiatry and Clinical Neuroscience ,vol. 259, no. 5, pp. 298–306, 2009.

[10]. R. Whitley and R. D. Campbell, "Stigma, agency and recovery amongst people with severe mental illness," Social Science &Medicine, vol. 107, pp. 1 – 8, 2014.

[11]. K. Gowen, M. Deschaine, D. Gruttadara, and D. Markey, "Young adults with mental health conditions and social networking websites:Seeking tools to build community." Psychiatric Rehabilitation Journal, vol. 35, no. 3, pp. 245–250, 2012.

[12]. Haberler G. Prosperity and depression: a theoretical analysis of cyclical movements. London: Routledge; 2017.

[13]. Guntuku SC, et al. Detecting depression and mental illness on social media: an integrative review. CurrOpinBehav Sci. 2017;18:43–9.

[14]. De Choudhury M, et al. Predicting depression via social Media. In: ICWSM, vol. 13. 2013. p. 1–10.

[15]. De Choudhury M, Counts S, Horvitz E. Predicting postpartum changes in emotion and behavior via social media. In: Proceedings of the SIGCHI conference on human factors in computing systems. New York: ACM; 2013.

[16]. O'Dea B, et al. Detecting suicidality on Twitter. Internet Interv. 2015;2(2):183–8.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Detection of Lungs Infection Using Convolutional Neural Network

**Omkar Gaikwad[1], Divyanshu Tripathi[1], Madhuri Dange[1], Harshada Mohite[1], Prof. Pallavi Shimpi[2]**
[1]Students, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Savitribai Phule Pune University, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Savitribai Phule Pune University, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Many countries are challenged by the medical resources required for COVID-19 detection which necessitates the development of a low-cost, rapid tool to detect and diagnose the virus effectively for a large numbers of tests. Although a chest X-Ray scan is a useful candidate tool the images generated by the scans must be analyzed accurately and quickly if large numbers of tests are to be processed. COVID-19 causes bilateral pulmonary parenchymal ground-glass and consolidative pulmonary opacities, sometimes with a rounded morphology and a peripheral lung distribution. In this work, we aim to extract rapidly from chest X-Ray images the similar small regions that may contain the identifying features of COVID-19. This paper therefore proposes a COVID-19 detection model based on Convolution Neural Network for X-Ray image segmentation.The model begins by taking input image, it extract features of the image using CNN which further shows the prediction whether it is covid positive or covid negative. Finally, the model begins a classification and prediction process with a fully connected network formed of several classifiers. model explains an integrated bio-informatics approach in which different aspects of information taken from different data sources are put together to form the user friendly platforms for physicians and researchers. The main precedence of the Artificial Intelligence based platforms is to increase the process of diagnosis and the treatment of the COVID-19 disease.

**Keywords :** Covid-19, Deep Learning,Convolution Neural Network, Image Processing, X-Ray

## I. INTRODUCTION

Due to the limited diagnosis tools available, many countries are only able to apply the COVID-19 test for a limited number of citizens. Despite the great efforts to find an effective way for COVID-19 detection, the required medical resources in many countries represent a big challenge. Accordingly, there is an urgent need to identify a low-cost and rapid tool to detect and diagnose COVID-19 effectively.

COVID 19 is an infectious illness triggered by the recently identified coronavirus virus. It was not understood until the outbreak in Wuhan, China, started in December 2019. The most frequent signs of COVID-19 include fever, tiredness, and dry cough. Pneumonia is a type of acute respiratory infection that

affects the lungs. The lungs are made up of little pockets called alveoli, which are packed with oxygen as a stable person breathes. When anyone has pneumonia, these alveoli are packed with pus and blood, rendering ventilation painful and therefore raising the absorption of oxygen.

Hence CNN becomes a natural candidate for diagnosis recommendation of COVID-19 patients. In seven different existing deep learning neural network architectures were compared using small data sets consisting of only 50 images.

In such scenario, Deep Learning techniques are artificial neural networks in which each layer has multiple neurons that function similarly to the neurons of the human body. Convolutional neural networks (CNNs) are one of the deep learning techniques that have proven to be successful and effective in the field of medical imaging classification. There have been several studies that have used CNN to diagnose pneumonia and other diseases based on radiography. CNN based architecture has been proposed in to identify different lung diseases. Hence CNN becomes a natural candidate for diagnosis recommendation of COVID-19 patients.By training convolutional neural networks (CNN) using these characteristics extracted from X-ray images, we could accurately predict COVID19.

The results are encouraging and demonstrate the effectiveness of deep learning, and more specifically, transfer learning with CNN to the automatic detection of abnormal X-ray images from small datasets, related to the Covid-19 disease.

Some researchers have proposed new architectures of CNN, or fine-tuned ResNet50 for the problem of classifying Chest X-Rays.

## II. METHODOLOGY

In this section, we first describe the dataset used in the study, followed by the proposed CNN. The definition of the input data and desired outputs prior to the actual methods provides a better definition of the problem and thus a better understanding of the methods.

### A. Collection of Dataset

We set up a database composed of three classes of chest radiographic images. The first class is made up of images of patients declared positive for COVID-19 that we collected from the database published by Cohen . This database contained 230 images is open to various researchers to add new images or to use the already existing images. The second class consists of 100 images of patients declared normal without any pneumonia. A first learning group noted internal validation containing 80% of the images of the constructed base. The second group noted external validation will be formed by 20% of the images of the base constructed plus ten images provided by our radiologist colleagues and will be used for the validation of our proposed CNN model.

### B. Deep Learning Algorithm

Deep learning has special techniques which functions like neurons of human body called as artificial neural network in which each layer has multiple neurons. CNN is a very powerful algorithm which is widely used for image classification and object detection. CNN algorithm train on large database such as ImageNet. ImageNet need not to train on first few layers. Upper layers is used to match current problem which is called Transfer Learning which is discuses in next paragraph. In this model we are going to use pre-trained CNN models on the ImageNet database which reduces the need to train the data from scratch. A pre-trained model is useful when there is time boundary , every-time it is not possible to build the model from scratch that why pre-trained model come into existence. Image Net in one of most wide, large ,real-

world database with the help of these pre-trained models weights obtained are then transferred to the specific CNN model which going to use transfer learning technique.

### C. Transfer Learning

Transfer learning is the type of machine learning Transfer learning has capacity to create new artifificial intelligence model by existing neural network. So by using it as base for new model .

In deep learning, this process involves the initial training of a CNN for a specific task , utilizing large-scale datasets. The availability of data for the initial training is the most vital factor for successful training since CNN can learn to extract significant characteristics of the image. Depending on the capability of the CNN to identify and extract the most outstanding image features, it is judged whether this model is suitable for transfer learning.

### D. Training of CNN model

We will be using Keras framework with Tensor Flow . Keras provides pre-trained weights from the ImageNet database on these pre-trained mmodel. ImageNet database on which our model is based may not similar to images but it help to make task more efficient. It also help to reduce requirement of large volume date for training. We are using Adam algorithm optimization which is next version of stochastic gradient descent and Adam is getting more and more popular in recent days and has seen border adoption for deep learning application. Further will be using ReLu activation function as it is most commonly used activation function for the output of CNN neurons.

As the current dataset is to large we will be requiring high computational power for training our CNN model. The accuracy of our model will be depending on our optimization algorithm which will be used. The performance of the models which we will be using will be measured on parameters like accuracy, specificity, precision and recall/sensitivity. It is a great advantage for us that today large number of datasets is available. With this available dataset further we will be implementing a system which will be used for detecting COVID-19 and differentiate between Bacterial Pneumonia and COVID-19 Pneumonia.

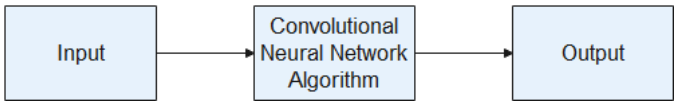



Fig. 1.

### E. Image pre-processing and Feature

Image pre-processing and feature Extraction is technique are needed for any image based application. The aim of Image pre-processing technique is to remove background of image with lot of noise. In our application raw size of image is 1012 * 974. First step of Image pre-processing is to pruning images with cropping the background and newly generated is 140240 pixels. In addition, the median filter is applied. After removing the noisy images, a dataset with images for three labels COVID-19, PNEUMONIA and NORMAL with given images in each label was extracted.

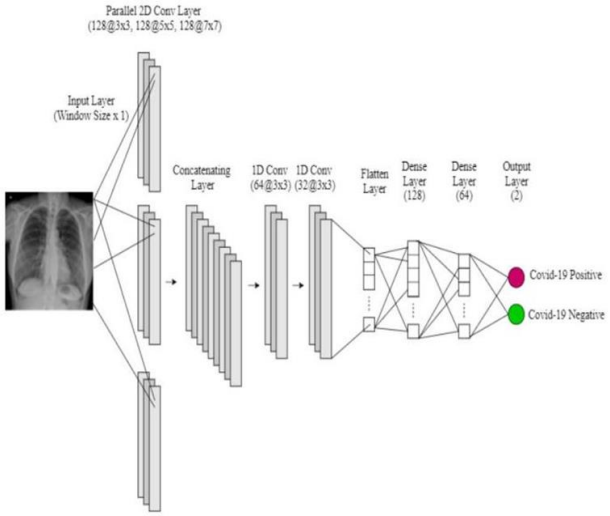



Fig. 2.

## III. RESULTS AND DISCUSSION

Focusing on the possibility of the ANN application for analyzing COVID-19-related infection problems, such as high-risk patients, control of the outbreak, recognizing and radiology, we used CNN, Deep Leaning to suggest several AI-based methods. Advanced machine learning algorithms can integrate and analyse large-scale data related to COVID-19 patients to facilitate a deeper understanding of viral spread pattern, improve the speed and accuracy of diagnosis, develop fresh, effective therapeutic approaches, and even identify individuals who, depending on their genetic and physiological features, are most susceptible to the disease. Despite much praise that such data has received because of its role in improving efficiency, productivity and processes in different sectors, it has been criticized for its small number of users who collect, store, manage the data and have access to them.

However in this model the first step is to collect datasets from various sources. The Data sets are then used to train the CNN model which is called pre-processing. In the last step CNN based model extract the features of the , using various layers of CNN. The various Layers used in CNN are concatenation Layer, 1D convolution, 2D Convolution layer, Flatters Layer, Dense Layer, and Output Layer.

The first layer i.e., concatenation layer takes the input and concatenates them along a specified dimension. The inputs must have the same size in all dimensions. 1D convolution layers recognize local patterns in a sequence which is further passed on to 2D Convolution Layer. Flatten layer in CNN converts the pooled feature map to a single column that is passed to the fully connected layer. Dense layer further adds the fully connected layer to the neural network.

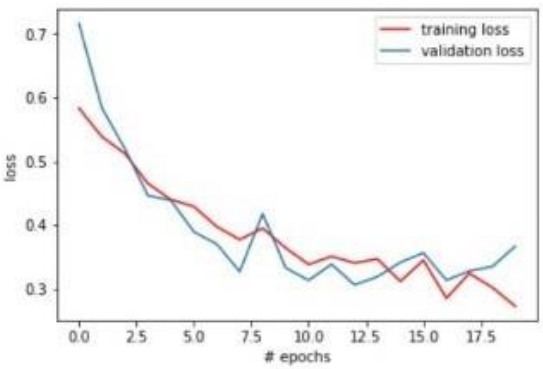
The model is for the prediction which is the classification of the best treatment method. The model shows the accuracy which varies from 90% to 97%. Convolutional Neural Network seems to be good options for classification, process, and prediction according to time series data because lags of unknown duration may take place between major events in a time series.

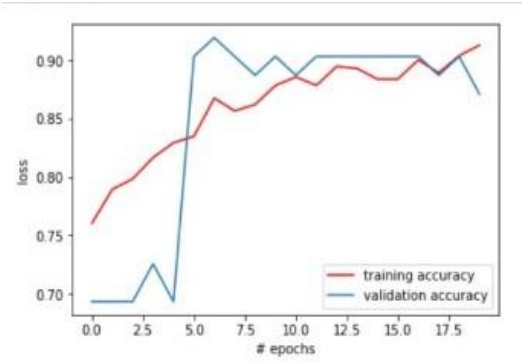
TABLE I

| Sr. no | Comparative study of classifiers model based features is shown in the table 1<br>Table 1 :Analysis of literature survey | | | |
|---|---|---|---|---|
| | **Paper Name** | **Methodology** | **Result** | **Author** |
| 1 | Deep Learning based Diagnosis Recommendation for COVID-19 using Chest X-Rays Images | Deep Learning, Convolutional Neural Network ImageNet | 89% | Rachna Sethi,Monica Mehrotra and Dhaarna Sethi |
| 2 | Artificial Intelligence based COVID-19 classification by using Deep Learning and Convolutional Neural Network | | 90% | Pallavi Shimpi, Omkar Gaikwad[1],Divyanshu Tripathi[2], Madhuri Dange[3] ,Harshada Mohite[4],Prof. |
| 3 | Development of a clinical decision support system for the early detection of COVID- | 3 step architecture - preprocessing of input images, feature extraction and use of | 80% | M. Qjidaa , A. Ben-fares , Y. Mechbal ,H. Amakdouf , M. Maaroufi , B. Alami |

| | | | | |
|---|---|---|---|---|
| | 19 using deep learning based on chest radiographic images | fully connected network for classification and prediction. | | ,H. Qjidaa Sidi Mohamed Ben Abdellah University. Faculty of Science Dhar El Mehraz Fez,Faculty of Medicine and Pharmacy Fez |
| 4 | Iteratively Pruned Deep Learning Ensembles for COVID-19 Detection in Chest X-Rays | use of iteratively pruned deep learning model ensembles for detecting pulmonary manifestations convolutional neural network and a selection of ImageNet pre-trained models | 90% | Sivaramakrishnan Rajaraman , Jenifer Siegelman ,Philip O. Alderson, Lucas S. Folio, Les R. Folio And Sameer |

Performance Analysis




```
Train on 551 samples, validate on 62 samples
Epoch 1/20
551/551 [==============================] - 465s 844ms/step - loss: 0.5833 - accuracy: 0.7604 - val_loss: 0.7161 - val_accuracy:
0.6935
Epoch 2/20
551/551 [==============================] - 180s 327ms/step - loss: 0.5385 - accuracy: 0.7895 - val_loss: 0.5836 - val_accuracy:
0.6935
Epoch 3/20
551/551 [==============================] - 204s 370ms/step - loss: 0.5122 - accuracy: 0.7985 - val_loss: 0.5197 - val_accuracy:
0.6935
Epoch 4/20
551/551 [==============================] - 188s 342ms/step - loss: 0.4652 - accuracy: 0.8167 - val_loss: 0.4463 - val_accuracy:
0.7258
Epoch 5/20
551/551 [==============================] - 179s 324ms/step - loss: 0.4400 - accuracy: 0.8294 - val_loss: 0.4387 - val_accuracy:
0.6935
Epoch 6/20
551/551 [==============================] - 224s 407ms/step - loss: 0.4290 - accuracy: 0.8348 - val_loss: 0.3894 - val_accuracy:
0.9032
Epoch 7/20
551/551 [==============================] - 248s 449ms/step - loss: 0.3975 - accuracy: 0.8675 - val_loss: 0.3701 - val_accuracy:
0.9194
Epoch 8/20
551/551 [==============================] - 292s 530ms/step - loss: 0.3771 - accuracy: 0.8566 - val_loss: 0.3269 - val_accuracy:
0.9032
Epoch 9/20
551/551 [==============================] - 213s 387ms/step - loss: 0.3950 - accuracy: 0.8621 - val_loss: 0.4178 - val_accuracy:
0.8871
```

## IV. CONCLUSION

This paper on the proposed clinical support system for the early detection of COVID-19 using deep learning based on chest X-ray images. This methodology also differentiates the patients suffering from pneumonia and COVID-19 as both have the same symptoms and patients usually got confused between the two. Detecting COVID-19 using X-Ray is much cheaper than the medical COVID-19 test kit and as fast as the current thermal imaging technique. The model will be much more accurate and useful in current situation.

This model particularly focuses on prediction of covid-19 positive and negative symptoms but if there some other symptoms then it will not be able to distinguish it into another disease.

The results suggest that CNN based architectures have the potential for the correct diagnosis of COVID-19 disease. Transfer learning plays a major role in improving the accuracy of detection. Fine-tuning of these models may further improve the accuracy. Other pre-trained models may also be explored for building a recommend-er diagnosis system.

## V. FUTURE SCOPE

Future work may include developing new architectures based on CNN for the detection of COVID-19 as well as other diseases in the medical domain. The model can detect the new disease by training and testing and adding categorized dataset of that particular disease.

## VI. REFERENCES


[1]. E. El-Din Hemdan, M. A. Shouman, and M. E. Karar, "COVIDXNet: A Framework of Deep Learning Classifiers to Diagnose COVID-19 in X-Ray Images," arXiv preprint arXiv:2003.11055, 2020.

[2]. Marios Anthimopoulos, Member, IEEE, Stergios Christodoulidis, Member, IEEE, Lukas Ebner, Andreas Christe, and Stavroula Mougiakakou*, Member, IEEE,"Lung Pattern Classification for Interstitial Lung Diseases Using a Deep Convolutional Neural Network"

[3]. F. Shan et al., "Lung Infection Quantification of COVID-19 in CT Images with Deep Learning Author list."

[4]. MOHAMMAD (BEHDAD) JAMSHIDI 1 , ALI LALBAKHSH 2 , (Member, IEEE), JAKUB TALLA 1, ZDENĚK PEROUTKA3 , (Member, IEEE), FARIMAH HADJILOOEI , PEDRAM LALBAKHSH5, MORTEZA JAMSHIDI6 , LUIGI LA SPADA7 , MIRHAMED MIRMOZAFARI 8 , (Member, IEEE),MOJGAN DEHGHANI9 , ASAL SABET10, SAEED ROSHANI11, (Member,IEEE), SOBHAN ROSHANI11, NIMA BAYAT-MAKOU ,(Member, IEEE), BAHARE MOHAMADZADE2 , (Student Member, IEEE), ZAHRA MALEK 13 , ALIREZA JAMSHIDI14, SARAH KIANI15, HAMED HASHEMI-DEZAKI 3, AND WAHAB MOHYUDDIN 16, (Member, IEEE),"Artificial Intelligence and COVID-19: Deep Learning Approaches for Diagnosis and Treatment "

[5]. S. Elghamrawy and A. E. Hassanien, "Diagnosis and Prediction Model for COVID-19 Patient's Response to Treatment based on Convolutional Neural Networks and Whale Optimization Algorithm Using CT Images," PrePrint, 2020, doi: 10.1101/2020.04.16.20063990.

[6]. S. Rajaraman, J. Siegelman, P. O. Alderson, L. S. Folio, L. R. Folio and S. K. Antani, "Iteratively Pruned Deep Learning Ensembles for COVID-19 Detection in Chest X-Rays," in IEEE Access, vol. 8, pp. 115041-115050, 2020.

[7]. Ravneet Punia1 , Lucky Kumar2 , Mohd. Mujahid3 , Rajesh Rohilla Electronics and Communication Department, Delhi Technological University, Delhi, India, "Computer Vision and Radiology for COVID-19 Detection",doi-5.07.2020

[8]. Rachna Sethi and Monica Mehrotra Department of Computer Science Jamia Millia Islamia Delhi ,Dhaarna Sethi Department of Information Technology Delhi Technological University, Delhi, India "Deep Learning based Diagnosis Recommendation for COVID-19 using Chest X-Rays Images"

[9]. M. Qjidaa 2 , A. Ben-fares 1 , Y. Mechbal 1 , H. Amakdouf 1 , M. Maaroufi 2 , B. Alami 2 , H. Qjidaa 1 Sidi Mohamed Ben Abdellah University. Faculty of Science Dhar El Mehraz Fez Faculty of

Medicine and Pharmacy Fez. “Development of a clinical decision support system for the early detection of COVID-19 using deep learning based on chest radiographic images”

[10]. S. Elghamrawy and A. E. Hassanien, “Diagnosis and Prediction Model for COVID-19 Patient’s Response to Treatment based on Convolutional Neural Networks and Whale Optimization Algorithm Using CT Images,” PrePrint, 2020, doi: 10.1101/2020.04.16.20063990

[11]. M. Anthimopoulos, S. Christodoulidis, L. Ebner, A. Christe and S. Mougiakakou, "Lung Pattern Classification for Interstitial Lung Diseases Using a Deep Convolutional Neural Network," in IEEE Transactions on Medical Imaging, vol. 35, no. 5, pp. 1207-1216, May 2016,

[12]. E. -S. M. El-Kenawy, A. Ibrahim, S. Mirjalili, M. M. Eid and S. E. Hussein, "Novel Feature Selection and Voting Classifier Algorithms for COVID-19 Classification in CT Images,"

[13]. M. Zhou, Y. Chen, D. Wang , Y. Xu, W. Yao, J. Huang, X. Jin, Z. Pan, J. Tan, L. Wang, Y. Xia, L. Zou, X. Xu, J. Wei, M. Guan, J. Feng, H. Zhang, J. Qu, “Improved deep learning model for differentiating novel coronavirus pneumonia and influenza pneumonia”, medRxiv, 2020

[14]. A.I. Khan, J.L. Shah, M. Bhat, CoroNet: “a deep neural network for detection and diagnosis of COVID-19 from chest x-ray images”,

[15]. Ahmed Abdullah Farid 1, *, Gamal Ibrahim Selim 1,2, and Hatem Awad A. Khater, “A Novel Approach of CT Images Feature Analysis and Prediction to Screen for Corona Virus Disease(COVID-19)” [Online]:https://www.researchgate.net/publication/340256588

[16]. Ioannis D. Apostolopoulos1 Tzani A. Mpesiana Published online: 3 April 2020 Australasian College of Physical Scientists and Engineers in Medicine 2020, “Covid 19: automatic detection from X ray images utilizing transfer learning with convolutional neural networks”

[17]. Artificial Intelligence based Covid-19 classification by using Deep Learning and Convolutional Neural Network.Omkar Gaikwad ,Divyanshu Tripathi , Madhuri Dange ,Harshada Mohite ,Prof. Pallavi Shimpi

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Forensic Aspects of Flash Memory and Retrieval of Deleted Information

**Aishwarya Munuswamy[1], Shubham Suryavanshi[1], Rahul Takalkar[1], Pooja Gupta[1], Prof. Chaitanya Bhosale[2]**
[1]Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Flash memory devices are considering efficient storage units; thus, it is producing tremendous demands for the usage of obtrusive memory devices. One of the severe problems that forensic investigators face is to remove deleted information from flash memory devices, as some of the flash memory machines prevent the reduction of eradicating data using the standard rhetorical techniques. This is to be taken into consideration by a study of the physics of flash retention, the development of trendy transition, layers, and the file systems that support these devices. It then regulates forensic experiments on various types of flash-based data-storage medium and encapsulates the results of each media. The paper also refers to the search for various practices to be applied to flash storage media, which helps to enable them to retrieve deleted information with the use of standard forensic techniques. The investigation includes the preservation of the organization, the search for digital indication, and the renovation of digital events. The focus of the examination is on the renovation of events using evidence so that suggestions can be developed and tested. In real world, the receiver of message needs guarantee that the message belongs to the sender and he should not be able to reject the establishment of that message.

**Keywords :** Forensics Investigation, AES Encryption, Digital Forensics Model, Digital Signatures, Flash Devices

## I. INTRODUCTION

Forensic investigation is that the assembling and analysis of all crime-related physical proof so as to come to a assumption a couple of suspect. Investigators can check up on computers, or other technology to determine however against the law took place. rhetorical are the scientific ways accustomed solve a crime. rhetorical investigation is the gathering and analysis of all crime-related physical evidence in order to come to a conclusion about a suspect. Investigators will look at blood, fluid, or fingerprints, residue, arduous drives, computers, or other technology to establish how a crime took place. This is often a general definition, though, since there are a number of various sorts of forensics. A forensic accounting investigation aids the victims of fraud or monetary crimes. conjointly called financial investigation, this sort of study uses intelligence-gathering techniques, accounting, business, and communication skills to produce proof to attorneys concerned in criminal and civil investigations. They investigate by hairdressing

through an outsized quantity of relevant figures, looking for irregularities or extralegal financial practices. Crimes will vary from evasion to thieving of company assets. They also explore insurance claims and high payouts. Pc investigations are like electronic discovery. These rhetorical investigations recover knowledge from computers and arduous drives to unravel against the law or realize proof of misconduct. Pc investigators can uncover things like sale of black market goods, fraud, and sex trafficking. Some common things that decision for computer investigation are divorce, wrongful termination, worker net abuse, unauthorized speech act of company info, and alternative extralegal internet activity. Rhetorical computer investigations can find information on cell phones and hard drives together with emails, browsing history, downloaded files, and even deleted data. These reliable applications create use of a computer memory medium which will save knowledge electrically mistreatment semiconductor chips. The data on these chips is dynamically removed and might be automatic many times when it's written and deleted. The semiconductor chip (or transistor) and can ware integrated at an outsized scale on a really tiny chip. This enables for huge digital storage capability on a little chip that's physically no larger than the dimensions of somebody's nail. These memory chips it' referred to as flash memory, and that they bring a large impact on the means the information it' collected and retrieved.

## II. RELATED WORK

In [1], Cryptography is a good approach for safeguarding sensitive info .it could be a method for storing and transmission information in kind that solely those it's supposed for scan and process. The evolution of secret writing is moving towards a way forward for endless possibilities. Stenography is that the art of passing information through original files. it's arrived from Greek sense "covered writing". Stenography refers to information or file that has been hid within a picture, video or audio file. Within the analysis paper mentioned that DES is secret key primarily based algorithmic program suffers from key distribution and key agreement problems. In [2], Krishnan Sansurooah, NAND flash chips are comprised of banks, pages, AND blocks. Erase procedures on a NAND flash are dead at the block level that contains a permanent range of pages. However RSA consumes great deal of your time to perform secret writing and cryptography operation It had been conjointly determined that decryption of DES algorithmic program is healthier than different algorithms in outturn and fewer power consumption. The straightforward non-volatile storage electronic transistor in an off state that has 3 terminals named as word line also recognized as a drain, the bottom also known because the supply and bit line. Word line is attached to the management gate that agrees to the holding of charges at the floating gate. During this phase, there aren't any electrons exist at the floating gate.

## III. EXISTING SYSTEMS

The image can alone be viewed by the receiver as a result of the image is encrypted exploitation AES and conjointly the key' solely acknowledged to the sender and receiver. Since the image is encrypted victimisation AES, it' safer than the DES and triple DES. Since the key size is 192 bits, it makes the coding and secret writing plenty of secure. The formula described by AES could also be a symmetric-key algorithm, which implies constant secrets used for every encrypting and decrypting the data. AES is based on a method principle referred to as a substitution-permutation-network, and is economical in each software package and hardware. AES could also be a variant, with associate degreed fast a set} block size of 128 bits AND a key size of 128, 192, or 256 bits. By contrast, it' such with block and key sizes which will be any multiple of thirty 2 bits, with a minimum of 128

and a most of 256 bits. AES operates on a four × four column-major order array of bytes, termed the state. Most AES calculations are done in a selected finite field. The key size used for an AES cipher specifies the amount of transformation rounds that convert the input, better-known as the plaintext, into the last word output, known because the cipher-text. The amount of rounds are as follows:

- 10 Rounds for 128-bit keys.
- 12 Rounds for 192-bit keys.
- 14 Rounds for 256-bit keys.

Each spherical consists of many process steps, together with one that depends on the secret writing key itself. A collection of reverse rounds are applied to remodel cipher-text into the initial plaintext exploitation an equivalent encryption key.

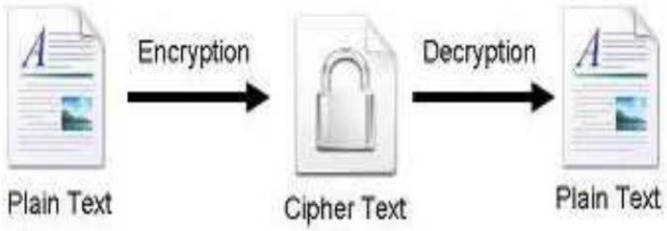



**Figure 1: Encryption & Decryption**

The simple flash memory transistor in an off state that has three terminals named as word line also recognized as a drain, the ground also identified as the source and bit line. Word line is attached to the control gate that agrees to the holding of charges at the floating gate. In this phase, there are no electrons exist at the floating gate.

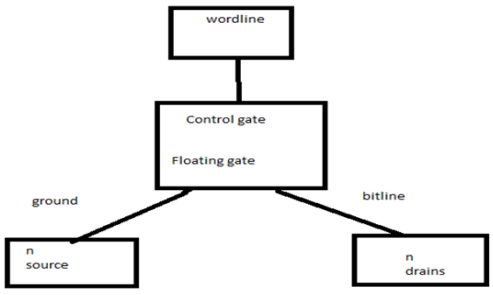



**Figure 2: Flash memory transistor**

## IV. METHODOLOGY

### 1) Advanced Encryption Standard (AES) algorithm

AES not only for security but also for great speed. Both hardware and software application are faster still. New encryption standard recommended by NIST to replace DES. Encodes data blocks of 128 bits in 10, 12 and 14 rounds depending on key size. It can be applied on various platforms specifically in small devices. It is cautiously tested for many security requests. The following steps processed in AES algorithm.

Following steps used to encrypt a 128-bit block:

[1] Originate the set of round keys from the cipher key.

[2] Modify the state collection with the block data.

[3] Add the initial round key to the starting state array.

[4] Achieve nine rounds of state manipulation.

[5] Perform the tenth and final round of state operation.

[6] Copy the final state array out as the encrypted data.

Each round of the encryption process involves a series of Steps to alter the state of array. These steps involve four types of operations. They are

a) **Sub Bytes**: This process is a simple switch that converts every bite into a different value.

b) **Shift Rows**: Each row is rotated to the right by a certain number of bytes.

c) **Mix Columns**: Each column of the state array is Processed separately to produce a new column. The new Column replaces the old one.

d) **Xor Round Key**: This operation simply takes the existing state array,

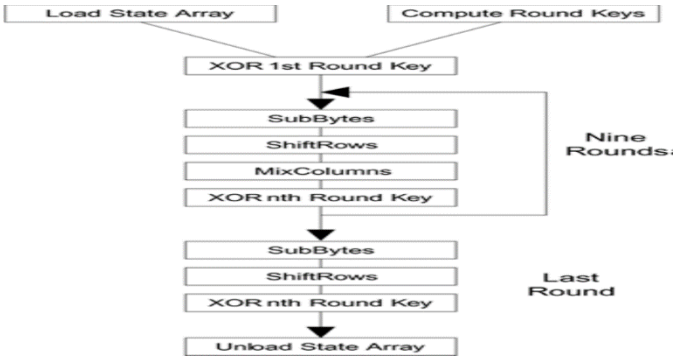


**Figure 3: Flow of AES Algorithm**

The features of AES are as follows – Symmetric key symmetric block cipher 128-bit data, 128/192/256-bit keys Stronger and faster than Triple-DES Provide full specification and design details Software implementable in C and Java

**Operation of AES**

AES is an iterative rather than Feistel cipher. It is based on 'substitution–permutation network'. It comprises of a series of linked operations, some of which involve replacing inputs by specific outputs (substitutions) and others involve shuffling bits around (permutations).

Interestingly, AES performs all its computations on bytes rather than bits. Hence, AES treats the 128 bits of a plaintext block as 16 bytes. These 16 bytes are arranged in four columns and four rows for processing as a matrix

Unlike DES, the number of rounds in AES is variable and depends on the length of the key. AES uses 10 rounds for 128-bit keys, 12 rounds for 192-bit keys and 14 rounds for 256-bit keys. Each of these rounds uses a different 128-bit round key, which is calculated from the original AES key.

The schematic of AES structure is given in the following illustration –

**First Round Process**

Byte Substitution (Sub-Bytes)

The 16 input bytes are substituted by looking up a fixed table (S-box) given in design. The result is in a matrix of four rows and four columns.

**Shift rows**

Each of the four rows of the matrix is shifted to the left. Any entries that 'fall off' are re-inserted on the right side of row. Shift is carried out as follows –

First row is not shifted.

Second row is shifted one (byte) position to the left.

Third row is shifted two positions to the left.

Fourth row is shifted three positions to the left.

The result is a new matrix consisting of the same 16 bytes but shifted with respect to each other.

**Mix Columns**

Each column of four bytes is now transformed using a special mathematical function. This function takes as input the four bytes of one column and outputs four completely new bytes, which replace the original column. The result is another new matrix consisting of 16 new bytes. It should be noted that this step is not performed in the last round.

**Add round key**

The 16 bytes of the matrix are now considered as 128 bits and are XORed to the 128 bits of the round key. If this is the last round then the output is the cipher-text. Otherwise, the resulting 128 bits are interpreted as 16 bytes and we begin another similar round.

**Decryption Process**

The process of decryption of an AES cipher-text is similar to the encryption process in the reverse order. Each round consists of the four processes conducted in the reverse order –

Add round key

Mix columns

Shift rows

Byte substitution

**AES Analysis**

In present day cryptography, AES is widely adopted and supported in both hardware and software. Till date, no practical cryptanalytic attacks against AES has been discovered. Additionally, AES has built-in flexibility of key length, which allows a degree of 'future-proofing' against progress in the ability to perform exhaustive key searches. However, just as for DES, the AES security is assured only if it is correctly implemented and good key management is employed.

**2) DIGITAL SIGNATURE**

Digital signatures can provide evidence of origin, identity and status of electronic documents, transactions or digital messages. Signers can also use them to acknowledge informed consent. Digital signature technology requires all parties trust that the individual creating the signature has kept the private key secret. If someone else has access to the private signing key, that party could create fraudulent digital signatures in the name of the private key holder. Digital signatures are the public-key primitives of message authentication. In the physical world, it is common to use handwritten signatures on handwritten or typed messages. They are used to bind signatory to the message. Similarly, a digital signature is a technique that binds a person/entity to the digital data. This binding can be independently verified by receiver as well as any third party. Digital signature is a cryptographic value that is calculated from the data and a secret key known only by the signer.

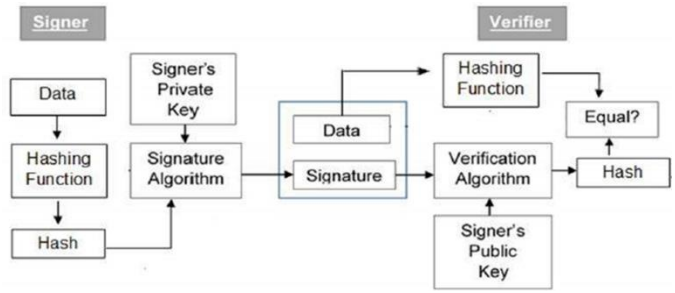
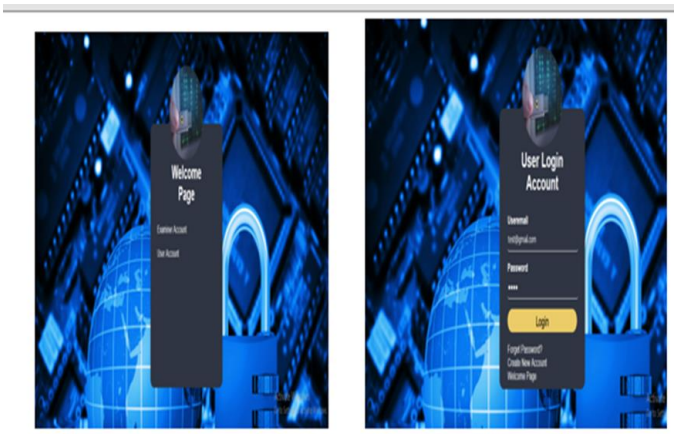



**Figure 4: Model of Digital Signature**

## V. RESULTS AND DISCUSSION

a. User or Criminal Module
b. User deletion File
c. Examiner or Forensic Experts Module
d. Retrieval Module




**Module 1**: Login and Welcome Page


**Module1:** User Home Page


**Module 2**: User File Deletion Page


**Module 3:** Examiner Login


**Module 3:** Examiner Home Page


**Module 4:** Retrieval of data

In [5], the identification process includes the identification of third parties. The Preparation phase carries document work as a report, logging of events. Define methods to be used, specify what all tools are required, and describe a collection of information. Thorough documentation is done. Preservation restricts access to unauthorized users, read access is provided includes plans for data processing. The Collection involves the aggregation of data is done, formation, unification includes proper formatting of data, information, fusion includes integration of data. Examination transforms data includes altering data, normalization of data that is used to standardize information in a proper format. Analysers verify the authenticity of data. Data presentation involves result implementation, generating reports [6]. Flash USB when data is recovered on the same storage media.


**Figure 5: Criminal evidence in all rulings**

In [7] Sonia Bui, There are some rules in criminal evidence which has to be known by the forensic departments. Accordingly, they follow the rules defined. Unsafe rulings are used to avoid the data into unsafe hands.

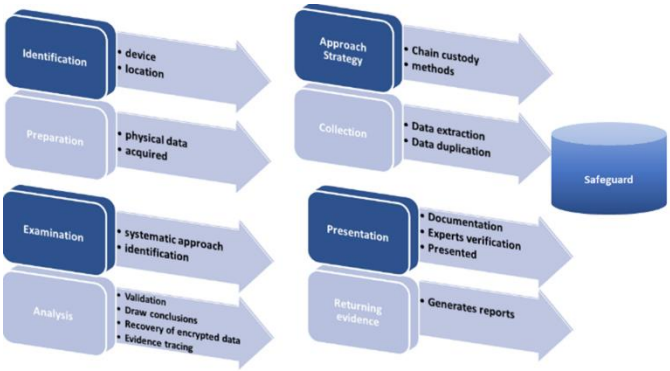



**Figure 6: Digital forensic model**

The identification process includes the identification of third parties. The preparation phase carries document work like the report, logging of events. In [8], Define Methods to be used, specify what all tools are required, describes the collection of information, thorough documentation is done. Preservation restricts access to unauthorized users, read-access is provided, plans for data processing. The collection involves the aggregation of data is done, format unification that includes proper formatting of data, information fusion includes integration of data. In [9],

Examination transforms data includes altering data, normalization of data that is used to standardize information in a proper format. Analysers verify the authenticity of data. Data presentation involves result implementation, generating reports [10].

## VI. CONCLUSION

Today almost all digital services like internet communication, medical and military imaging systems, multimedia system requires reliable security in storage and transmission of digital images. Due to faster growth in multimedia technology, internet and cell phones, there is a need for security in digital images. Therefore, there is a need for image encryption techniques in order to hide images from such attacks. In this system we use AES Algorithm, BLOB for database attack, Digital Signatures. Such Encryption technique helps to avoid intrusion attacks.

## VII. ACKNOWLEDGEMENT

Special thanks to Dr. Pankaj Agarkar, HOD and Prof. Chaitanya Bhosale, Department of Computer Engineering, D.Y Patil School of Engineering for guidance and resource provision which helped in development of this project. Thanks to all associated faculties for providing all necessary help.

## VIII. REFERENCES

[1]. Shivendran Divakar Tiruchanpalli, "Forensic Aspects of Various Flash Memory Devices (Dec 2019)", St. Cloud State University.

[2]. Krishnun Sansurooah, "A forensics overview and analysis of USB flash memory devices (Dec 2009)", Edith Cowan University, Australia.

[3]. Jeong UK Kang, Heeseung Jo, Jinn-Soo-Kim, Joonwon Lee, "A superblock-based flash translation layer for NAND flash memory (Oct 2006)", Korea. https://dl.acm.org/doi/abs/10.1145/1176887.1176911

[4]. Abhilash Garg, Supriya Chakraborty "Investigation of Data Deletion Vulnerabilities Storage (Jan 2020)", India.

[5]. Woodford, C. (2017, June 29). Flash memory. Retrieved from ExplainThatStuff: http://www.explainthatstuff.com/flashmemory.html

[6]. Aya Fukami, Saugata Ghose, Yixin Luo, Yu Cai, Onur Mutlu, "Digital Investigation (Jan 2017)", Europe.

[7]. Sonia Bui, Michelle Enyeart, Jenghuei Luong," Issues in Computers forensics (May 2003)", COEN 150

[8]. Derek Bem and Ewa Huebner, "Analysis of USB Flash Drives in a Virtual Environment (June 2007)", Small Scale Digital Device Forensics Journal, VOL. 1, NO.1.

[9]. Yatendra Kumar Gupta,"Systematic Digital Forensic Investigation Model", (March 2016).

[10]. David A. Dampier 3 Arafat AL-Dhaqm1, Shukor Abd Razak 2 ," (IEEE) Categorization and Organization of Database Forensic Investigation Processes (June 2020)" Research Management Centre, Xiamen University Malaysia under the XMUM Research DOI:10.1109XXXXXXX.XXXX.3000747

[11]. Avinash Kumar, Ashar Neyaz & Narasimha Shashidhar, "A Survey On Solid-State Drive Forensic Analysis Techniques", International Journal of Computer Science and Security (IJCSS) 14 (2), 13-21 2020.USA

[12]. Nikunj Pansari and Dhruwal Kushwaha, "Forensic analysis and investigation using digital forensics-An overview" ISSN: 2454-132X, Uttar Pradesh.

[13]. B.Padmavathi, S.Ranjitha Kumari,"A Survey on Performance Analysis of DES, AES & RSA Algorithm along with LSB Substitution Technique" India.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Understanding Customer Behaviour in Shopping Mall by Indoor Tracking and QR Identification

**Shreyas Tembhekar[1], Rohan Sambhudas[1], Shubham Yerunkar[1], Vinita Sangle[1], Prof. Chaitanya Bhosale[2]**
[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

The prosperity of various indoor data tracking technologies makes possible for the large collection of tracking data in indoor spaces such shopping malls. Much of the focus has been on several fundamental problems such finding the ideal location, indoor shopping mall model, products requirements and understanding the patterns of shopping behavior of customers to facilitate higher growth in sales and to analyze strategies to efficiently manage the customer data, this paper attempts to analyze customer behavior from a unique indoor tracking data, which will promote the convergence between various applications and the underlying data. In particular, this paper uses the alternative method for indoor tracking and customer data by using QR code technology which uniquely differentiates each customer, collectively stores data and provides organized purchased product data, wherein we cluster users into several groups and summarize the most characteristic behaviors of each cluster. Last but not least, we analyze customer's individual behaviors through two aspects: 1) the K-means clustering algorithm is used to reveal concentrated region for the attributes required to analyze and 2) a summary of all the purchase data classified into categories required by user are generated.

**Keywords :** QR code, K-means clustering, indoor tracking.

## I. INTRODUCTION

In recent years, the data mining field has become a very important concept in business and marketing sector. One such sector is the shopping malls and complexes which require the analysis and understanding the customer purchase pattern and behavior towards the products. This paper aims to provide a concrete solution to analysis and tracking of customer behavior and its analysis using machine learning. Although a considerable amount of research has focused on the management [1] and analysis of indoor tracking data [2], we still have a relatively limited understanding of the customer to become the loyal consumer behaviors in an indoor space (e.g., a shopping mall). To fulfill this crucial void, in this paper, we aim to introduce a unique indoor tracking technique with the help of QR code technology. Both the data and relevant analysis can serve as the building blocks of future study and applications which

can serve the purpose to generate maximum efficiency for the shopping malls from the data obtained from this paper. The usage of QR code technology [3] is implemented to allocate unique identification to each customer entering the shopping mall. All the purchases made by the Customer are recorded in the database by scanning the QR code at the time of purchase and linking it to allocated customer. The purchase details are then analyzed based on machine learning techniques to generate results which facilitate the growth of the shopping centers. This paper provides a combined solution to store customer data for marketing and to analyze it for better development of strategies and improvements in the business sector.

## II. LITERATURE SURVEY

In this section, we give a brief overview of several core issues involved in dealing with indoor tracking data and Indoor Localization. To obtain accurate positions of tracked objects serves as the foundation of other relevant issues. Over the past several decades, a variety of techniques have been proposed for indoor localization, which can be classified into two categories: active and passive. The former kind of techniques require tracked persons to participate actively, while the latter estimate the position based on the variance of a measured signal or video process. Since the former are able to capture the semantics associated with indoor entities and the movements enabled or disabled by such entities. In a separation of different space models into a multi-layered representation is introduced so as to reflect the internal structure of an indoor space as well as the characteristics of sensors and transmitters. Indoor Data Indexing. Given tremendous indoor tracking data collected by one or more techniques, numerous indexing methods have emerged to meet the demands for efficient and scalable spatial query processing. To cope with the challenges posed by various applications, researchers have presented a variety of querying methods for indoor objects.

Some remarkable contributions in the survey of the Customer behavior analysis and related aspects are also included.[4] in his study mentioned Street markets in developing countries constitute an integral part and exhibiting the ethnic image of the habitat of the local economy. The shopping malls had intercepted the traditional marketplace culture and instrumental in shifting the consumer behavior in urban areas. In this paper discussed how consumer's decision-making styles shift towards shopping at mall. It concluded with specific suggestions for reducing conflicts and increasing cohesiveness with regard to shopping behavior between shopping malls and street markets. [4] strategically analysed the Indian retail industry. This identified the drivers which were affected the growth of the Indian retail market, looks at the major factors affecting the retail business and to carry put the SWOT analysis of organized retail in India. The results of the study depicted that infrastructure, economic growth and changing demographics of consumers were the major driver of organized retail in india. In this study stated location of the retail store, management style and adequate salaries to personnel enhanced the effectiveness of retail business. Some studies mentioned future competition between mall operators so they redefined nature of business. They sated Indian families shopping had become more of an emotional experience than habitual low involvement consumer behavior. The purpose of the paper was to examine the impact of entertainment facilities in Indian malls on shopping behavior. The researcher findings suggested that entertainment facilities in malls contributed to drawing traffic to Indian malls.[5] in their paper presented consumers satisfaction level as experienced by the shopping centre offer. They stated the relationship between shopping centre image attributes and the consumer satisfaction, loyalty, The Study results indicated specific shopping centre image

attribute were positively related to consumer satisfaction and loyalty. Consumer's intensions were examined regarding potential shifts in their behavior due to economic crisis.

A bar code is an optical machine-readable representation of data related to the object to which it is attached. Originally barcodes systematically represented data by varying the width and space of parallel lines, and may be referred to as linear or one-dimensional (1D).Bar codes consist of bars and spaces that vary in width. The bars and spaces on a bar code correspond to numbers and letters that represent descriptive data. In 1994 Denso Wave5 started using a type of bar code for their robots industry. It spread over to the car manufacturing industry. We never really saw the potential that had QR Code technology. Unlike the standard bar code system in use today, QR codes are far more powerful and can contain much more information. While out current bar-coding system holds information only one-way, QR Code [6] holds into both vertically and horizontally. In comparing the current bar-coding system with QR Codes [7], we also note that QR Code is really about convenience. In order to access the information contain within our current barcode system, we need a special scanner. The type of scanner and system isn't cheap. Therefore, you don't saw them in households and the system's use continues to be restricted to retailers and larger businesses.

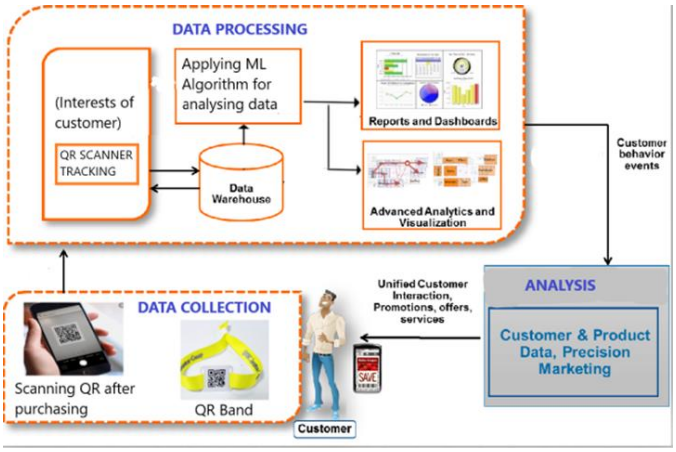
Multiple researches were made which contributed towards the development of what stands today as a solid foundation towards develop of this paper which marks the contribution from the previously conducted survey.

| Research topic | Year and Specifications | Key points of project |
|---|---|---|
| Small town shopping center analysis | 2010(prototype model) | Basic analysis using keyword |
| Overall Customer Satisfaction survey | 2012 (survey) | Satisfaction analysis from customer perspective |
| Survey of facility management systems | 2013 (survey and project design) | To develop new facilities for customers |
| Interest research software analysis | 2016 (published result) | To determine the interest of customers in the mall |
| Understanding Customer Behavior in Shopping Mall from Indoor Tracking Data | 2018 (base paper) | Analysis using machine learning and use of RFID indoor tracking |

Literature Survey

## III. METHODS AND MATERIAL

### A. ARCHITECTURE LAYOUT




System Architecture

### B. MODULES

The system is divided into 3 modules which represent the data collection phase, the data processing and

manipulation phase and finally the output generation phase.

The primary data gathering phase begins at time when the customer enters the shopping mall. The person is allocated a unique custom generated QR code wrist band to carry along and present it while any purchase being made during their shopping journey in the mall. This generated unique code carries the Customer data which includes the name details, age, contact details and other required attributes which are linked to the QR code. This sets up the base structural layout in the database for all the customers which visit the shopping mall.

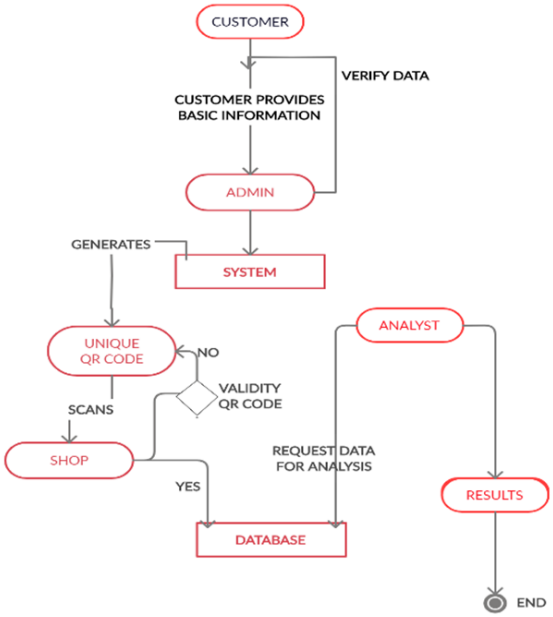
The customer provides the QR code for scanning at the indoor shop inside the mall which assigns all the product data to the scanned QR code. The Mall employee assigns the details for product(s) purchased by the customer along with the shop ID linked with it. The shop ID allows us to uniquely identify the indoor path and tracking data for the customer visited shops only where the purchase was made which generates the tracking data exclusively for shopping requirements of the customer and their pattern along choice of purchased products.

The data gathered provides the segregated data which includes all the history about a particular customer which can be accessed anytime for any assessment by the system admin which in this case will be the Mall analysts and manager. [8]

The Data gathered from all the customers is analyzed by using machine learning techniques and algorithms to obtain the pattern of customer behavior. The indoor tracking data is used to determine the best regions which are visited by the customers visiting the mall.

The graphical output is presented based upon multiple factors such age group, gender, amount spent, quantity of products, category of products purchased. Also, further study can be used to determine the time spent by customers in the shopping mall and the loyalty of customers based upon their purchase history to decide advertisement campaigns as well as offers for specific customers.

## C. PROCESS




Activity Diagram

**Abbreviation list**

**Q – QR code**

**D – Individual Customer data**

**S – Cumulative Customer Data**

**P – Product Purchase Data**

**S` - Product Data linked with Customers**

**Module 1: Data Collection from Customer**

Input D into S

Check for all conditions

If (true)

Allocate Unique Q

Else

Re-enter D to S

Generate Q

**Module 2: Product purchase data**

Scan Q

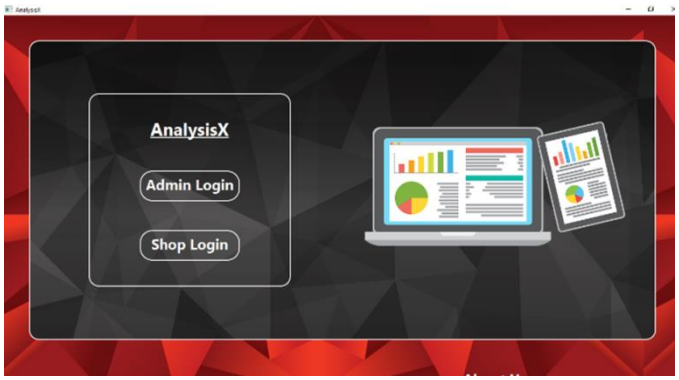
If (true)

Input P into S
Else
Rescan Q
Store into S
Generate S`

**Module 3: Result Generation**

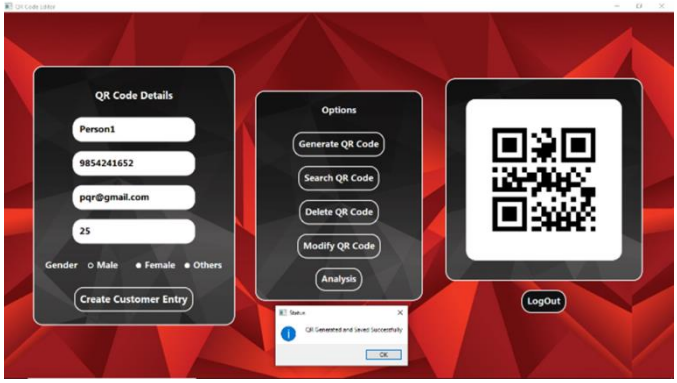
Covert real-time data to Spreadsheet csv
Pre-processing S`
Apply K-means clustering algorithm on S`
Input S` to visualization tools
Generate graphical result

## IV. RESULTS AND DISCUSSION




Home Screen

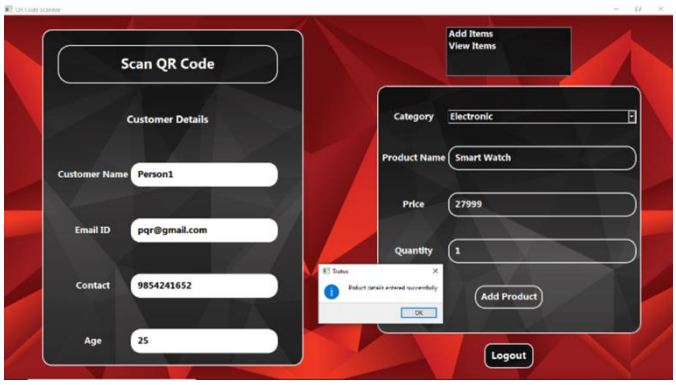
The home screen of application provides the login interface for shops and the administrator. The login page also includes a separate Signup window for each section with all parameters and details required for it. The features provided to each login section differ according to its required functionality.




Data Entry and QR Code Generator

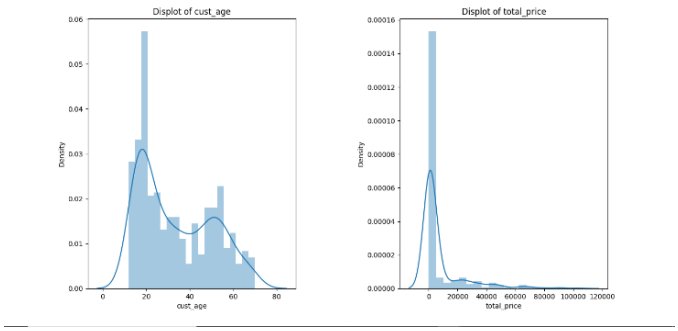
The QR code generation and Analysis section is available to the admins only. This section enables the generation of new customer entries and automatic QR code generation. The QR code is also locally stored in the files for manual distribution.

All the associated functions which include modification, searching and deletion of QR code associated with the customer. The Analysis section provides a variety of graphical tools to analyze the database of customers and to reach a concrete conclusion. It also provides on-demand features which can be specifically configured according to the needs. The Analysis section is dedicated to obtain patterns in the numerous data elements of the customers. It helps in tracking the information of each individual customer as well as a cumulative group of customers and to understand their purchase patterns and behavior for the future purpose of advertisement and promotional offers which are customer-specific.




Scanning QR Code and Product Details Entry

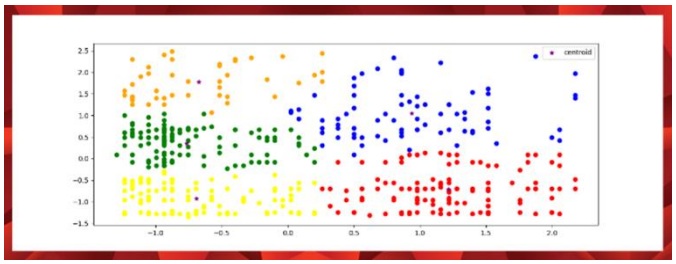
The Scanning section displays the real-time scanned data of the QR code using a local camera device. The product purchases can be individually registered for each scanned customer using the uniquely allotted QR code. The history of purchases of each or a group of customers can be tracked here using specific filters.




Density Graph

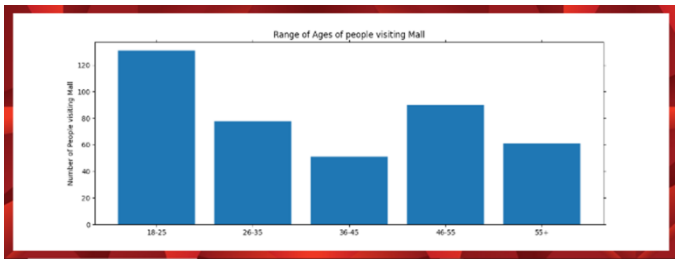
The chart uses unsupervised clustering techniques to visualize areas of varying density and to obtain the attributes for the region having the highest set values. Thus, we can conclude a particular attribute to be of maximum impact using it.

The values from the clustering plot can be used to improvise the product pricing and to enables to efficiently manage the quantity for it. The clustering data is visualized into alternative forms for feature specific data.



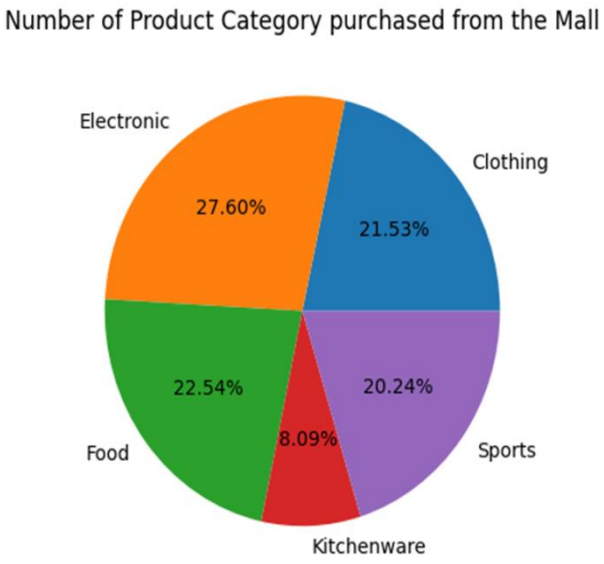

Cluster formation using K-Mean

The result indicates the indexed values for product price range against the age of customers who visit the mall. This enables us to categorized the spending capacity of customers at specific age group to provide promotions and offers according to the predicted centroid values which ideally indicate their spending capacity.




Bar Graph for Ranges of Age Groups

The age group(s) having the higher concentration among the visited customers.




The graphical visualization can be customized to obtain data about the customer purchase behavior towards the products. The customer affection

**QR Scan time: 0.25s – 1.2s**
**Scan accuracy: ~ 95%**
**Prediction and Visualization accuracy: ~76.7%**
**Error margin in plotting: +5% to -5%**

## V. CONCLUSION

This paper will benefit shopping malls and businesses to adopt new technology and increase the consumer traffic. It is cost effective solution to medium sized business as compared to the individual hosted solution. This application establishes that the use of QR code in shopping malls can greatly influence fast and efficient shopping analysis using numerous patterns of purchase and behaviour of customers.

This enables the owners to access real time information about their customer product purchase statistics by simply scanning for their required QR code. Importantly, the system will enable accurate statistical and graphical data report and reliable data mining for the shopping mall on both consumer and

product information in a organized format by the use of QR code technology.

## VI.ACKNOWLEDGEMENT

Special thanks to Dr. Pankaj Agarkar, HOD and Prof. Chaitanya Bhosale, Department of Computer Engineering, DY Patil School of Engineering for guidance and resource provision which helped in development of this paper. Thanks to all the associated faculties for providing all necessary help.

## VII. REFERENCES

[1]. H. Lu, X. Cao, and C. S. Jensen, "A foundation for efficient indoor distance-aware query processing," in 2012 IEEE 28th International Conference on Data Engineering (ICDE). IEEE, 2012, pp. 438–449

[2]. Y.-M. Li, L.-F. Lin, and C.-C. Ho, "A social route recommender mechanism for store shopping support," Decision Support Systems, vol. 94, pp. 97–108, 2017.

[3]. Department of CSE, Institute of Road and Transport Technology. Asian Journal of Applied Science and Technology (AJAST) Volume 1, Issue 4, Pages 37-39, May 2017.

[4]. RajGopal, Journal of Accounting and Economics, 51, 1-20. Deepika Jhamb, Chitkara University and Ravi Kiran, Thapper Unniversity in Journal of Emerging Knowledge on Emerging Markets, November 2011.

[5]. Prokopis k. Theodoridis and Anastasios p. panopoulos, Hopping Centre image attributes effects on consumer's satisfaction and loyalty in Greece – Evidence at the initial stages of the economic crisis

[6]. International Standard ISO/IEC 18004 (2000). Automatic Identification and data capture techniques-Bar code symbology-QR Code, Switzerland.

[7]. Constantinides, E., (2004), "Influencing the Online consumer's behavior: The web experiences", Internet Research, vol.14, no.2, pp.111-126.

[8]. Lei Fu, Design of QR Codebased, Mall Shopping Guide System, International Conference on Information Science and Technology, March 26-28, 2011 Nanjing, Jiangsu, China.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Virtual Painting with OpenCV using Python

**Yash Patil[1], Karunesh Singh Bais[1], Deep Paun[1], Mihir Paun[1], Vishal Kisan Borate[2]**

[1]Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Assistant Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

In modern technologies video tracking and processing the feed has been very essential. This processed data can be used for many research purposes or to express a particular output on a particular system. There are various methods for processing and manipulation of data to get the required output. This paint application is created using OpenCV module and python programming language which is an apex machine learning tool to create an application like this. Given the real time webcam data, this paint-like python application uses OpenCV library to track an object-of-interest (a bottle cap in this case) and allows the user to draw by moving the object, which makes it both awesome and challenging to draw simple things.

**Keywords :** Machine learning, OpenCV, Morphing Techniques, Human-Computer Interactions, Air Writing.

## I. INTRODUCTION

OpenCV was launched in August 1999 at the Computer Vision and Pattern Recognition conference (and so turns 17 years old at the publication of this book). Gary Bradski founded OpenCV at Intel with the intention to accelerate both the research and use of real applications of computer vision in society. OpenCV has nearly 3,000 functions, has had 14 million downloads, is trending well above 200,000 downloads per month, and is used daily in millions of cell phones, recognizing bar codes, stitching panoramas together, and improving images through computational photography.

OpenCV is at work in robotics systems—picking lettuce, recognizing items on conveyor belts, helping self-driving cars see, flying quad-rotors, doing tracking and mapping in virtual and augmented reality systems, helping unload trucks and pallets in distribution centres, and more—and is built into the Robotics Operating System (ROS) [1]. It is used in applications that promote mine safety, prevent swimming pool drownings, process Google Maps and street view imagery, and implement Google X robotics, to name a few examples.

OpenCV has been re-architected from C to modern, modular C++ compatible with STL and Boost. The library has been brought up to modern software development standards with distributed development on Git. Computer vision is an interdisciplinary scientific field that deals with how computers can be made to gain high-level understanding from digital images or videos. From the perspective of engineering,

it seeks to automate tasks that the human visual system can do. OpenCV is a computer vision and machine learning software library that includes many common image analysis algorithms that will help us build custom, intelligent computer vision applications. In this application frequent image feed results in video tracking of our particular object of interest.

Video tracking is the process of locating a moving object (or multiple objects) over time using a camera. It has a variety of uses, some of which are: human-computer interaction, security and surveillance, video communication and compression, augmented reality, traffic control, medical imaging, and video editing.

## II. RELATED WORK

Machine Learning applications are becoming an integral part of our life and for the surrounding society. Real life applications in the field of machine learning can improve the efficiency and consistency in our day-to-day work, by using computer vision and its associating algorithms and its subsequent modules or libraries can help us develop this type of real-life applications.

OpenCV library is an open source library for building a machine learning architecture that can track and process real life data and manipulate it for a required set of expected output.

Related research on various papers and its summaries are as follows:

Title of the Paper is Hand Gesture Recognition its authors are Rafiqul Zaman Khan, Noor Adnan Ibraheem and the related paper's essential aim of building hand gesture recognition system is to create a natural interaction between human and computer where the recognized gestures can be used for controlling a robot or conveying meaningful information. How to form the resulted hand gestures to be understood and well interpreted by the computer considered as the problem of gesture interaction Human computer interaction (HCI) also named Man-Machine Interaction.

Title of the Paper is Gesture Controlled Computer its authors are S. T. Gandhe, Nikita A. Pawar, Mayuri S. Hingmire, Kalpesh P. Mahajan, Devshri V. Patil. This paper describes the method for humans to interact with digital world and use the computer with just our hand movements. The paper is based on image processing. The camera detects gestures and converts those gestures into equivalent digital algorithms as programmed. This paper deals with the controlling all operations of mouse such as right click, left click and movement of cursor over the desktop, drag and drop, snapshot, Air writing and painting through hand gestures.

## III. PROPOSED SYSTEM

The proposed system can be classified into mainly two steps after acquiring the input image from camera, videos or even an Object of Interest. These steps are: Extraction Method image pre-processing and Features estimation and Extraction [1].

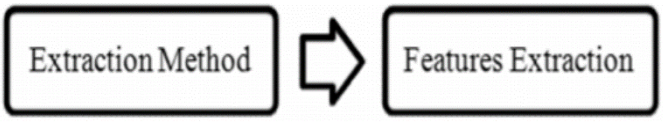



Figure 1: System of architecture.

### A. Extraction Method and image pre-processing:

Segmentation process is the first process for recognizing Object of Interest. It is the process of dividing the input image (in this case Object of Interest image) into regions separated by boundaries.

The segmentation process depends on the type of object, if it is dynamic object then the Object need to be located and tracked, if it is static object with no moving parts such as a coloured bottle cap or a pen of particular colour the input image has to be segmented only. The object should be located firstly, generally a

bounding box is used to specify the depending on the object colour and secondly, the object have to be tracked, for tracking the object there are two main approaches either the video is divided into frames and each frame have to be processed alone, in this case the object frame is treated as a moving OBJ(Object-of-Interest) and segmented, or using some tracking information such as shape, object colour using some filter. The common helpful cue used for segmenting the object is its colour, since it is easy and invariant to scale, translation, and rotation changes. In this case a coloured markers which provide exact information about the orientation and position.

The colour space used in a specific application plays an essential role in the success of segmentation process, however colour spaces are sensitive to lighting changes.

## IV. FEATURES EXTRACTION

Good segmentation process leads to perfect features extraction process and the latter play an important role in a successful recognition process.

The modules of OpenCV for image processing applications are given below:

**CORE** module contains basic data structures and basic functions used by other modules.

**IMGPROC** module contains image processing related functions such as linear, non-linear image filtering and geometrical image transformations etc. **VIDEO** module contains motion estimation and object tracking algorithms.

**ML** module contains machine-learning interfaces. **HighGUI** module contains the basic I/O interfaces and multi-platform windowing capabilities.

Feature's vector of the segmented image can be extracted in different ways according to particular application. Various methods have been applied for representing the features can be extracted. In this method we have used the shape of the object such as object contour [2]. A contour is a closed curve of points or line segments that represents the boundaries of an object in the image. Contours are essentially the shapes of objects in an image. Contours are sometimes called a collection of points or line segments that overall represent the shape of the object in an image.

Figure 2: Silhouette using contour selection

## V. PROPOSED ALGORITHM

**Implementation Method:**

In this machine learning application, we have developed code by using Python programming language along with OpenCV library. Main idea behind this algorithm is to use live feed from camera and process each frame. However, the algorithms will be implemented on defined ROI (region of interest).

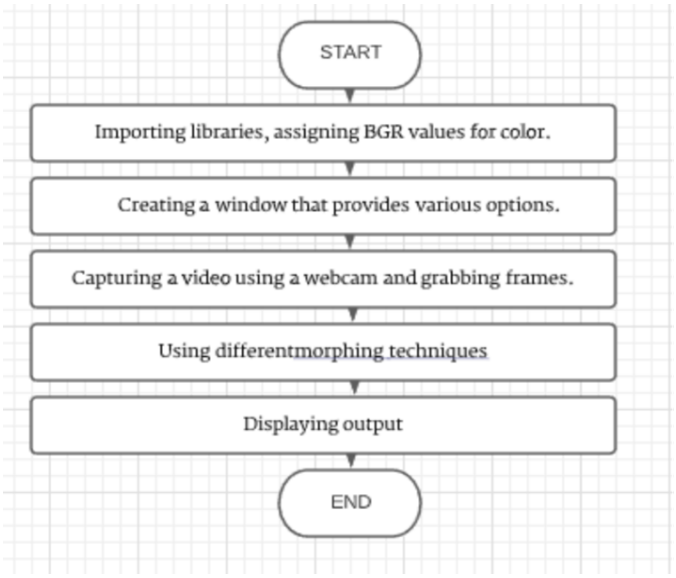



Figure 3: Algorithm.

**Step 1: Initialize Some Stuff**

Firstly, we import the necessary libraries. Following are mentioned in the image:

```
1. import numpy as np
2. import cv2
3. from collections import deque
```

Then we initialize variables that are used in the following steps. We can take any colour in this case we have taken blue colour to be traced on the Contour-Of-Interest.
The blueLower and the blueUpper NumPy arrays help us in finding the blue coloured cap. The kernal helps in smoothing blue cap once found.
The bpoints, gpoints, rpoints and ypoints deques are used to store the points drawn on the screen of colour blue, green, red, and yellow respectively.

**Step 2: Setup the Paint Interface**

Now we manually set the coordinates of each of the colour boxes on the frame. We use the OpenCV function cv2.rectangle() to draw the boxes.

**Step 3: Start Reading the Video (Frame by Frame)**

Now we use the OpenCV function cv2. VideoCapture() method to read a video, frame by frame (using a while loop), either from a video file or from a webcam in real-time. In this case, we pass 0 to the method to read from a webcam. We can just add the exact same paint interface for ease of usage.

**Step 4: Find the Contour-Of-Interest**

Once we start reading the webcam feed, we constantly look for a blue colour object in the frames with the help of cv2.inRange() method and use the blueUpper and blueLower variables initialized in Step 0. Once we find the contour, we do a series of image operations and make it smooth. These operations are specific type of morphing techniques as defined below.

**Morphing Techniques:**

Morphological transformations are some simple operations based on the image shape. It is normally performed on binary images.
Two basic morphological operators are Erosion and Dilation. Then its variant forms like Opening, Closing, Gradient etc. also comes into play. We have tracked the object of interest by the techniques of dilation and erosion.
Once we find the contour (the if condition passes when a contour is found), we use the centre of the contour (blue cap) to draw on the screen as it moves.
The code finds the contour (the largest one), draws a circle around it using the cv2.minEnclosingCircle() and cv2.circle() methods , gets the centre of the contour found with the help of cv2.moments() method.

**Step 5: Start Drawing and Store the Drawings**

Now we start tracking coordinates of each point the centre of the contour touches on the screen, along with its colour. We store these set of points of different colours in different deques (bpoints, gpoints etc.). When the centre of the contour touches one of the coloured boxes we put on the screen in Step 1, we store the points in its respective colour deque.

**Step 6: Show the Drawings On the Screen**

## VI. RESULT

We have stored all the points in their respective colour deques. Now we just join them using a line of their own colour. The OpenCV function cv2.line() comes in handy for us to do that.
Once we join all the points in each and every frame with a line and put it on both the windows we created using cv2.imshow() method and it all fits perfectly to work like a paint application. After falling out of the while loop, we entered to read data from the

webcam, we release the camera and destroy all the windows hence terminating the application.

Here Colour Detection and tracking is used in order to achieve the objective. The colour marker in detected and a mask is produced. It includes the further steps of morphological operations on the mask produced which are Erosion and Dilation. Erosion reduces the impurities present in the mask and dilation further restores the eroded main mask.

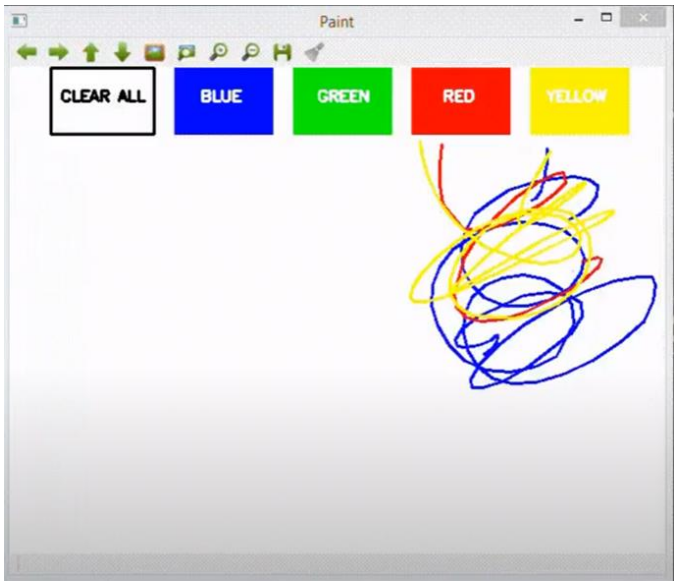



Figure 4: Application GUI.

## VII. FUTURE WORK

Some examples that are being implemented in the near future are as follows:

**Video Processing using Android Phone:**

Mobile devices such as smart phones, iPads and tablet pcs are equipped with cameras, the demand of the image processing applications increased. These applications need to be faster and consumes lower power because the mobile device is only powered by a battery. The hardware technology depends on the semiconductor technology instead we can use an efficient programming language to write an image processing application for the mobile devices [4].

**Robot Control:**

Controlling the robot using gestures considered as one of the interesting applications in this field proposed a system that uses the numbering to count the five fingers for controlling a robot using hand pose signs. The orders are given to the robot to perform a particular task, where each sign has a specific meaning and represents different function [16].

## VIII. CONCLUSION

Demonstration of the image processing capabilities of OpenCV. The ultimate goal is to create a computer vision machine learning application that promotes Human computer interaction (HCI) also named Man-Machine Interaction (MMI)] refers to the relation between the human and the computer or more precisely the machine, and since the machine is insignificant without suitable utilize by the human there are two main characteristics should be deemed when designing a HCI system as mentioned: functionality and usability [5]. System functionality referred to the set of functions or services that the system equips to the users while system usability referred to the level and scope that the system can operate and perform specific user purposes efficiently.

## IX. REFERENCES

[1]. https://towardsdatascience.com/Painting-with-opencv

[2]. https://www.geeksforgeeks.org/live-webcam-drawing-using-opencv

[3]. Volume 43, Issue 1, June 2012 ISSN: 2277 128X, International Journal of Advanced Research in Computer Science and Software Engineering: Research Paper -- Hand Data Glove: A Wearable Real-Time Device for Human-Computer Interaction

[4]. International Journal of Artificial Intelligence & Applications (IJAIA), Vol.3, No.4, July 2012, DOI:

10.5121/ijaia.2012.3412 161- HAND GESTURE RECOGNITION: A LITERATURE REVIEW

[5]. OpenCV for Computer Vision Applications, Proceedings of National Conference on Big Data and Cloud Computing (NCBDC'15), March 20, 2015

[6]. https://www.geeksforgeeks.org/live-webcam-drawing-using-opencv/

[7]. https://docs.opencv.org/master/d5/d54/group__objdetect.html

[8]. https://circuitdigest.com/tutorial/real-life-object-detection-using-opencv-python-detecting-objects-in-live-video

[9]. Real Time Object Detection and Tracking Using Deep Learning and OpenCV Proceedings of the International Conference on Inventive Research in Computing Applications (ICIRCA 2018) IEEE Xplore Compliant Part Number: CFP18N67-ART; ISBN:978-1-5386- 2456-2

[10]. Numpy.org, 2017. [Online]. Available: http://www.numpy.org

[11]. (2017, January 17). Object Detection [Online].Available: http://en.m.wikipedia.org/wiki/Object_detection

[12]. Study on Object Detection using Open CV – Python, International Journal of Computer Applications (0975 – 8887) Volume 162 – No 8, March 2017

[13]. Nidhi, "Image Processing and Object Detection", Dept. of Computer Applications, NIT, Kurukshetra, Haryana, 1(9): 396-399, 2015

[14]. OpenCV, Open source Computer Vision library. In http://opencv.willowgarage.com/wiki/, 2009

[15]. http://docs.opencv.org/modules/imgproc/doc/imgproc.html

[16]. http://en.wikipedia.org/wiki/OpenCV

[17]. Javed O, Shafique K, Shah M. A hierarchical approach to robust background subtraction using colour and gradient information. IEEE Workshop on Motion and Video Computing (MOTION' 02); 2002.

[18]. Ammar Anuar, Khairul Muzzammil Saipullah, Nurul Atiqah Ismail, Yewguan Soo "OpenCV Based Real-Time Video Processing Using Android Smartphone", IJCTEE, Volume 1, Issue 3

[19]. Yash Patil, Karunesh Singh Bais, Deep Paun, Mihir Paun, Vishal Kisan Borate, "Virtual Painting with Opencv Using Python", Volume 5, Issue 8, November December 2020 ISSN: 2395 602X, International Journal of Scientific Research in Science and Technology.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Search Engine Optimization and Report Generator

**Anshuman Vats, Pranav Gholap, Pragati Tamboli, Kshitij Motke, Jayshree Chaudhari**
Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

In this project, we will be working on creating a fully automated SEO report generator based on the guidelines given by the search engines (Google/Bing/ Gropher) and create an indexing chart by going through the source code of the given website and ranking it in aspects of performance, SEO, best practices and availability. The secondary objective of the project is to recommend keywords based on the given website description ( meta description tag from HTML file). To create the report we will need to rank the result that comes up after searching someone's name or their website and categorize them into three categories Good, Bad, and Critical. These can be flagged to the administrator team for content removal. For categorization, we will be building upon the Compromise NLP engine based on NODE JS environment.

**Keywords :** SEO, Automation, Selenium, Pagespeed Insight, Text classification

## I. INTRODUCTION

### A. Search Engine Optimisation

Search Engine Optimisation SEO stands for "search engine optimization." In simple terms, it means the process of improving your site to increase its visibility for relevant searches. The better visibility your pages have in search results, the more likely you are to garner attention and attract prospective and existing customers to your business.

### B. How does SEO work?

Search engines such as Google and Bing use bots to crawl pages on the web, going from site to site, collecting information about those pages, and putting them in an index. Next, algorithms analyze pages in the index, taking into account hundreds of ranking factors or signals, to determine the order pages should appear in the search results for a given query.

Search ranking factors can be considered proxies for aspects of the user experience. Our Periodic table of SEO factors organizes the factors into six main categories and weights each based on its overall importance to SEO. For example, content quality and keyword research are key factors of content optimization, crawling ability and mobile-friendliness are important site architecture factors.

The search algorithms are designed to surface relevant, authoritative pages and provide users with an efficient search experience. Optimizing your site and content with these factors in mind can help your pages rank higher in the search results.

### C. Web Automation

Website automation is a way to automate common web actions-like filling out forms, clicking on buttons, downloading files, and hands them over to helpful software bots. While the internet makes doing business faster and easier in countless ways, these actions can be time-consuming and prone to errors

## II. PROBLEM STATEMENT

The current process of SEO optimization and report generation is a manual process. Where we search for their online reputation, search results get categorized based on textual context and the effect on one's reputation. If they have a personal website or organization's website we go to that website and based on the search engine guidelines (Google/ Bing/ Gropher) we rank the website in various aspects. After collecting all the data. A report is generated that is then delivered to the client.

Pain points:

- Manual process.
- Report generation is a repetitive task.
- Data collection from various sources is time-consuming

## III. OBJECTIVE

Our objective is to Analyzing website against SEO guidelines to create the SEO ranking for a given website further Creating a text classifier to categorize the fetched result from search engines against someone's name/organization thereafter Automating the Google docs using Docs API to generate the required report based on the extracted data from previous steps and deliver it in a custom-designed google doc.

Once all the data has been collected and sorted we will use the Google Docs automation process using Python to create reports that then can be delivered in pdf format.

1. Data collection for SEO listing
2. Categorizing search engine result using NLP
3. Report automation

This is a complete solution delivery project in the scope of Full stack development based on technologies SEO, Automation, and Natural Language Processing.

The final product is going to follow the API first architecture.

## IV. DISCUSSION

### A. Project Scope

Creating a fully automated system for SEO report generation and optimization. Consisting of - Text classifier (NLP), Google docs Automator and web scraper (Selenium/Scrappy/Puppeteer).

- Web application adhering to the PWA standards.
- Codebase: Microservice Architecture
- Custom NLP model
- Deployed on AWS

### B. Functional Requirements

The system should provide an interface where the user can enter the name of the website for which he/she wants to get the search engine ranking and page speed insights.

Visualization of the score based on the result returned from the servers and suggestion to get a higher score if not sufficiently based on the business requirements.

An auto report generator to provide the end-user with the ORM sheet that can later be used to pitch the client.

All this needs to be done using a headless browser instance running in the background and calculating all the scores by running the required test on the given website provided by the user.

### C. Non-Functional Requirements

#### 1) Performance Requirements

The model should efficiently work as per the given conditions and evolve accordingly

### 2) Safety Requirements

This model does not possess the capabilities to be used in a negative manner and as such there will be no repercussions for it.

### 3) Security Requirements

The model should be secure as it does not contain any components that may possess a risk factor.

## D. System Requirements

### 1) Software Requirements

- VUE js
- Node
- Modern Browser (chromium-based preferred)

### 2) Hardware Requirements

- Processor i3 5th Gen & above
- Hard Drive: 10GB
- RAM Size: 4GB

# V. SYSTEM DESIGN

## A. Models

Initializing all the required systems in the NODE environment.

### Module 1: Performance testing

We take the input from the user and perform various test to finally conclude how does the website perform in different scenarios and give insights on how to take correct measures

### Module 2: SEO testing

We test the website against the set SEO parameter for which we assign a rank and give input on how to improve the SEO rank

Puppeteer JS (NPM)

```
const puppeteer = require('puppeteer');

(async () => {
  const browser = await puppeteer.launch();
  const page = await browser.newPage();
  await page.goto('https://example.com');
  await page.screenshot({path: 'example.png'});
  await browser.close();
})();
```

### Module 3: User reputation (Text classification)

We search for the user's name and see if the search result contains -ve or +ve result based on our NLP engine

Natural JS

```
// Configuring Natural js for natural language processing
var Analyzer = natural.SentimentAnalyzer;
var stemmer = natural.PorterStemmer;
var analyzer = new Analyzer("English", stemmer, "afinn");
var tokenizer = new natural.WordTokenizer();
```

### Module 4: Report generation

Using print.js for exporting all the JSON data that can be pitched to the clients.

## B. Process Diagram

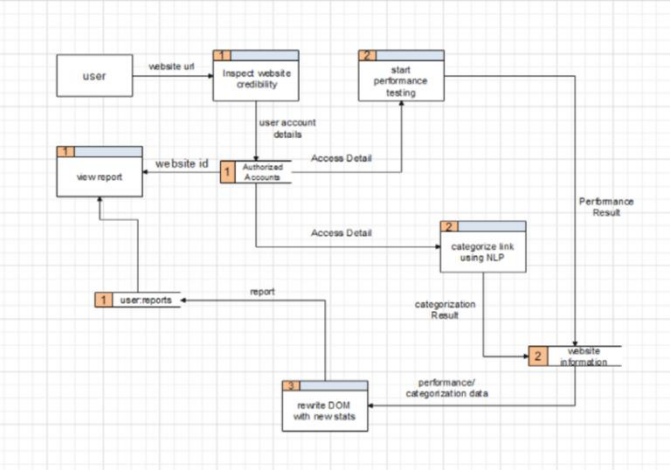



figure 2: Process Diagram

### C. System Architecture

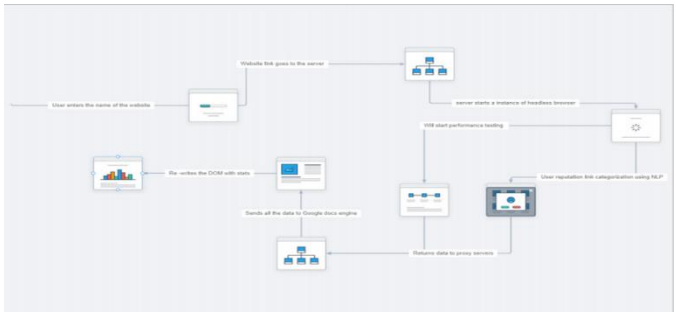


figure 3: System Architecture

### D. Functionality

The user enters the name of the website for which we will be doing the analysis.
That website link is sent to the backend server and this where all the processing will be carried out.
Once the name is received the backend server will start to create a headless browser instance.
In these instances, we will do our performance and SEO testing. There will be another instance that will go on to check the search result on Google and then mark and categorize the response to Good, Bad, or Critical.
All this raw data will be sent to a proxy server which will then convert this data into a JSON object.
To access the google docs engine we need a proxy server because the remote server doesn't allow direct access to themselves hence our proxy server will feed the data to the Google engine which will, in turn, give us the required report.

## VI. ADVANTAGES

Unlike traditional "outbound" advertising channels, which involve reaching out to consumers whether they want to hear from you or not, inbound methods center on making it easy for your audience to find you when they want information.
Google's organic rankings are based entirely on what its algorithm determines to be the best results for any given query. This means that once you've created a page that the search engine deems worthy of directing their users to, it can continue to attract traffic to your site for months (or even years) after you publish it. Of course, researching and writing high-quality content requires an investment. That investment will either be in the form of time if you choose to create it yourself or money if you choose to hire a digital marketing agency to create it for you.
It's difficult to say why this is, though the most logical conclusion is that users trust Google's algorithm. They know which spots advertisers are paying for, and they choose to instead visit the pages the search engine has determined to be the best.
Earning links from reputable websites is a main component of any SEO strategy. This means that one of the biggest parts of an SEO professional's job is to identify opportunities for placement or coverage on industry blogs, news publications, and other relevant sites

## VII. RESULT

We tested our system on one of the most popular website "Microsoft - Official Home Page" and the co-founder of Microsoft "Bill Gates" following were the results as of 3rd June 2021 from India:

### 1) Performance Testing

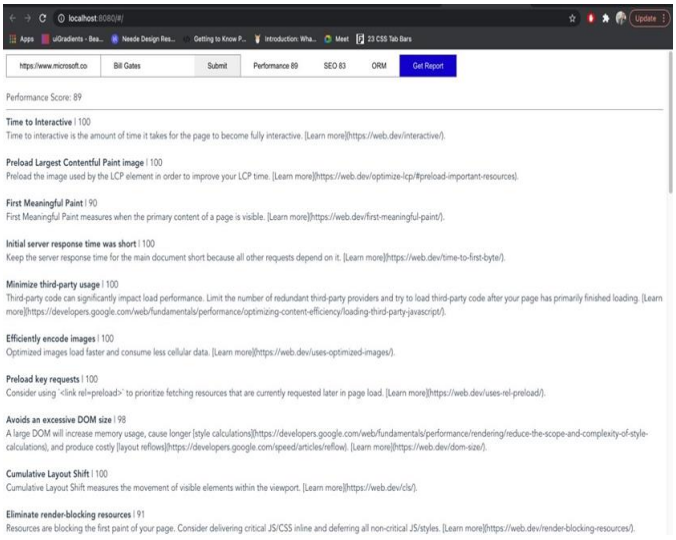



figure 4: Performance testing result

### 2) SEO Testing

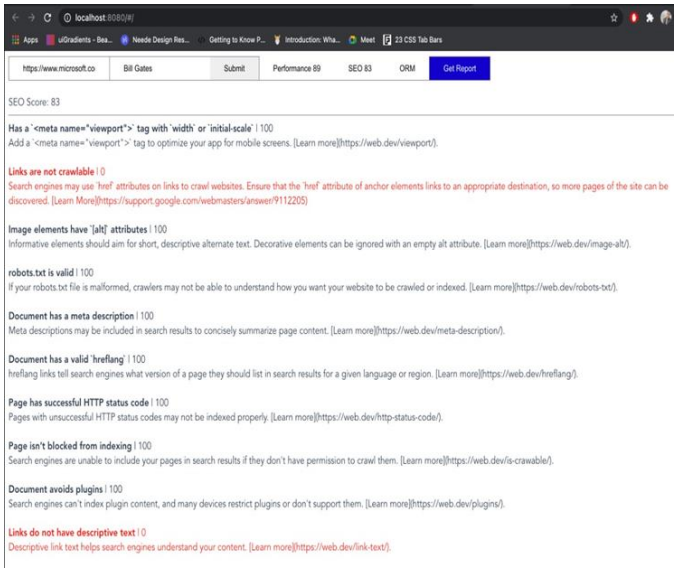



figure 5: SEO testing result

### 3) ORM Testing

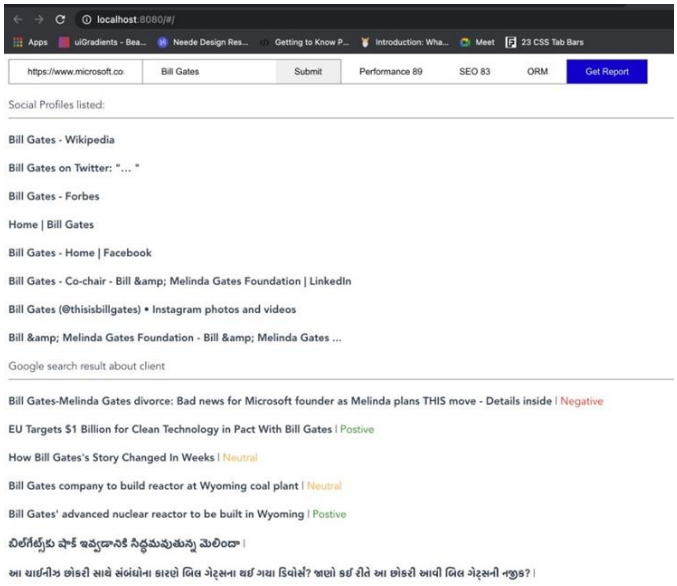



figure 6: ORM testing result

## VIII. CONCLUSION & FUTURE SCOPE

In this, we have successfully built an automated system that can perform automated performance testing, SEO testing and also use an NLP engine to dissect whether a person or company's reputation is categorically good, bad, or critical.

This could be scaled up to a full-fledged business solution to provide search engine optimization solutions and online reputation management and can be set up as a microservice to create a subscription-based system.

## IX. ACKNOWLEDGMENT

It gives us great pleasure in presenting the paper on "Search Engine Optimisation and Report Generator". We would like to take this opportunity to thank Dr. Pankaj Agarkar, AP, and Head of Computer Engineering Department, DYPSOE, Pune for giving us all the help and support we need during the course of the Paper writing work. We are grateful to him. Our special thanks to Dr. Ashok Kasnale, Principal DYPSOE who motivated us and created a healthy environment for us to learn in the best possible way. We also thank all the staff members of our college for their support and guidance

## X. REFERENCES

[1]. D. Pratiba, Abhay M.S, Akhil Dua, Giridhar K. Shanbhag, Neel Bhandari, Utkarsh Singh, "SEO TECHNIQUES FOR VARIOUS APPLICATION-A COMPARATIVE ANALYSIS AND EVALUATION," Published in IEEE 20-22 Dec 2018

[2]. Gowtham Aashirwad Kumar, Dr. A Ravikumar, "AN ANALYTICAL STUDY OF SEARCH ENGINE OPTIMIZATION (SEO) TECHNIQUES: TO MAXIMIZE NUMBER OF TRAVELERS ON AN E-CONTENT MATERIAL WEBSITE," Published Volume 11, Issue 1, January 2020

[3]. Peng Qi*, Yuhao Zhang*, Yuhui Zhang, Jason Bolton, Christopher D. Manning, "A PYTHON LANGUAGE PROCESSING TOOLKIT FOR MANY HUMAN LANGUAGES," Published Stanford University Stanford, CA 94305 23 Apr 2020

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Prevention of Phishing Attacks on Online Voting System Using Visual Cryptography

**Akshada Tingare[1], Pragati Shilote[1], Mohoni Raykar[1], Priyanka Pathare[1], Prof. Vandana Chavan[2]**

[1]Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Assistant Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

The aim of Voting System using Visual Cryptography is to provide facility to cast for critical and confidential decisions of internal corporate. It provides the flexibility of casting vote from any remote place. The confidentiality of the election is maintained by applying the appropriate security measures so that the voter can vote for any participating candidate but only if he logs into the system by entering the correct password which is generated by merging the two shares using Visual Cryptography scheme. The administrator is responsible for sending the shares, 1st share to voter email id before election and 2nd share will be available in the Voting System for his login during election. The voters get the secret password to cast his vote by the combination of share 1 and share 2 using Voting Cryptography. Phishing is an attempt by an individual or group which aims to get personal confidential information from unsuspecting victims. Internet voting focuses on security, privacy, and secrecy issues, as well as challenges for stakeholder involvement and observation of the process.

**Keywords :** Authentication, Visual Cryptography, Image captcha phishing, Phishing, Open CV Library Algorithm, Online Voting.

## I. INTRODUCTION

Due to rapid increase in the internet usage, sharing of information on the internet has started, however they are unaware that the network on it they are sharing files is secure or not. Thus, data security becomes a very serious issue these days [9]. Phishing is identified as a significant security threat known is phishing [12-13] every moment a new technique for doing fraud is being increased. Thus, the security in these cases should be elevated and should not be manageable with implementation. Now a days, most applications are safe with their underlying system. Phishing is identified as fraud that steals identification and personal data of people [10]. many information security techniques have been developed to protect information from hackers that includes Steganography, Cryptography and other encryption techniques. Steganography techniques is applied on any style of digital media like text, video, audio or footage. Visual cryptography and Secret Image Sharing are cryptography techniques that are used for materials, matter footage, and written

notes etc. website address of ABC Corporation but it doesn't take us to the legalized site. [11] In the existing system of phishing detection there is also an approach where the visual cryptography is used. In this approach when the user first registers at the bank server, then at the time of registration itself an image is chosen that's split into two shares. One share of image is kept at the server and user gets another share that he keeps with him. When the user wants to initiate transaction with merchant server, he sends his UID code to the merchant server. Merchant server then sends his sys Id & password along with the user's UID to the bank server. once bank server gets this request he initial verifies if the merchantserver is registered merchant. If so, he fetches the share of image associated with the precise UID code and sends it to the merchant server which then sends it to the user. once user gets the share of image, he combines it along with his share. If user gets the primary image that was selected at the time of registration, then he gets to know that the merchant is authenticated, and the user can now proceed the transaction. One-time passwords are passwords that are used once and only valid for one login session or transactions. Banks, governments and security-based industries deploying OTP system where user might have many passwords and use each password just once. OTPs can avoid number of shortcomings that are associated with traditional passwords that are valid for many transactions as users are reluctant to voluntarily change passwords frequently. Since OTPs are only valid for single use, an attacker has a smaller window of time to gain access to resources guarded by such an identification as a result of any previously taken passwords will most likely became invalid [11].

## II. SECURITY ATTACKS

### A. IP Spoofing Attacks

The basic protocol for sending data over the web network and many other computer networks is the Internet Protocol (IP). The first goal of an IP spoofing attack is to determine a connection that allows the attacker to gain root access to the host and to make a backdoor entry path into the target system. IP spoofing could be a technique used to gain unauthorized access to computers whereby the intruder sends messages to a computer with an IP address that indicates the message is coming from a trusted host. The attacker learns the IP address of a trusted host and modifies the packet headers so that it appears that the packets are coming from that trusty host. In computer networking, IP address spoofing or IP spoofing is that the creation of Internet Protocol (IP) packets with a false source IP address, for the purpose of impersonating another computing systems.

### B. Trust exploitation

It refers to an individual taking advantage of a trust relationship inside a network. The goal of a trust exploitation attacker is to compromise a trusty host, using it to stage attacks on other hosts in a network. If a host in a network of a company is protected by a firewall (inside host), but is accessible to a trusty host outside the firewall (outside host), the inside host are often attacked through the trusted outside host.

### C. Password Attacks

Types of Password Attacks:

#### 1. Non-electronic Accounts

It is a non-technical attack that is the performed even without sound technical knowledge.

#### 2. Active Online Attack Types:

a. Password guessing: Attackers create possible passwords by collecting information from social media accounts and other online sources.

Criminals use the default password provided by manufacturers to crack accounts.

b. Brute-force attacks: Attackers make multiple attempts with possible combinations until they crack the account.
c. Dictionary attacks: Attackers load dictionary files of passwords and runs it against user attacks.
d. Rule based attack: Attackers load dictionary files of passwords and runs it against user attacks.
e. Trojan/Keylogger/ Spyware: Either of these viruses or malware are run in the background to track the passwords.
f. Hash injection attack: The attacker injects a compromised hash into a local session and uses it to retrieve the domain admin account hash. To log on to the domain controller, use the extracted hash.

**3. Passive Online Attack:**

a. Man-in-the-middle: The attacker gains access to the communication channel to extract confidential information.
b. Wire-sniffing: Packet sniffer tools on the local area network are used to access and track the network traffic.
c. Replay attack: Packets and authentication captured using a sniffer are used to extract relevant information, and then they are placed on the network to gain access.

**4. Offline Attack:**

a. Rainbow table: Captured password hashes are compared to the precomputed tables to recover passwords.
b. Distributed network attack: The technique is used to recover passwords from hashes using excess power of machines to decrypt passwords.

## D. Confidentiality and Integrity Attacks:

Confidentiality breaches can occur once an attacker attempts or tries to get access to read-sensitive information. These attacks can be very difficult to detect because the attacker can copy sensitive information without the knowledge of the owner and without leaving a trace. A confidentiality breach can occur just because of incorrect file protections. as an example, a sensitive file could mistakenly be given global read access. Unauthorized copying or examination of the file would probably be difficult to track without having some type of audit mechanism running that logs every file operation. If a user had no reason to suspect unwanted access, however, the audit file would in all probability ne'er be examined.

## E. Phishing, Pharming and Identity theft

Two of the most common ways in which thieves acquire personal data to help them in identity theft are phishing and pharming. Phishing utilizes bulk e-mail messages to entice recipients into revealing personal data. Pharmers, on the opposite hand, cast a wide net for the unwary.

Identity theft continues to be a problem. In computing, phishing is an endeavour to criminally acquire sensitive information, such as usernames, passwords, and card details, by masquerading as a trustworthy entity. Phishing is usually carried out by email or instant message (IM), although typically phone contact is attempted; the phisher usually directs users to enter details at a web site. Phishing is an associate degree example of social engineering. Pharming is an attack aimed at redirecting the traffic of a website to another website. Pharming is conducted either by ever changing the hosts file on a victim computer or by exploiting a vulnerable Name System (DNS) server. Pharming has become a significant concern to businesses hosting e- commerce and on-line banking websites.

## F. Accessibility Attacks

Availability means that information is accessible by authorized users. If an attacker is not able to compromise the first two elements of information security (see above) they may try to execute attacks like denial of service that would bring down the server, making the website unavailable to legitimate users due to lack of availability. DoS attacks attempt to compromise the availability of a network, host, or application. They are considered a major risk because they can easily interrupt a business process and cause significant loss. These attacks are relatively simple to conduct, even by an unskilled attacker. Botnet is a term for a collection of software robots, or bots, that run autonomously and automatically. They run on groups of "zombie" computers controlled by crackers. Among the different kinds of threats, there is the possibility of occurrence of phishing in voting systems [4],and the social phishing scams have to be avoided or otherwise their effects can be easily wide spread in an election process.

The geography of phishing attacks in first quarter of 2015 is given in figure 1 [5].

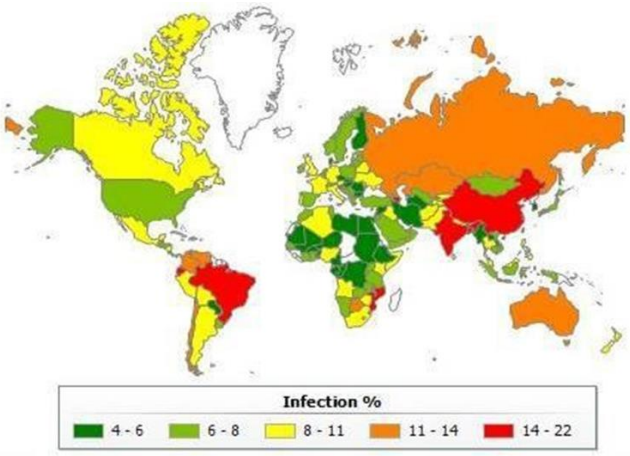



Fig 1. Literature Survey

## III. LITERATURE SURVEY

Comparative study of classifiers model-based features is shown in the table 1

Table 1: Analysis of literature survey

**COMPARATIVE ANALYSIS OF LITERATURE SURVEY**

| Sr. No. | Paper Name | Methodology | Result |
|---|---|---|---|
| 1 | The Phishing Guide Understanding & Preventing Phishing Attacks | multi-tiered approach(client-side, server-side and enterprise) | 66.45% |
| 2 | Visual Cryptography | Visual Cryptography(basic) | 72.55% |
| 3 | Segment-based Visual Cryptography | Visual Cryptography using seven segment display | 77.75% |
| 4 | CAPTCHA: Using Hard AI Problems For Security | AI problems (Stegnography) | 85.30% |
| 5 | A Text-Graphics Character CAPTCHA for Password Authentication | Text-Graphics Character Captcha | 89.54% |
| 6 | Hashed Based Visual Cryptography Scheme For Image Authentication | Visual cryptography | 90.15% |
| 7 | Visual Cryptography and Chaotic Image Encryption for the Security Of Biometric System | Visual cryptography | 91.13% |
| 8 | Image Authentication using Visual Cryptography and Encryption algorithm | RSA algorithm & Visual cryptography | 94.20% |

Table 1. Comparative Analysis

## IV. VISUAL CRYPTOGRAPHY FOR ANTI-PHISHING

Recently Phishing is most popular attack. Phishing is a form of online identity theft that aims to steal the sensitive information. Phishing is done to acquire confidential information such as Usernames, passwords, and card details by disguising as a legitimate entity in an electronic communication. In this paper we have introduced a new method, which can be used as a safe way against phishing, which is named as "Visual cryptography for Anti-phishing". In that approach website cross verifies its own identity to the end users and it make a system is secure and authenticated as well. In this technique we used the concept of image processing and an improved visual cryptography. Visual Cryptography (VC) is a method of encrypting a secret image into the shares, such that

after stacking a sufficient number of shares the secret image is disclosed in that method an image- based authentication is performed using Visual Cryptography (VC).

The image captcha is decomposed into 2 shares that are stored in separate database servers, one with user and one with server such that the original image captcha is revealed only when that two shares are simultaneously stacked. Once the original image captcha is disclosed, the user can use it as the password.

## V. EVOLUTION OF VOTING SYSTEMS

There are different types of voting systems starting from the early days and upto the current technological trends. These are explained in the following section.

### A. Paper ballot system

Paper ballot system is the most commonly used method in voting system. The system was widely used before the invention of electronic voting system. Paper ballot system uses paper and stamp method to cast a vote. Every voter makes use of one ballot and it is not shared. The disadvantages in this system are:

i) time consuming,
ii) booth capture,
iii) low count speed.

### B. Electronic voting system

An electronic voting system is a type of voting system which allows voters to cast their confidential votes using Internet. The disadvantages in this system are:

i) People poor in computer knowledge face difficulty in voting,
ii) security problems,
iii) cost.

### C. Online voting system

Online voting system is the most recent used electronic voting system in which the voted ballot is transmitted over the public Internet through web from anywhere in the world. Security is the most important drawback of this system [7].

Some major issues related to online voting system based on security are:

- Most of the applications are giving high security towards the Password Security and they are not focusing on phishing attacks. By phishing, attackers get the passwords from the client and they go into the relevant sites with right secret key.
- There is no efficient method to safeguard the websites from the phisher attacks. Other than the given voting systems the voter can use other voting methods to cast their votes.

## VI. PROPOSED ONLINE VOTING SYSTEM

Taking an online voting system into consideration to elect the president or any other government authorities. Detection and prevention of Phishing attacks can be done using the technique as described in figure 2.

When government is going to held elections the election officer or administrator uses online voting system to cast vote. During this process people who are eligible to cast vote has to upload the password image, it has to move from local system to web server. Then the password image is divided into two shares, this system proposed the Visual Cryptography technique. Before dividing the image into two shares the image is first converted into Monochrome Image (Black and White Image).

Given a secret image S to the user, a set P of n participants and a strong access structure, a Visual Cryptographic Scheme (VCS) for General Access Structures (GVCS) encodes S into n shares of transparencies. Modeling of minimizing the pixel expansion for a (k, n)-VCS into an integer linear program (ILP), to ensure that the constraints for GVCS can be satisfied. The pixel expansion of a GVCS can thus be minimized by solving the corresponding ILP.

The proposed ILP is generalized for (k,n)-VCS. It can be applied to construct the basis matrices with the minimum pixel for a GVCS. The optimal pixel expansion of a GVCS can be acquired, especially for those applications that really need a GVCS with the smallest shares. After Image is divided into two shares one share has to be sent to the relevant voter through email, for which SMTP technique is used [8].

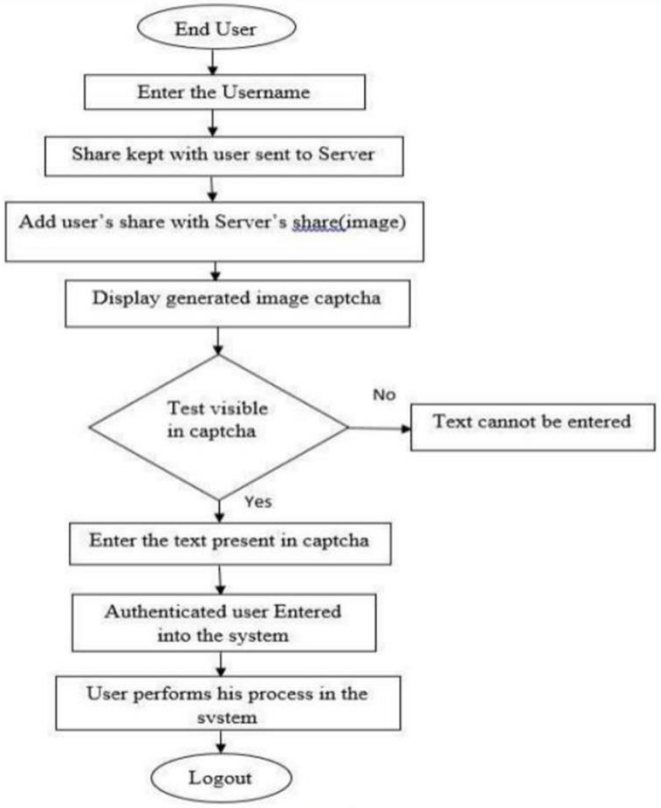



Figure 1. Proposed Online Voting System

Fig 2. Proposed Online System

The image of text captcha is split into two shares namely share1 and share 2. From Figure 3, we can easily identify three different forms of input and output. Each pixel of the images is divided into smaller blocks. There are always the same number white (transparent) and black blocks. If a pixel is divided into two parts, there are one white and one black block. If the pixel is divided into four equal parts, there are two white and two black blocks. In case1 and case2, it is shown that correct images are formed and the captcha can be reconstructed properly whereas in case3, different shares are used and hence the captcha cannot be generated properly. After entering the captcha, user is allowed to cast his vote. In case 3, the two shares are different and thus the output is not the proper image captcha. Hence user cannot be able to enter the captcha and thus the user is logged out of the system.

For Online Voting system there are many powerful validations to make the voting successful. Some of them are:

- Once voter has casted his vote , he is not able to vote again This can be accomplished by making his password to be expired.
- Whenever the voter did his voting, the corresponding voting count of that candidate has to be increased.
- Proper authentication is been provided so that the voters will not have unambiguous regarding the security of voting using online voting system. This can be achieved by the combined usage of visual cryptography and anti-phishing process.

## VII. PROPOSED ALGORITHM

**Algorithm for image comparison:**

**OpenCV library of Java:**

To compare two images –

1. Read Both of them using the Image.IO.read() method
2. Get the height and width of both of them to make sure they are equal.
3. Get the pixel values and, get the RGB values of both of the images.
4. Get the sum of the differences between the RGB values of these two images.
5. Calculate the percentage of the difference using the following formula – Average = difference /

weight * height * 3; Percentage = (Average / 255) * 100

**Algorithm:**

Step 1 - Check if dimensions of both the image match.
Step 2 - Get the RGB values of both images.
Step 3 - Calculate the difference in two corresponding pixels of three-color components.
Step 4 - Repeat Step 2-3 for each pixel of the images.
Step 5 - Calculate the percentage by dividing the sum of differences with:

Number of pixels, to obtain the average difference per pixel 3, to obtain the average difference per color component 255, to obtain a value between 0.0 and 1.0 which can be converted into a percent value Compare two Images using Open CV Library in Java.

## VIII. ADVANTAGES

1. The system which uses visual cryptography enhances the security level of the system.
2. User login is safe and secure. Voters can vote from any place.
3. Voter can login in to the account only if he/she has successfully uploaded the image share which is provided on their email.
4. This system will cause voter to cast vote only once.
5. If will be efficient for voters living in remote locations.

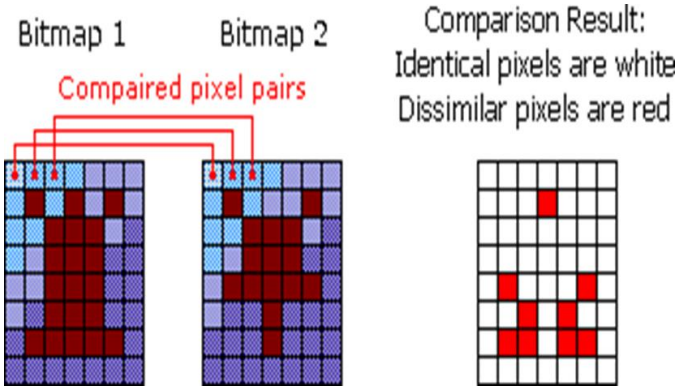



Fig 3. Comparison of Images

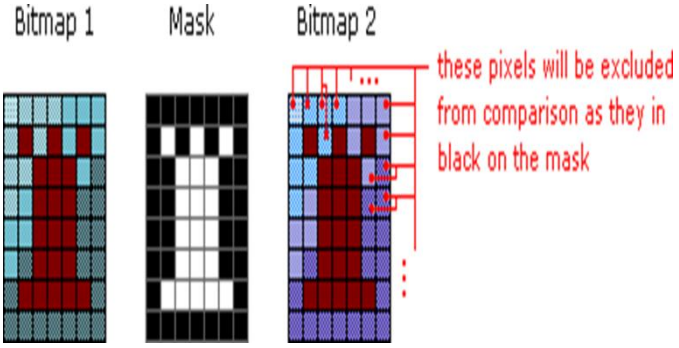



Fig 4. Pixel matching

## IX. IMPLEMENTATION

1. User Registration in system

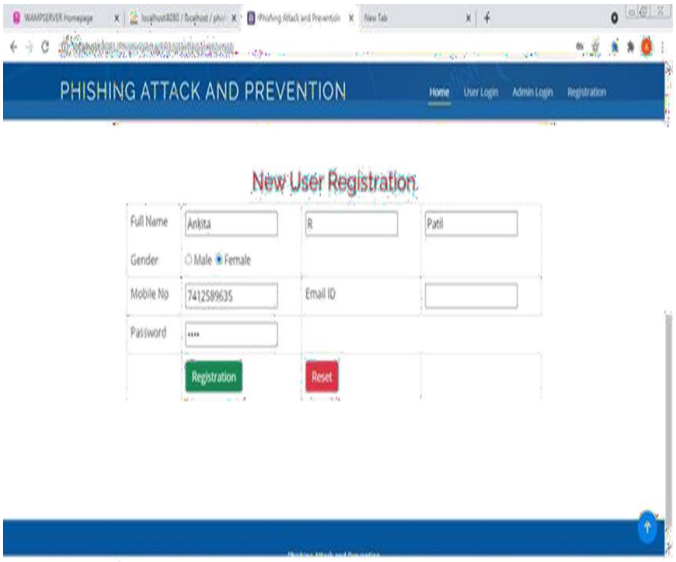



Fig 5 Registration

2. Sending Image share through mail

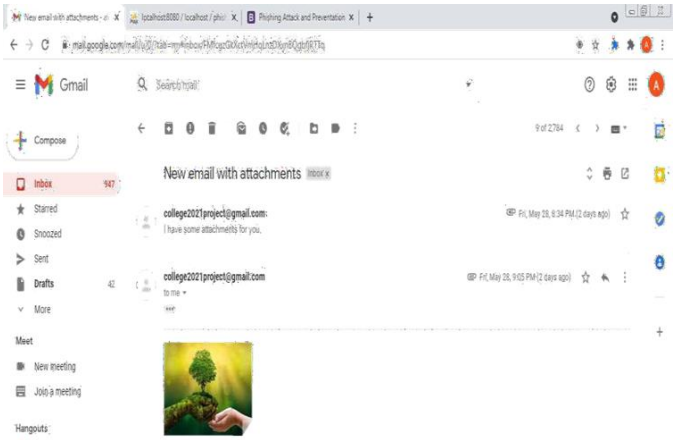



Fig 6. Image process

3. Detection of Phishing attack

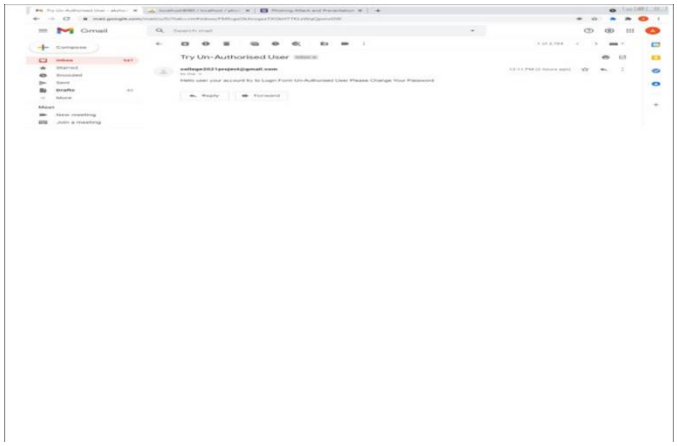


Fig 7. Detection of attack

4. Voting System

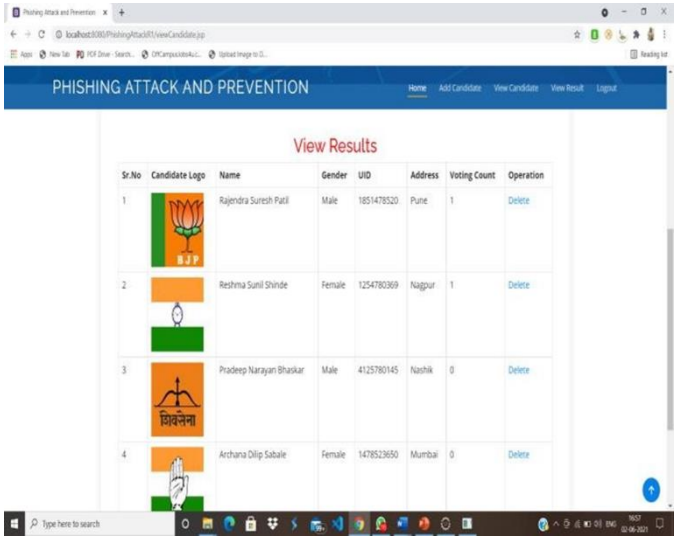



Fig 8. Voting process

5. Prevention using visual cryptography

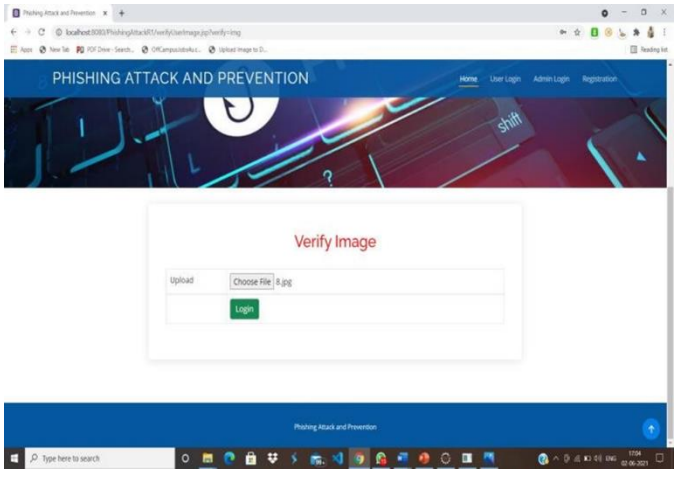



Fig 9. Prevention of attack

## X. CONCLUSION

At present generation attacks are more in online systems, phishing has become major network security issue, leading many losses by hacking the confidential data that are used by the user. Phishers creates their own fake websites which is exactly similar to the original website including applying DNS server name, setting up web server and creating web pages similar to genuine website. So in this paper we are going to design link guard algorithm which is a character based. It has capacity to detect many attacks using APWG (anti phishing working group).Open CV Library is used for prevention of phishing attacks . Proposed online voting system will be very effective and it will be useful for voters and organization in number of ways and it will reduce the cost and time of voters and organization both.

## XI. REFERENCES

[1]. NetworkSecurity, https://en.wikipedia.org/wiki/Network_security, accessed on May 2015.

[2]. JoeyPaquet, http://users.encs.concordia.ca/~paquet/wiki/index.php?title=Capability_maturity_model, accessed on May 2015.

[3]. Villafiorita A, Weldermariam K, Tiella R, “Development, Formal verification and evaluation of an e-voting system with VVPAT”, IEEE Transactions on Information Forensics and Security, 2009, p.no. 651- 661.

[4]. Abdalla Al-Ameen and Samani Talab, “The Technical Feasibility and Security of E-Voting”, The International Arab Journal of Information Technology, Vol.10, No.4, July 2013, p.no.397-404.

[5]. https://securelist.com/analysis/quarterly-spam-reports/69932/spam-andphishing-in-the-first-quarter-of-2015/, Phishing attack, accessed on 12.09.2015.

[6]. M. Mounika Reddy and B.Madhura Vani, "A Novel Anti phishing Framework based on Visual Cryptography", International Journal of Advanced Research in Computer and Communication Engineering, Vol.2, Issue 9, Sep 2013, P.No.3434-3436.

[7]. Mayur Patil, Vijay Pimplodkar, Anuja R.Zade, Vinit Vibhute, Ratnakar Ghadge, "A Survey on Voting system techniques", International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 3, Issue. 1, Jan 2013, p.no. 114-117.

[8]. Shyong Jian Shyu, Ming Chiang Chen, "Minimizing Pixel expansion in Visual cryptographic scheme for General Access Structures", IEEE Transactions on Circuits and Systems for Video Technology, Vol. 25, No. 9, Sep 2015.

[9]. Liang H., & Xue Y., "Understanding security behaviours in personal computer usage: A threat avoidance perspective", Association for Information Systems, 11(7), pp. 394–413, 2010

[10]. Ollmann G. The Phishing Guide Understanding & Preventing Phishing Attacks, NGS Software Insight Security Research.

[11]. Anti-Phishing Working Group, Global Phishing Survey: Trends and Domain name use in 1H2009, 2009Anti-Phishing Working group .http://www.antiphishing.org/.

[12]. Yuancheng Lia et al., "A semi-supervised learning approach for detection of phishing web pages", Optik, (124), pp. 6027– 6033,2013 .

[13]. Nalin Asanka Gamagedara Arachchilage, Steve Love, Security awareness of computer users: A phishing threat avoidance Perspective, Computers in Human Behavior (38), 2014.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Malaria and Dengue Disease Prediction Based On Blood Cell Image Using Machine Learning

**Neha Kamble[1], Prachi Andhare[1], Srushti Anap[1], Reshma Burde[1], Prof. Nilesh Mali[2]**

[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

The health care environment is found to be rich in information, but poor in extracting data from the knowledge. This is often due to the shortage of effective analysis tool to get hidden relationships and trends in them. By applying the machine learning algorithms and techniques, valuable knowledge are often extracted from the health care system. Malaria and Dengue fever have condition affecting the structure and functions of body and has many root causes. We tend to area unit exploitation Deep Learning algorithms to extend the accuracy of Malaria and Dengue Disease prediction System. We also expand this technique to research the actual area to maximum patient were health is weak based on hospital patient data. It is enforced as desktop application during which user submits the heterogeneous data like image of blood cells symptoms. It retrieves hidden information from stored database and deep learning model and compares the user values with trained data set.

**Keywords**- Machine learning, Disease prediction, Area detection, Malaria, Dengue

## I. INTRODUCTION

Welcome to the AI for Social Good Series, where we will be focusing on different aspects of how Artificial Intelligence (AI) including with popular open-source tools, technologies and frameworks are getting used for development and betterment of our society. “Health is Wealth” is probably a clichéd quote yet very true! During this system, we will check out how AI are often leveraged for detecting malaria, a deadly disease and therefore the promise of building a low-cost, yet effective and accurate open-source solution. The intent of the system is two-fold understanding the motivation and importance of the deadly disease Malaria and Dengue and therefore the effectiveness of deep learning in detecting Malaria and Dengue.

A major challenge facing healthcare organizations (hospitals, medical centres) is the provision of quality services at affordable costs. Quality service implies identification of diagnosing patients correctly and administering treatments that are effective. Poor clinical choices will lead to disastrous consequences

which are therefore unacceptable. Hospitals must also minimize the value of clinical tests. They can achieve these results by using acceptable computer-based information and/or decision support systems. Most hospitals nowadays use employ some sort of hospital information systems to manage their healthcare or patient data.

## II. RELATED WORK

Alif Bin Abdul Qayyum, Tanveerul Islam, Md. AynalHaque [1] Proposed three different dilation approaches were used among which Fibonacci series-wise dilated CNN model performed best altogether metrics like accuracy (96.05%), precision (95.80%), recall (96.33%) and F1 score (96.06%) while working with a dataset of 27,558 cell images.

Feng Yang*, MahdiehPoostchi, Hang Yu, Zhou Zhou, KamolratSilamut, Jian Yu, Richard J Maude, Stefan Jaeger*, Sameer Antani[2] This work investigates the likelihood of automated malaria parasite detection in thick blood smears with smart-phones.
They developed the primary deep learning methodology which will detect malaria parasites in thick blood smear images and might run on smart-phones.

WanchaloemNadda, WaraporнBoonchieng, and EkkaratBoonchieng [3] Proposed. In this research they use machines to classify patients as dengue and non-dengue patients. They used the text of symptoms of the patients for input data. They used the dataset is that the treatment data from the patients with fever, cold, flu, pneumonia, and Dengue from the hospital.

Octave Iradukunda, HaiyingChe, JosianeUwinez, Jean Yves Bayingana, Muhammad S Bin-Imam, Ibrahim Niyonzima [4] During this paper, an appropriate model is designed to detect malaria with accuracy. A single hidden layer feedforward neural networks methodology namely extreme machine learning(EML) model was applied to classify and predict whether a patient has been suffering from by malaria or not.

Abhas Dhaka. Prabhishek Singh [5] To implement this epidemic system four algorithms are used namely Random Forest Regression, Decision tree regression, Support vector regression, Multiple linear regression.

## III. MATERIALS AND METHODS

### A. System Architecture:

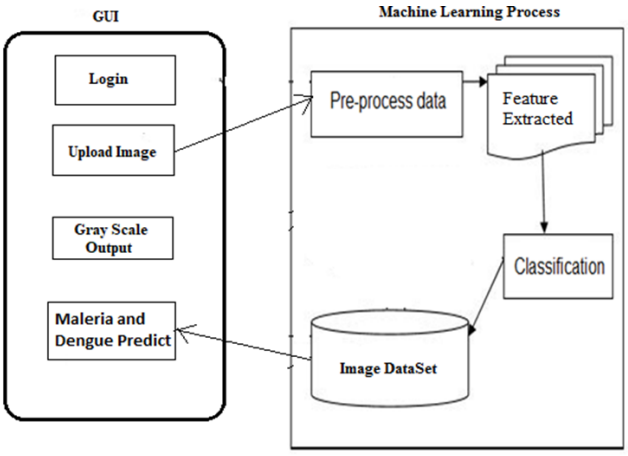



Fig 1. System architecture

The people are affected by various diseases like Dengue, Malaria. This information is collected from the various hospitals and therefore the analysis of data is completed and prediction of some diseases are often made. This technique gives the prediction as per locality of the area.

### B. Description:

**Module 1:**

During this system we tend to notice the malaria and dengue diseases-based blood cell dataset and apply image processing with the help of machine learning technique.

**Model 2:**

Here offer the module for detecting diseases.

**C. Mathematical Model:**

Let ' S ' be the system S= {I, O, P, Fs, Ss}

where,

I = Set of input

O = Set of Output

P = Set of technical processes Fs = Set of Failure state

Ss = Set of Success state

Identify the input data I1, I2,…, In

I = {(Input Data (Image), Dataset (Dengue, Malaria))}

Identify the output applications as O1, O2,…,On

{(Malaria Detection, Dengue Detection)}

Identify the Process as P

P = {(Image pre-processing, Image Processing, Grey-scale, smoothing, Edging, segmentation, feature extraction, classification, show result)}

Identify the Failure state as Fs

Fs = {(If data set not loaded, If not predicted, if more time required to predict}

Identify the Success state as Ss

P = {(Correct prediction within time)}

**D. Algorithm:**

1. Classify dataset under labeled folders such as malaria and dengue images
2. Read dataset
3. Read features of all images and label (here name of dataset folder) of it
   a. Conv2D
   b. Maxpool2D
   c. RELU activation for layers
   d. Sigmoid activation for dense layer
   e. Binary Cross entropy for loss calculation
4. Store it in model file
5. Get input image
6. Read features of input image
7. Compare features of stored features
8. Show label as prediction of nearly matched features.

Algorithm Details

Step 1 : Convolution Operation

Here are the three elements which include in the convolution operation:

1. Input image
2. Feature detector
3. Feature map

Step 2 : ReLU Layer

The reason we would like to try to to that's that images are naturally non-linear.

When you check out any image, you will find it contains tons of non-linear features (e.g. transition in the middle of pixel, borders, colours etc.). The rectifier serves to interrupt up the linearity even further so as to form up for the linearity that we'd impose a picture once we put it through the convolution operation.

Step 3 : Pooling

Again, max pooling cares with teaching your convolutional neural network to acknowledge that despite all of those differences that we mentioned, they're all images are same. In order to try to to that, the network must acquire a property that's referred to as "spatial variance." This property makes the network capable of detecting the thing in the image without rambling by the differences within the image's textures, the distances from where they're shot, their angles, or otherwise.

Step 4 : Flattening

This will be a brief breakdown of the flattening process and how data move from pooled to flattened layers when working with Convolutional Neural Networks.

Step 5 : Pooling

What happens after the flattening step is that you simply simply find yourself with an extended vector of input file that you then undergo the synthetic neural network to possess it processed further which is called pooling.

Types of pooling: Mean, Max, Sum

Step 6 : Full Connection

In this part, everything that we trained throughout the section will be merged together. By learning this, you will get to determine a fuller picture of how Convolutional Neural Networks operate and thus the way the "neurons" that are finally produced learn the classification of images.

Step 7 : Summary

In the end, it'll wrap everything up and provides a fast recap of the concept covered within the training.

Step 8 : SoftMax & Cross-Entropy

Optimization Functions for model file. To calculate final accuracy and losses.

## IV. RESULTS AND DISCUSSION

Fig 2(a) and fig 2(b) represents the GUI and login window respectively.

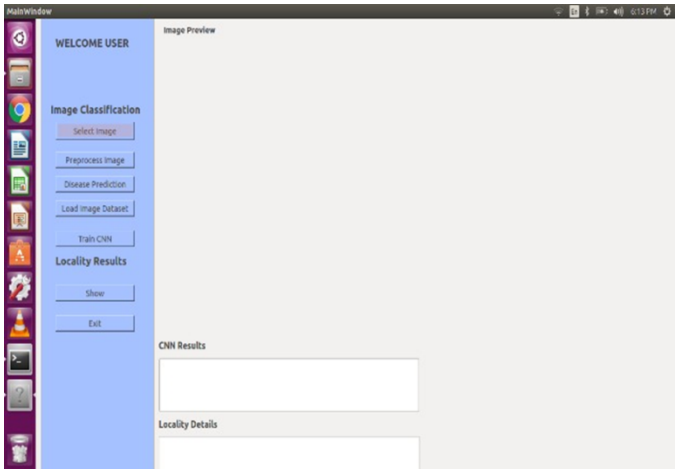



Fig 2(a). GUI

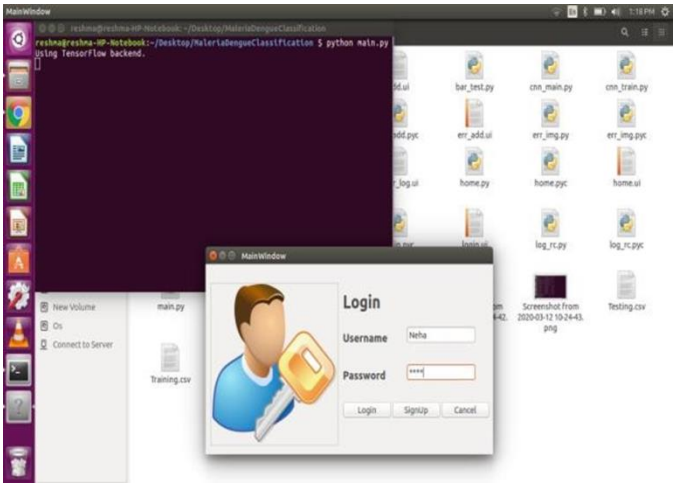



Fig 2(b). Log-In window

After successful authentication for operating the application, the user can input the data (i.e. images of blood cell dataset) to be processed. Then the input images are pre-processed in which the original image is converted into grayscale image, canny edge image and bilateral image. As shown figure 3(a) represents malaria blood cell image dataset which is pre-processed and converted into grayscale image, canny edge image and bilateral image. Similarly figure 3(b) represents dengue blood cell image dataset which is pre-processed and converted into grayscale image, canny edge image and bilateral image.

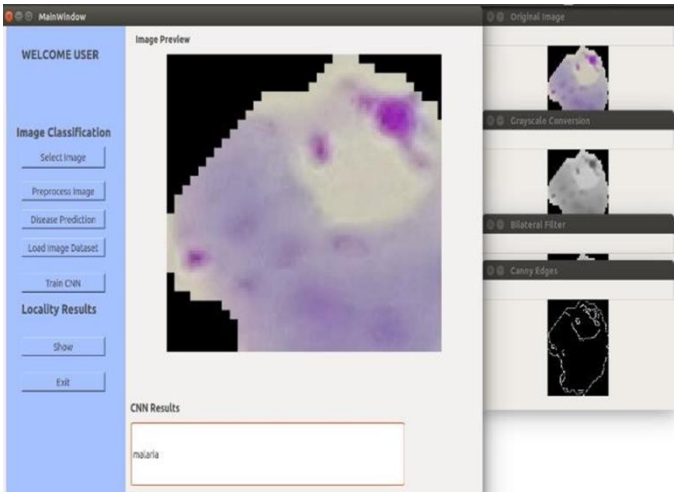



Fig 3(a). Malaria disease Prediction.

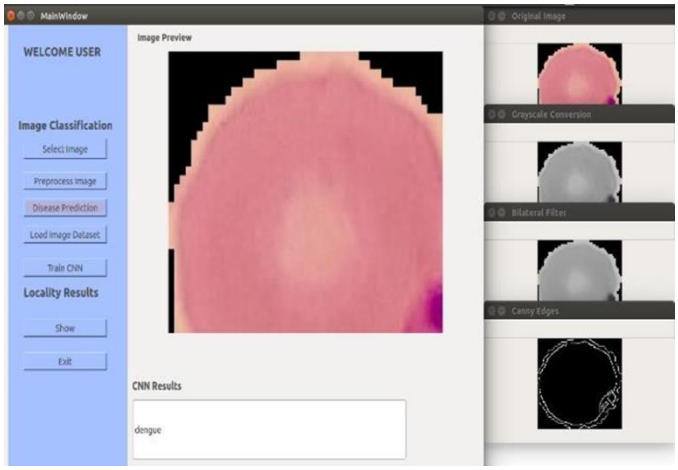



Fig 3(b). Dengue disease Prediction

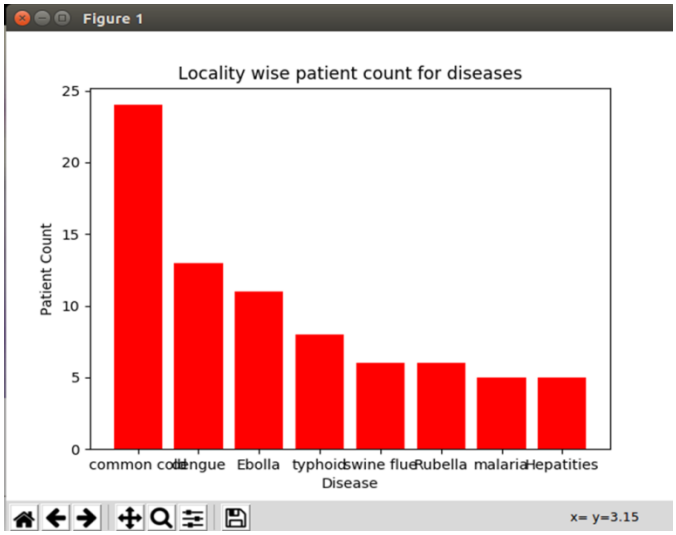



Fig 4. Graph of diseases as per locality.

Figure 4 represents the diseases and patient count for those diseases as per the locality in graphical form. The graph shows patient count for different diseases including malaria and dengue as per the locality.

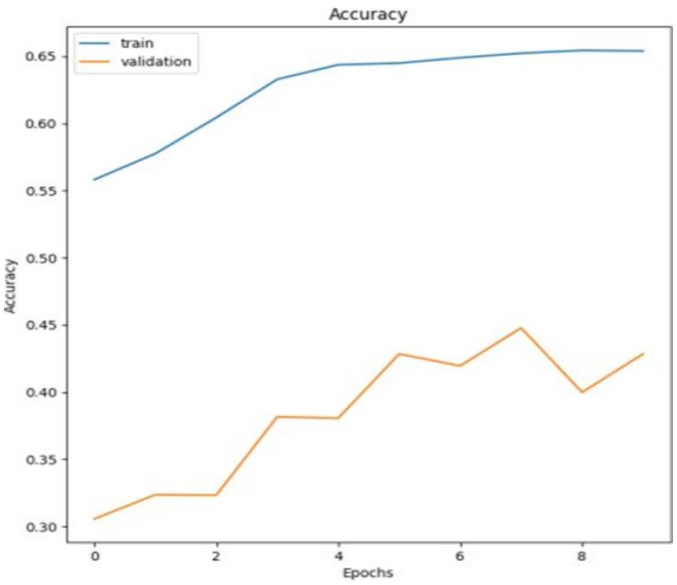



Fig 5(a). Accuracy Graph

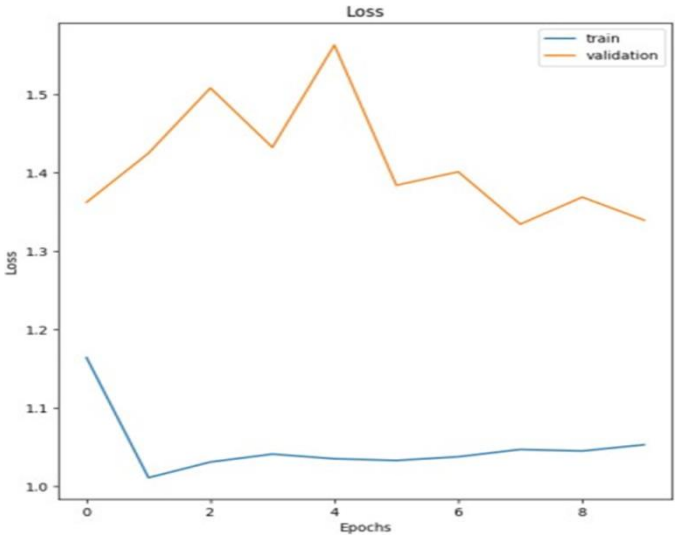



Fig 5(b). Loss graph.

Figure 5(a) and Figure 5(b) represents the accuracy and loss respectively in graphical form. In fig 5(a), the accuracy increases as the epochs increase. In fig 5(b), loss decreases as epochs increases.

## V. FUTURE SCOPE

For future work, in addition to input just as images of blood cell dataset of malaria or dengue, we could also accept textual data as input consisting of symptoms and predict the disease based on symptoms algorithm other than malaria and dengue as well. Further it would predict the diseases and count of patients as per

locality using textual input data. Also, instead of just predicting results for malaria and dengue dataset we can additionally can also predict results of normal dataset.

## VI. CONCLUSION

A robust and novel method by using machine learning for diagnoses malaria and dengue has been implemented during this paper. By using this method, we obtain the less than 60 seconds time to offer diagnosis as compared to other clinical laboratories. The prediction algorithm rule is design to predict the area in danger zone of particular disease by considering the locality from the database to calculate the results. The results need to be the same as the Python output, also as keeping to a suitable processing speed and duration. The research will focus on the benefits it can provide for the successful diagnosis of malaria, dengue and therefore the supportive treatment. The system prediction is extremely important within the awareness about the viral disease spreading within the locality as people get alerted by the system about any particular disease in order that they take precautions about that.

## VII. REFERENCES

[1]. Alif Bin Abdul Qayyum, Tanveerul Islam, Md. AynalHaque. Malaria Diagnosis with Dilated Convolutional Neural Network (CNN) Based Image Analysis,2019.

[2]. Feng Yang*, MahdiehPoostchi, Hang Yu, Zhou Zhou, KamolratSilamut, Jian Yu, Richard J Maude, Stefan Jaeger*, Sameer Antani . Deep Learning for Smartphone-based Malaria Parasite Detection in Thick Blood Smears, 2019.

[3]. WanchaloemNadda, WaraporнBoonchieng, and EkkaratBoonchieng. Weighted Extreme Learning Machine for Dengue Detection with Class-imbalance Classification, 2019.

[4]. Octave Iradukunda, HaiyingChe, JosianeUwinez, Jean Yves Bayingana, Muhammad S Bin-Imam, Ibrahim Niyonzima.Malaria Disease Prediction Based on Machine Learning,2019

[5]. Abhas Dhaka. Prabhishek Singh. Comparative Analysis of Epidemic Alert System using Machine Learning for Dengue and Chikungunya, 2020.

[6]. ShivendraPratap Singh, Prakhar Bansal, Somesh Kumar, Pankaj Shrivastava. Malaria Parasite Recognition in Thin Blood Smear Images using Squeeze and Excitation Networks , 2019 IEEE Conference on Information and Communication Technology.

[7]. Bruno M. G. Rosa*, Member, and Guang Z. Yang. Portable Impedance Analyzer as a Rapid Screening Tool for Malaria: An Experimental Study with Culture and Blood Infected Samples by Early forms of Plasmodium falciparum, 2020.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# College Enquiry CHATBOT using RASA

**Nikita Ingale[1], Tushar Anand Jha[1], Ritin Dixit[1], Vishal Kisan Borate[2]**

[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Assistant Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Nowadays, many people are using smartphone with many new applications i.e., technology is growing day by day. A chat bot has information stored in its database to identify the sentences and making a decision itself as response to answer a given question. The college enquiry chat bot will be built using algorithm that analyses queries and understand user's message. This chat bot is implemented using RASA. Rasa is an open-source framework for building AI bots which consists of two components: Rasa NLU and Rasa core. Rasa core is the component which handles the dialog engine for the framework and helps in creating more complex chatbots with customization. Rasa's NLU helps the developers with the technology and the tools necessary for capturing and understanding user input, determining the intent and entities. To design a College Enquiry Chatbot for Students to solve their quires within few minutes. Hardware requirements are i3 processor-based computer and 2GB-RAM. Software requirements include Rasa and Python 3.6 or higher. The aim is to implement a chatbot which can resolve student's queries, search the result for query and give the solution. The chatbot will handle the queries, ultimately reducing the human effort.

**Keywords :** Machine Learning, Human-Computer Interaction, Rasa

## I. INTRODUCTION

These days, we see the talk bots wherever Chatbots are the wellspring of answers to the client's inquiries in a specific space where it is working.

Visit bots are the wellspring of answers to the client's inquiries. The requirement for school request framework emerges because of different reasons which include: the moderate idea of school site, an outcast would not realize where to look for a specific snippet of data, hard for the individual external school's area to remove data. The school enquiry framework will give the reaction by summing up the question and afterward yield answers, it additionally gives particular data what the client needs.

Rasa is an open-source system for building AI bots which comprise of two parts: Rasa NLU and Rasa center.

Rasa center is the segment which handles the exchange motor for the system and helps in making more unpredictable chatbots with customization. Rasa's NLU assists the engineers with the innovation

and the apparatuses essential for catching and understanding client input, deciding the purpose and substances.

**Contribution:**

In this paper, we proposed the method in which we can get the answer to the query given by the student . The algorithm presented here is extended by previous works by [1],[2],[3].

Our contribution works, compared to previous work can be summarized as: In our system we will compare the query in our database and then give the output to the user.

**Structure:**

This paper is organized as follows: Section 2 presents Related Work. Section 3 summarizes our Proposed Work which consists of our base algorithm which presented in [1],[2],[3]. We will evaluate our methods & compare with existing work in Section 3 Results. Finally, in Section 4 we conclude and present suggestion for future work.

## II. METHODS AND MATERIAL

In this chapter we will be seeing the mathematical model , System Architectutre and the data flow of the project.

### A. Mathematical Model

**Module 1: Bag of words**

BoW is basically the way of extracting the characteristics/features from text so that it can be used in building models for example machine learning algorithm. The approach is very easy and flexible. BoW is a representation of words which includes two main things, document of known words and frequency of known words. The BoW can be simple or complex, the complexity comes in how we handle both creating the vocabulary of known words and occurrence of known words. Which has three important steps first collecting the data, second-designing the vocabulary and the last step is creating the document vector.

Step 1 : Collecting the data: It can be any data given by the user, we can treat each and every line as different document.

Step 2 : Designing the vocabulary: Here we can collect the list of all the unique words ignoring case sensitive and punctuation and put that into the model vocabulary.

Step 3 : Creating the document vector Here we check the frequency of words in each document and the main goal of this step is to turn each word in the document into the vector form so that it can be easily used as an input to the other machine learning algorithms. The easiest way of scoring is to mark the presence of words as a Boolean value, 0 for absent and 1for present and then convert it into a binary vector.

**Module 2:**

Conditional Random Fields are a discriminative model, used for predicting sequences. They use contextual information from previous labels, thus increasing the amount of information the model has to make a good prediction.

### B. System Architecture

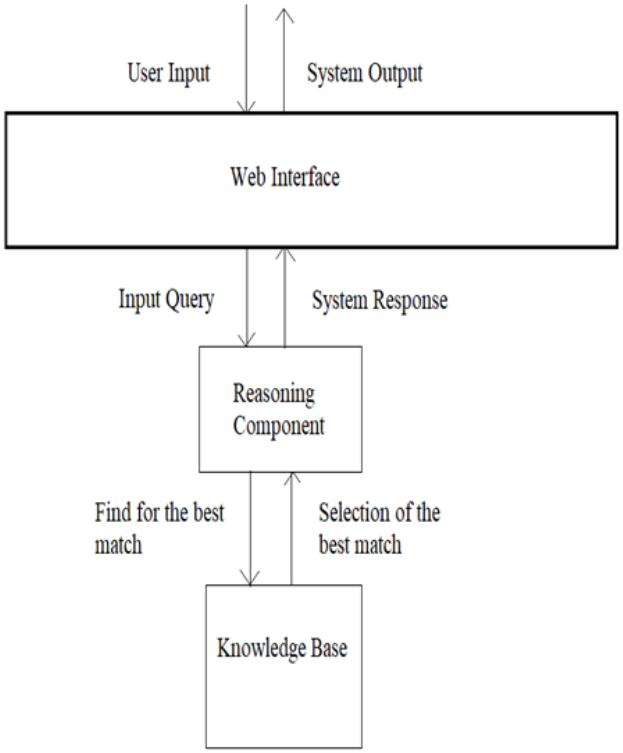



**Fig 1.** System Architecture

### C. Data Flow Diagram:

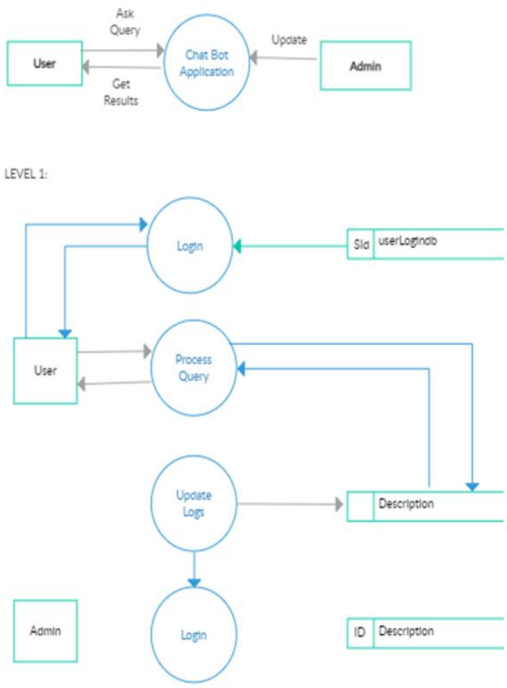



**Fig 2.** Data Flow Diagram

## III. RESULTS AND DISCUSSION

In this chapter we will see how our chatbot works and look at the peroutputs of the specific menu options in our project.

### A. Algorithm:

Step 1 : Tokenizers

The first step is to split an utterance into smaller chunks of text, known as tokens. This must happen before text is featurized for machine learning, which is why you'll usually have a tokenizer listed first at the start of a pipeline.

Step 2 : Featurizers

Featurizers generate numeric features for machine learning models.

Step 3 : Intent Classifiers

Once we've generated features for all of the tokens and for the entire sentence, we can pass it to an intent classification model. We recommend using Rasa's DIET model which can handle both intent classification as well as entity extraction. It is also able to learn from both the token- as well as sentence features.

Step 4 : Entity Extraction

Even though DIET is capable of learning how to detect entities, we don't necessarily recommend using it for every type of entity out there. For example, entities that follow a structured pattern, like phone numbers, don't really need an algorithm to detect them. You can just handle it with a RegexEntityExtractor instead.

### B. Result Screenshots

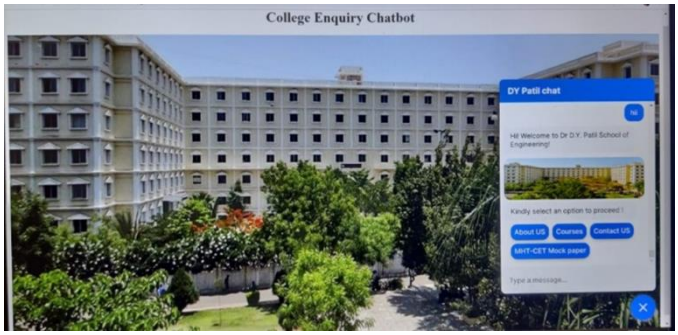



**Fig 3.** Front Page of Chatbot

The above image explains that there is a chatbot with the college photo at background as the user say's hi the bot responds by showing the picture of college with the 4 options so that the user can select according to his query.

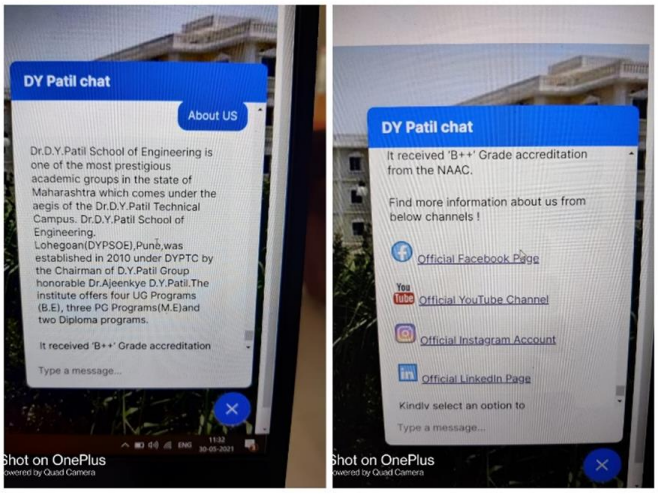



**Fig 4.** About Us Option

The above image is about the "**About Us**" option which will tell the user about the details of the college including the NAAC grade of college.

It will also provide the user with the Official Facebook page, Youtube link, Instagram page and LinkedIn page of the college.

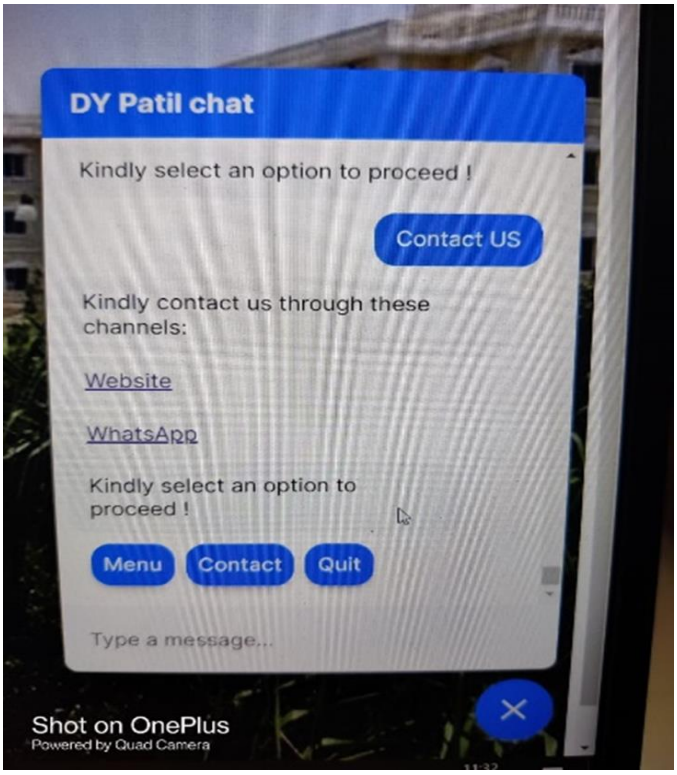



**Fig 5**. Contact Us Option

This above image is shows "Contact Us Option" where the user can find the website and the whatapp number.

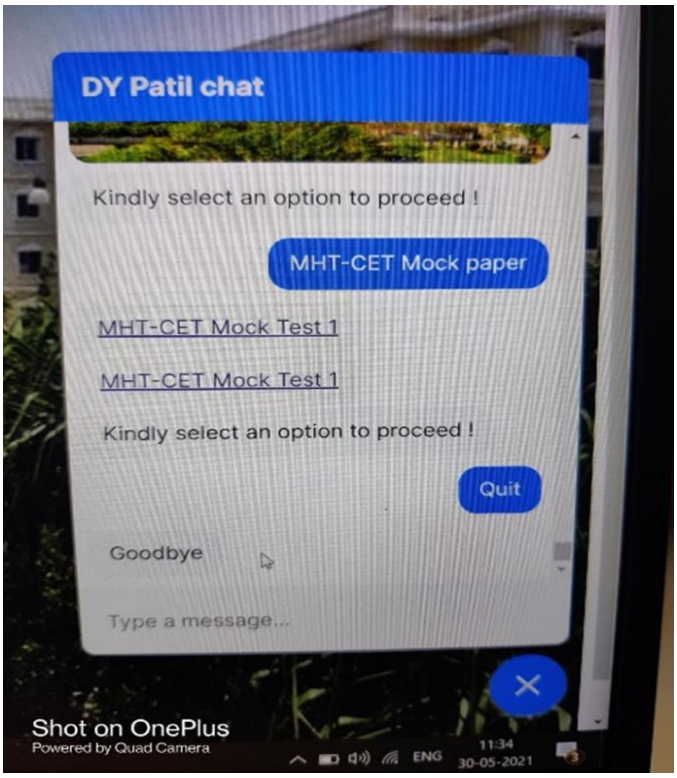



**Fig 6**. MHT-CET paper Option

Here in this "MHT-CET Mock Paper" option the user can take the mock test for the better practice.

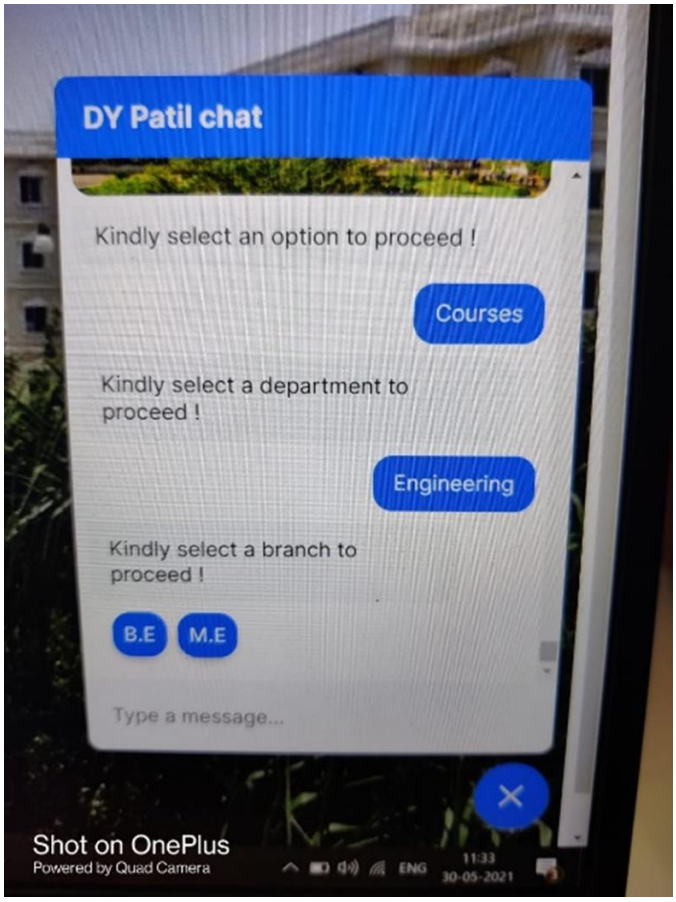



**Fig 7**. Courses Option

Here in this "Courses" the user can see the BE and ME courses.

## IV. CONCLUSION

Chatbots are turning into a basic piece of the computerized world.

The undergrad and workers can openly transfer their questions.

The talk bot gives quick and effective pursuit to answers to the inquiries and gets the significant connects to their inquiry.

The goal of the system is to help the students to stay updated with their college.

The main motive of the project is to reduce the work load on the college's office staff and reduce the response time to a user's query.

## V. REFERENCES

[1]. Jayesh Gangrade1, Surinder Singh Surme2, Sumant Somu3, Shubham Raskonda4, Poonam Gupta, A Review on College Enquiry Chatbot, G.H. Raisoni College of Engineering and Management, Pune, India, 2019 IJESC.

[2]. Hiral Paghadal1, Anezka Virani2, Apratim Shukla3, Dr. G T Thampi, Department of Information Technology, Thadomal Shahani Engineering College, Mumbai, Maharashtra, India, May 2020

[3]. Ms.Ch.Lavanya Susanna, R.Pratyusha,P.Swathi, P.Rishi Krishna,V.Sai Pradeep, "College Enquiry Chatbot", InternationalResearch Journal of Engineering and Technology (IRJET), 3 Mar2020.

[4]. Nikita Ingale, Tushar Anand Jha, Ritin Dixit, Vishal Kisan Borate, "College Enquiry Chatbot using Rasa" International Journal of Scientific Research in Science and Technology (IJSRST) Vol 5, Issue 8, pp. 210-215, Nov-Dec 2020

[5]. P.Nikhila, G.Jyothi, K.Mounika, Mr. C Kishor Kumar Reddy and Dr. B V Ramana Murthy on "Chatbots Using Artificial Intelligence", International Journal of Research and Development, January/2019.

[6]. Payal Jain, "College Enquiry ChatBot Using Iterative Model", International Journal of Scientific Engineering and Research (IJSER),ISSN (Online):January 2019.

[7]. Sagar Pawar, Omkar Rane, Ojas Wankhade, Pradnya Mehta, "A Web Based College Enquiry Chatbot with Results", International Journal of Innovative Research in Science, Engineering and Technology, April 2018.

[8]. Jincy Susan Thomas, Seena Thomas, "Chatbot Using Gated End-to- End Memory Networks", International Research Journal of Engineering andTechnology (IRJET) 03 Mar 2018.

[9]. Harsh Pawar , Pranav Prabhu, Ajay Yadav, Vincent Mendonca , Joyce Lemos, “College Enquiry Chatbot Using Knowledge in Database”, International Journal for Research in Applied Science & Engineering Technology (IJRASET), April 2018.

[10]. Prof. Suprita Das, Prof. Ela Kumar, “Determining Accuracy of Chatbot by applying Algorithm Design and Defined process”, 4 th International Conference on Computing Communication and Automation (ICCCA), IEEE,2018.

[11]. Prof.K.Bala, Mukesh Kumar ,Sayali Hulawale, Sahil Pandita,“Chatbot For College Management System Using A.I”, International Research Journal of Engineering and Technology (IRJET) Nov –2017.

[12]. Assistant Prof Ram Manoj Sharma, “Chatbot based College Information System”, RESEARCH REVIEW International Journal of Multidisciplinary, Issue- 03, March-2019.

[13]. Nitesh Thakur, Akshay Hiwrale, Sourabh Selote, Abhijeet Shinde and Prof. Namrata Mahakalkar, “Artificially Intelligent Chatbot”, Universal Research Reports, July - September 2017.

[14]. Jayesh Gangrade, Surinder Singh Surme, Sumant Somu, Shubham Raskonda, Poonam Gupta on “A Review on College Enquiry Chatbot” , International Research Journal of Engineering and Technology (IJESC), Issued Nov 2019.

[15]. Colace, F., De Santo, M., Lombardi, M., Pascale, L., Pietrosanto, A. (2018). Chatbot for E-Learning: A Cases Study. International Journal of Mechanical Engineering and Robotics Research Vol. 7, No. 5, September.

[16]. Emanuela Haller and Traian Rebedea, “Designing a Chat-bot that Simulates an Historical Figure”, IEEE Conference Publications, July 2013.

[17]. Maja Pantic, Reinier Zwitserloot, and Robbert Jan Grootjans, “Teaching Introductory Artificial Intelligence Using Asimple Agent Framework”, IEEE Transactions On Education, Vol. 48, No. 3, August 2005.

[18]. Mauldin Michael (1994) ,”ChatterBots , TinyMuds, ” and that tureing test : entering the loebner prize competition “, proceedings of the eleventh national conference on artificial intelligence.

[19]. Bayu Setiaji, Ferri Wahu Wibawo, “Chatbot Using A Knowledge in the Database”, on 2016 7th International Conference on the Intelligent Systems, Modelling and Simulation.

[20]. S. J. du Preez, M. Lall and S. Sinha, "An intelligent webbased voice chat bot," EUROCON 2009, EUROCON '09. IEEE, St. - Petersburg, 2009.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Speech Emotion Recognition Based Patient Feedback for Hospitals

**Rutuja Patil[1], Siddhi Salunke[1], Pournima Ubale[1], Mayur Talole[1], Prof. Ajita Mahapadi[2]**
[1]UG Student, Department of Computer Engineering, Dr DY Patil School of Engineering, Pune, Maharashtra, India
[2]Assistant Professor, Department of Computer Engineering, Dr DY Patil School of Engineering, Pune, Maharashtra, India

## ABSTRACT

This paper presents design and implementation of a patient feedback system based on speech emotion recognition (SER) for hospital purpose. Reviews are recorded through the microphone and based on that emotions are generated. The proposed system is implemented using Speech Features and Speech Transcriptions, which include Spectrogram, Mel-Frequency Cepstral Coefficients (MFCC) and TextBlob. Using this features and transcriptions different aspects of emotions are detected.

**Keywords :** Speech Emotion Recognition, SER, Speech Transcriptions, Speech Features

## I. INTRODUCTION

Feedback is an event that occurs when the output of a system is used as input back into the system as part of a chain a of cause and effect. Feedback plays vital role for in almost every sector of an industry, which helps in adopting new knowledge and prevents any mistake. Since we know that traditional feedbacks are given manually through forms and online reviews, which can be very time consuming and irritating to fill out. So in today's world everything is just a few clicks away, so the people have become very impatient when it comes to giving feedbacks, so we have implemented a module which allows us to record a review through microphone which is when SER comes into the picture.

**Speech Emotion Recognition (SER)** systems can be defined as a collection of methodologies in which speech signals are processed and classified to detect the sentiments. The process of extracting of emotional state of the speaker from their speech is SER. SER is used in variety of applications such as caller agent conversation analysis, interactive voice based-assistant. For this we use speech features which are to be extracted.

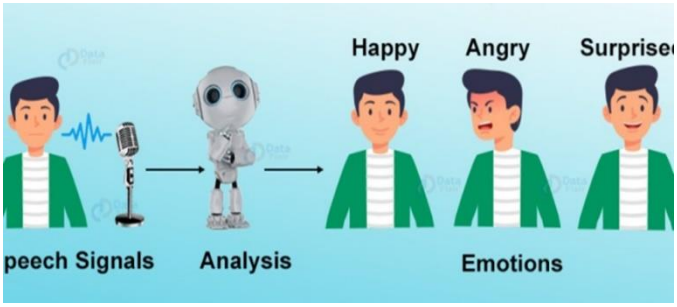



Fig1.1 Speech Emotion Recognition (SER)

Speech features are two types of that is **The temporal features** (time domain features) and **The spectral features** (frequency based features), that can be

obtained by converting the signals which are time based into the frequency domain using the Fourier Transform which are used to identify rhythm, pitch, notes etc. So a visual representation of this features is called as spectrogram.

**A spectrogram** displays signal strength over time at the various frequencies present in a waveform. Spectrograms can be two-dimensional graphs with a third variable represented by colour, or three-dimensional graphs with a fourth colour variable. When the audio file has been applied the spectrogram, then it is also called voiceprints, voicegrams or sonograms.

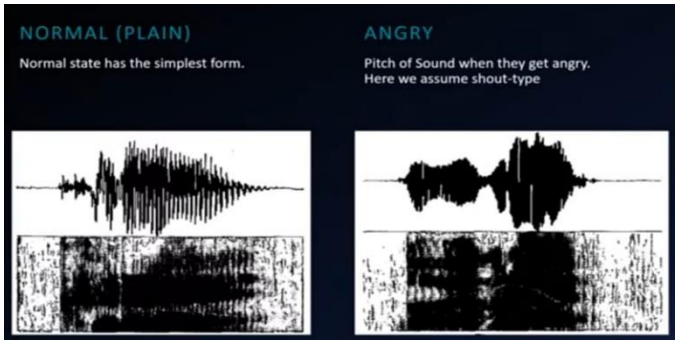



Fig 1.2 Normal, Angry Spectograms

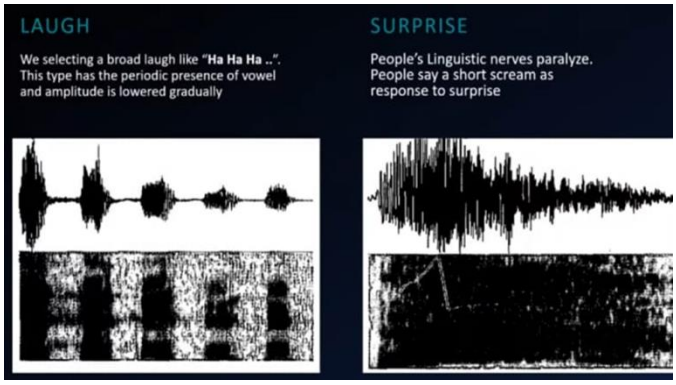



Fig 1.3 Laugh, Surprise Spectograms

The above pictures display's the different spectrogram for the different emotions such as normal, angry, laugh and surprise. The obtained Spectrogram magnitudes are then mapped to the Mel-scale to get Mel-spectrograms.

From the Audio data we have extracted three key features which have been used are MFCC (Mel Frequency Cepstral Coefficients), Mel Spectrogram and Chroma. coefficients that collectively make up an MFC. They are derived from a type of cepstral representation of the audio clip (a nonlinear "spectrum-of-a-spectrum"). MFFC are commonly used as features in speech recognition system, such as the system which can automatically recognize the voice spoken through the microphone into the system.

**Speech Transcriptions** are also used along with speech features. In Speech transcription the audio file is transcripted from the spoken audio into the text and it returns a block of text for each portion of the audio which is transcribed. For this TextBlob has been used.

**TextBlob** is a Python library for processing textual data. It provides a simple API for diving into common natural language processing (NLP) task such as part-of-speech tagging, translations noun phrase extraction, sentiment analysis, classifications, sentiment analysis.

## II. METHODOLOGY

The design of the Feedback System for patients using Speech Emotion Recognition involves the incorporation of the following steps:

1) Initially the speaker uses the microphone for giving the review using the record a review button.
2) The voice is recorded as a wav file and then analyzed and the preprocessing part is done. Preprocessing can include normalization, noise removal, cleaning of the audio file.
3) After preprocessing all the speech features and transcriptions are extracted such as Pitch, tone, spectrograms and passed to the classifier.
4) From the Training Dictionary also the speech features and transcriptions are extracted and sent to the classifier. We have used RAVDESS dataset.

5) After receiving the the features and transcription the MLP classifier classifies the emotions and TextBlob generates the transcriptions.
6) Based on the results the accuracy score and emotions are generated.
7) Generated emotions are mapped into a review which can be either Excellent, Satisfied, Not satisfied, Needs Improvement.

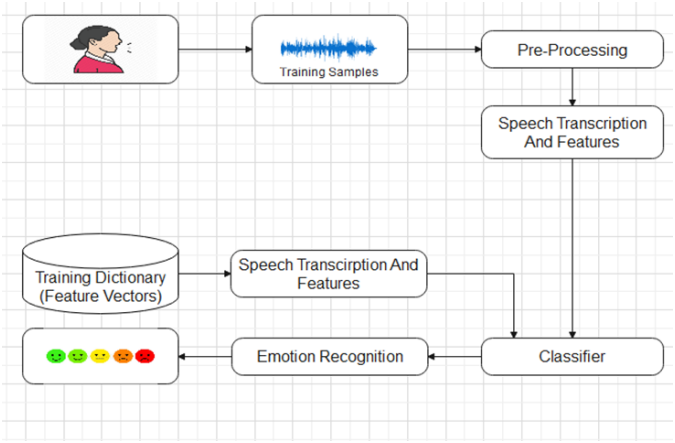



Fig 2.1 Block Diagram of the Total System

## III.DESIGN AND IMPLEMENTATION OF THE PROPOSED SYSTEM

The Python implementation of Librosa package, Soundfile package, numpy, Scikit were used.

Librosa is a python package for music and audio analysis. It provides the building blocks necessary to create music information retrieval systems. **PyAudio** is a set of Python bindings for PortAudio, a cross-platform C++ library interfacing with audio drivers. Soundfile is an audio library based on libsndfile, CFFI and NumPy. SoundFile can read and write sound files.Scikit learn is a free software machine learning library for the Python programming language.

We have used **Multi-layer Perceptron (MLP) Classifier to classify the emotions from the given wave signal, which makes the choice of learning rate to be adaptive.**

**Multi-layer Perceptron (MLP) Classifier is a neural network algorithm which is suitable for classification prediction problem where inputs are assigned a class as a label.**

### A. Module I

1 Start the microphone for recording the review
2 All the preprocessing of the recorded review will be done such as cleansing of the audio file will be done, silence removal, noise cancellation, handling the missing data.
3 After this the framing of audio file is done and converted into a standardized format.
4 Now the file is ready for further processing.
5 Stop

### B. Module II

Module II consist of TextBlob.

1. Start the sentiment analysis using TextBlob sentiment analyser, in this Naïve Bayes analyser predicts the sentiment.
2. In return it will generate positive and negative scores.
3. Based on this score we will predict the emotions.
4. Stop

### C. Module III

Module III consist of Mel-Frequency Cepstral Coefficients (MFCC)

1 Start
2 Import libraries such as sklearn, librosa, numpy, soundfile.
3 Load the data from dataset (RAVDESS) and extract the features.
4 Train the data on the MLP Classifier
5 Test the data using model.fit().
6 calculate the accuracy and predict the emotions
7 Stop

We compare the module I and module II and based in that result and score emotions are detected.

### D. RAVDESS dataset

(The Ryerson Audio-Visual Database of Emotional Speech and Song)

The RAVDESS dataset is being used which is in English language.

It contains 7,356 files (total size: 24.8 GB) out of which speech audio-only files are 1440.

There are 24 Actors: 12 male and 12 female. 7 different emotion classes (calm, happy, sad, angry, fearful, surprise, and disgust expressions).

## IV. EXPERIMENTAL SETUP

**System Feature 1:**

In our system the first action is performed by microphone, microphone will record the voice of the patient who is giving the feedback about the hospital. The recorded voice will go through CNN algorithm in order to find attributes.

**System Features 2:**

In our system the second action is performed by SER is extracting speech features and speech transcriptions. It is then compared with the features of trained dataset.

**System Feature 3:**

After Comparison with the trained dataset, the best fitted emotion is generated.

**User Interface:**

In our system user interface will be a webpage where patients will record their feedback using inbuilt microphone and they can see their ratings and reviews with the help of monitor, by using html, CSS, JavaScript a webpage is designed.

**Hardware Interface:**

Hardware interfaces is an inbuilt microphone to record the feedback given by the patients, a monitor to display the ratings and reviews.

**Software Interface:**

Implementation is done using python programming language.

Webpage is developed using html, CSS, JavaScript.

## V. RESULT AND DISCUSSION

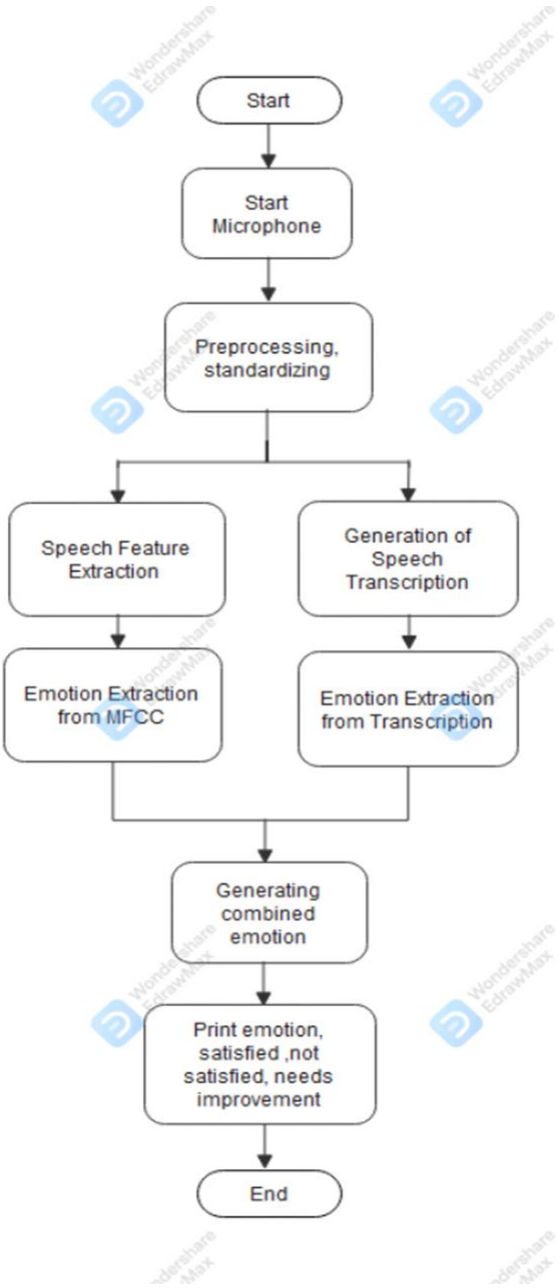



Fig 5.1 Flowchart Of The System


Fig 5.2 Result of the emotion generation through voice

## VI. CONCLUSION

This System therefore helps us to record a review with the help of the Speech Emotion Recognition, which indeed reduces the times and effort needed to give a feedback. Feedbacks have always been ignored or neglected, because it's an annoying process. Therefore with the help of this system, feedback can be given in just one click and helps us from the lengthy process of filling out forms or typing a review.

## VII. REFERENCES

[1]. Suraj Tripathi1, Abhay Kumar1*, Abhiram Ramesh1*, Chirag Singh1*, Promod Yenigalla1, "Deep Learning based Emotion Recognition System Using Speech Features and Transcriptions, Samsung R&D Institute India – Bangalore , arXiv.org, 2019.

[2]. Nithya Roopa S., Prabhakaran M, Betty.P, Nov 2018. "Speech Emotion Recognition using Deep Learning". International Journal of Recent Technology and Engineering (IJRTE) ISSN: 2277-3878, Volume-7 Issue-4S, November 2018

[3]. k Ashok Kumar, J L Mazher Iqbal . "Machine Learning Based Emotion Recognition using Speech Signal". International Journal of Engineering and Advanced Technology (IJEAT) ISSN: 2249 – 8958, Volume-9 Issue-1S5, December, 2019

[4]. https://www.geeksforgeeks.org/speech-recognition-in-python-using-google-speech-api/

[5]. https://www.tutorialspoint.com/artificial_intelligence_with_python/artificial_intelligence_with_python_speech_recognition.html

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Automatic Answer Sheet Checker

**Pratik Laxman Trimbake[1], Swapnali Sampat Kamble[1], Rakshanda Bharat Kapoor[1], Mr Vishal Kisan Borate[2], Mr Prashant Laxmanrao Mandale[2]**

[1]Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Assistant Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Nowadays online tests and examinations are becoming popular to reduce the burden of the examination evaluation process. The online exams include either objective or multiple-choice questions. However, subjective-based questions and answers are not involved due to the evaluation process complexity and efficiency of the evaluation process. An automatic answer checker application that checks the written answers and marks the grades similar to a human being will be more helpful for universities and academic institution. The current online exams are conducted and evaluated on machines which can contain only objective questions and there is no provision to extend these into subjective questions. In order to overcome the problems, Artificial Intelligence (AI) based software application is built to check subjective answers by allocating marks to the user automatically, by checking the template answers in the database and the answers written by the user.

The proposed system is based on keyword search algorithm that searches keyword provided by admin in the database and stemming algorithm that is used for linguistic normalization to evaluate. As a result of this artificial intelligence-based online answer evaluator, the evaluator's time and energy can be conserved with improved work efficiency.

**Keywords :** Artificial Intelligence, AI, Software, Database, Keyword Search Algorithm, Stemming Algorithm

## I. INTRODUCTION

The answer sheet is widely used for student performance in exam in school and college. The main approach is to evaluation is efficient and reliable. An automatic answer sheet checker checks the answer sheet and written mark as similar to human being. This software is built to check the subjective answer. The system consists of in build artificial sensor that verify answer and allocate marks according as good as human being accessing large number of handwritten answer sheet is relatively time-consuming task there is an intense need of speed up and enhance a process of rating handwritten words while maintaining cost effectiveness. It is relatively inexpensive answer written by hand. The primary means of testing the student on state assessment of reading compression motivation of these system is mainly always we have

seen the online OMR sheet checker or objective answer sheet checker but the main goal is to develop subjective answer checker. Artificial Intelligence is an ability to design smart machines or to develop self- learning software applications that imitate the traits of the human mind like reasoning, problem-solving, planning, optimal decision making, sensory perceptions etc.

## II. METHODS AND MATERIAL

### A. Methods

#### 1. Keyword Search Algorithm

Keyword searches have been defined as a method of searching for documents which possess keywords specified by a user, a search using a full text search filter whereby a search term list is applied to a full text index to find responsive files, and a search for documents containing one or more words that are specified by a user.

If there is a keyword such as e-discovery, the search would be for that term and only that term. If it is a straight keyword search, it would only pick up e-discovery and not electronic discovery, eDiscovery, or E Discovery. There are limitations with basic keyword searches, as they can fail to uncover variants of a word. Furthermore, if there is a typo or a misspelled word such as edisocvery, or an abbreviation such as eDisco, basic keyword search technology will miss these search terms.

#### 2. Stemming Algorithm:

A stemming algorithm is a process of linguistic normalization, in which the variant forms of a word are reduced to a common form, for example,

connection connections

connective ---> connect connected

connecting

It is important to appreciate that we use stemming with the intention of improving the performance of IR systems. It is not an exercise in etymology or grammar. In fact from an etymological or grammatical viewpoint, a stemming algorithm is liable to make many mistakes. In addition, stemming algorithms - at least the ones presented here - are applicable to the written, not the spoken, form of the language.

#### 3. PageRank Algorithm:

**PageRank (PR)** is an algorithm used by Google Search torank web pages in their search engine results. PageRank is a way of measuring the importance of website pages. According to Google, PageRank works by counting the number and quality of links to a page to determine a rough estimate of how important the website is. The underlying assumption is that more important websites are likely to receive more links from other websites. It is also used to rank keywords based on how important it is.

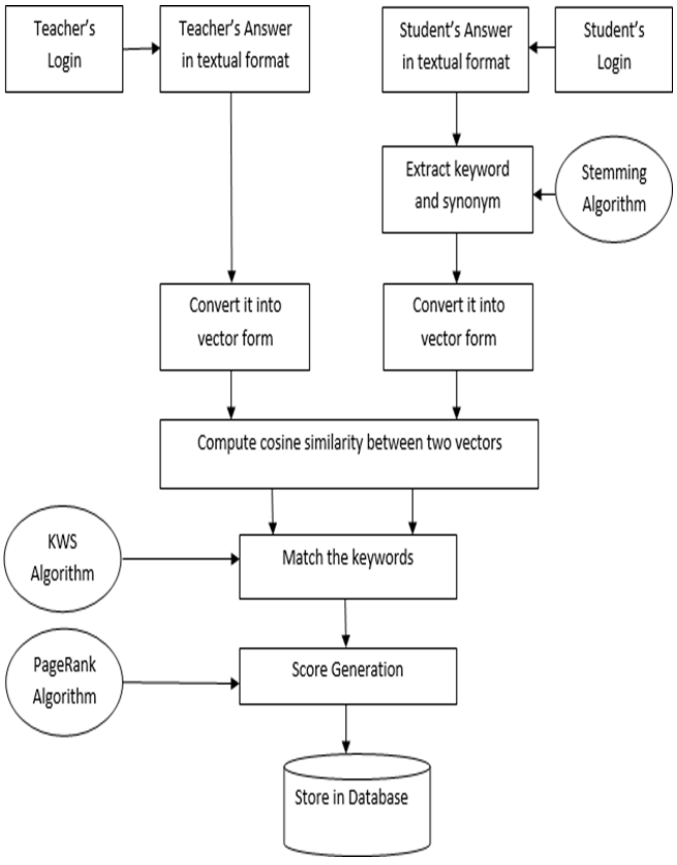



Figure 1. System Architecture

### B. Materials

Software Requirements:

1. Processor – i3
2. Hard Disk – 5 GB
3. Memory – 1GB RAM

Hardware Requirements:

1. Windows Xp , Windows 7(ultimate , enterprise)
2. Visual studio 2010
3. SQL 2008

## III. RESULTS AND DISCUSSION

Based on the databases, Artificial Intelligence needs to be installed. Incorporating AI into complex systems poses numerous challenges to traditional test and evaluation methods. As AI handles varying decision levels, it needs conference to ensure testable, repeatable and auditable decisions. Additionally, we need to understand failure modes and failure mitigation techniques. The key challenges embedded-AI exacerbates, the themes based for how traditional and evaluation will evolve to provide AI system assurance.

**Result:**

The current manual evaluation takes about 60 seconds to evaluate an answer whereas the proposed system takes about 15 seconds to evaluate an answer. The proposed system is 3 times more time efficient as compared to manual answer evaluation system. The proposed system is about 75 - 87.5% accurate with comparison to manual system. The proposed system is about 75 - 87.5% accurate with comparison to manual system. The proposed system completely eliminates the human effort and time to evaluate an answer.

Proposed system can evaluate 5760 answers in a day where as a human working for 8 hours can evaluate 480 answers a day. Hence, proposed system can evaluate 11 times more answers compared to that of manual evaluation system.

## IV. CONCLUSION

The answer sheet is widely used for student performance in exam in school and college. The main approach is to evaluation is efficient and reliable. An automatic answer sheet checker checks the answer sheet and written mark as similar to human being. This software is built to check the subjective answer.

Examinations play a very important role in colleges, universities and various other educational institutes. Many educational institutes have their examinations conducted online, but these exams only contain multiple choice questions which are providing to be very efficient in testing the student's aptitude, on the other hand fail to measure the conceptual knowledge a student or learner must possess. Therefore, subjective answer must be included in online examinations.

The proposed system evaluates the answer based on the keywords. By comparing the standard answer and the student's answer marks is obtained if the student utilizes all the keywords mentioned in the standard answer. Hence the said system could be of great utility to the educators whenever they need to take a quick test for revision purpose, as it saves them the trouble of evaluating the bundle of papers.

## V. REFERENCES

[1]. A. Ghanbarpour and H. Naderi, "An Attribute-Specific Ranking Method Based on Language Models for Keyword Search over Graphs," in IEEE Transactions on Knowledge and Data Engineering, vol. 32, no. 1, pp. 12-25, 1 Jan. 2020, doi: 10.1109/TKDE.2018.2879863.

[2]. A. Ghanbarpour and H. Naderi, "A Model- based Keyword Search Approach for Detecting Top-k Effective Answers," in The Computer Journal, vol. 62, no. 3, pp. 377-393, March 2019, doi: 10.1093/comjnl/bxy056.

[3]. C. Roy and C. Chaudhuri, "Case Based Modeling of Answer Points to Expedite Semi-Automated Evaluation of Subjective Papers," 2018 IEEE 8th International Advance Computing Conference

(IACC), Greater Noida, India, 2018, pp. 85-90, doi: 10.1109/IADCC.2018.8692133.

[4]. S P. Pakray, S. Pal, S. Bandyopadhyay and A. Gelbukh, "Automatic Answer Validation System on English language," 2010 3rd International Conference on Advanced Computer Theory and Engineering(ICACTE), Chengdu, China, 2010, pp. V6-329-V6- 333, doi:10.1109/ICACTE.2010.5579166.

[5]. V. Hristidis, Y. Papakonstantinou, "Discover: keyword search in rela-tional databases," Proc. of the 28th international Conference on Very Large Data Bases, VLDB Endowment, Hong Kong, China, pp. 670-681, 2002.

[6]. S. Agrawal, S. Chaudhuri, G. Das, "DBXplorer: A System for Keyword- Based Search over Relational Databases," Proc. of the 18th International Conference on Data Engineering, IEEE Computer Society, pp. 5-16, 2002.

[7]. C.-S. Park, S. Lim, "Efficient processing of keyword queries over graph databases for finding effective answers," Information Processing & Management, vol. 51, no. 1, pp. 42-57, 2015.

[8]. J. Coffman, A.C. Weaver, "An Empirical Performance Evaluation of Relational Keyword Search Techniques," IEEE Tran. on Knowledge and Data Engineering, vol. 26, no. 1, pp. 30-42, 2014.

[9]. T. Roelleke, "Information Retrieval Models: Foundations and Relationships," Synthesis Lectures on Information Concepts, Retrieval, and Services, Morgan & Claypool Publishers, pp. 1-163, 2013.

[10]. A. Dhokrat, G. Hanumant R, C. Namrata Mahender, "Automated Answering for Subjective Examination", International Journal of Computer Applications, Volume 56, No.14, pp: 14-17, October 2012.

[11]. Sheeba Praveen "An Approach to Evaluate subjective Questions for Online Examination System" published in International Journal Of Innovative research in Computers and communication Engineering Volume-2, Issue 11, November 2014.

[12]. Ani Thomas, MKKowar & Sanjay Sharma "Intelligent Fuzzy Decision Making For Subjective Answer Evaluation using Utility" published by Emerging Trends in Engineering and Technology 2008 ICETET '08 First International conference on Date 16-18 July 2008.

[13]. A Gunjal,Mrunal M, Sayli M Pawar and PrakashJ.Kulkarni, "Evaluation of Subjective answers using GLSA enhanced with contextual synonyms", Published in International Journal on Natural Language processing Computing(INLC) Vol 4.No1,February 2015.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Bank Locker Security System using Machine Learning with Face & Liveness Detection

**Akash Mote[1], Kanhaiya Patil[1], Akshay Chavan[1], Mrunal Saraf[1], Prof. Amruta Chitari[2], Prof. Ashwini Pandagale[2]**

[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Ensuring the security of transactions is currently one of the biggest challenges facing banking systems. The use of biometric authentication of users attracts huge sums of money from banks around the world due to their convenience and acceptance. Especially in offline environments, where face images from ID documents are matched to digital selfies. In fact, comparisons of selfies with IDs have also been used in some broader programs these days, such as automatic immigration control. The great difficulty of such a process lies in limiting the differences between comparative facial images given their different origins. we propose a novel architecture for cross-domain matching problem based on deep features extracted by two well-referenced Convolutional Neural Networks(CNN). The results obtained from the data collected, called Face Bank, with more than 93% accuracy, indicate the strength of the proposed face-to-face comparison problem and its inclusion in real banking security systems.

**Keywords :** Convolutional Neural Networks(CNN), Face Bank, automatic immigration control, Digital selfies, Face-to-face comparison problem.

## I. INTRODUCTION

Face recognition is the process of identifying something that has already been discovered as a known or unknown face. Often the problem of facial recognition is confusing and the problem of facial recognition Face recognition on the other hand determines whether a "face" is a well-known, or unknown, person who uses this purpose facial information to verify this facial expression.

## FACE AWARENESS:

## DIFFERENT METHODS OF FACE RECOGNITION:

There are two main methods of facial recognition: Geometry (element supported) and photometric (based on visual). As the researcher's interest in facial recognition continues, a number of different algorithms are developed, three of which are well-studied in facial textbooks. Visual algorithms can be divided into two main methods

Geometry: Based on the geometric relationship between landmarks, or in other words the

geographical position of facial features. This means that the basic geometric features of the face such as the eyes, nose and mouth are first identified and the face is divided on the basis of various geometric distances and angles between the elements.

Photometric stereo: Used to detect the composition of an object from multiple photographs taken under various lighting conditions. The shape of the object is defined by a gradient map, which is made up of the mass of a normal surface

### A. Motivation

- The main motive of the program is to identify the user.
- Provides less time to find the user using face detection.
- Used to detect unauthorized user.

### B. Problem Definition

Face recognition is the process of identifying something that has already been discovered as a known or unknown face. Often the face problem is confused with the face problem The face recognition on the other hand determines whether a "face" is a well-known, or unknown, person who uses this purpose facial information to verify this facial expression.

## II. LITERATURE SURVEY

IGang Pan et al. [1] The gift spoofing against the image in the visual perception of physical exploitation in real-time physical acquisition is the automatic exploitation. This method only requires a standard camera with no separate hardware to avoid spoofing attacks in an unconventional way. The blink of an eye is a portable method that opens quickly and closes bottles Repeat over and over again}. A standard camera captures fifteen frames per second, providing 2 face frames that have been used as a guide to spoofing attacks. 2 framed captives respectively ar thought-about frames. HMM generates options from a limited country set. The typical HMM active blast exploitation detects spoofing attacks..

Anjos et al. [2] set out how to support pre- or post-adjustment adjustments for the user's physical condition. This method is divided into movement detection. This method works by the connection between the rotation of the user's head and its domain. Looking at the author's relationship using a good movement guide. Visible flow is used to hunt the direction of movement. This method is an easy method but requires a lot of frames to look at the physical properties, so the user has to work together. The acquisition of physical assets [3] is planned to strengthen the reliability and safety of the face recognition system. The fake face is separated from the one with the 000 tricks of exploitation with completely different tactics. With this paper, we tend to propose a single face recognition method for supported face detection based on frequency analysis and discriminatory texture of 2-D paper masks on a live face.

Analyse frequency; we used a power spectrum using an established method of operation [4] that not only exploits not only low frequency data but also shared data that resides between regions with high frequency. In addition, it is widely used in Binary Pattern (LBP) [5]. In face recognition, quality attack strategies may be categorized into several categories. The concept of differentiation depends on what verification evidence is provided by the facial verification system, the type of illuminated image, refined facial images, video recording, 3D facial models with the ability to blink and move lips, 3D facial models with multiple expressions and so on [6].

The main purpose of this paper is to vogue and implements a bank security protection system supported by RFID and GSM technology that can be organized in banks, secure offices and homes. In either case the real person was found to be in cash in a bank township. The RFID reader reads the id list from the

entry tags and sends it to the microcontroller, if the id list is active then the microcontroller sends an SMS request to the specified cell range, so that the first calculator unlocks the bank lock, if one sends countersign to the microcontroller, which can verify passwords entered by the keyboard and retrieve them from a written cell phone. If these 2 passwords are similar to a locker unlocked otherwise it will remain in a locked area [7].

## III. PROPOSED SYSTEM

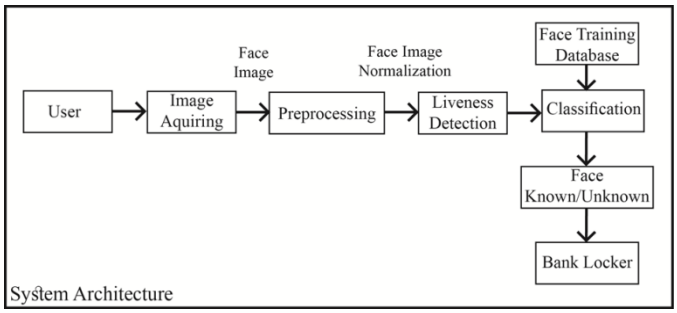



**Fig 1. System architecture**

In this diagram, we are going to implement eye-blink detection & face recognition Based on LBPH algorithm. The algorithm works in real time through a webcam and displays the person's name.

The program runs as follows:

1. Detect faces in each frame generated by the webcam.
2. For each detected face, detect eyes.
3. Detect liveness of the face i.e. Eyes are blinking or not.
4. Recognize face and access the respected locker of the user.

### A. Mathematical Model

Let S be the closed system defined as, S = {Ip, Op, A, Ss, Su, Fi}

Where,

Ip=Set of Input, Op=Set of Output, Su= Success State, Fi= Failure State and A= Set of actions, Ss= Set of user's states.

Set of input=Ip={username, password, Face image, bank details }

Set of actions =A={F1,F2,F3,F4,F5,F6} Where,

- F1= Authentication of user
- F2 = Capture and preprocess image
- F3 = Face detection
- F4 = Face recognition
- F5= Authentication Process
- F6= Bank details verified

Set of user's states=Ss={login state, recognize face, recognize, unauthorized person detection, validation}

Set of output=Op={ authorization, alerts}

Su=Success state={ Login Success, Image capture, face detection, alerts}

Fi=Failure State={Login failed, camera failure}

Set of Exceptions= Ex ={NullPointerException, NullValues Exception, Connection Exception

## IV. SYSTEM REQUIREMENTS

Database Requirements

Dataset of user's face.

### A. Software Requirements

Operating System

Python 3

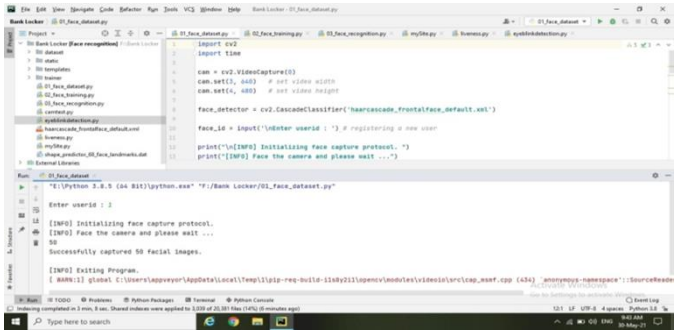
Sublime for html and css coding

### B. Hardware Requirements

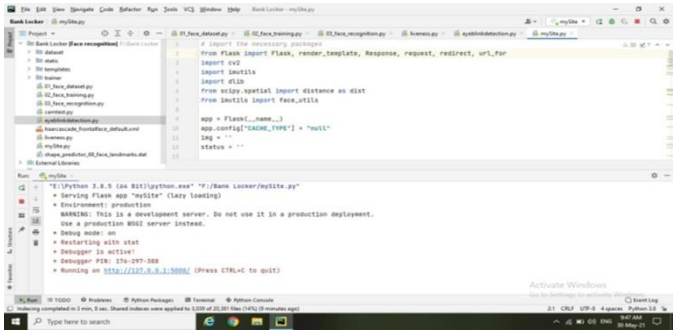
Pc/Laptop(4gb Ram/ above i3 processor

## V. RESULTS AND DISCUSSION

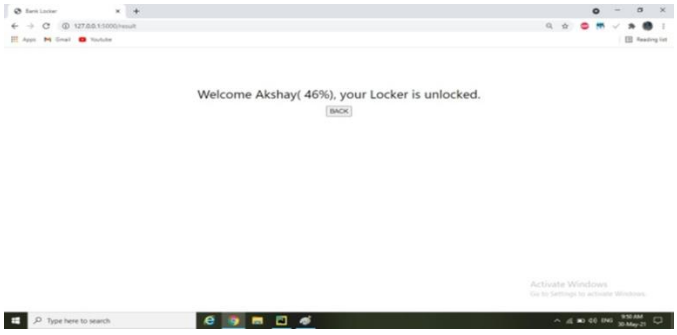
1. Face dataset created



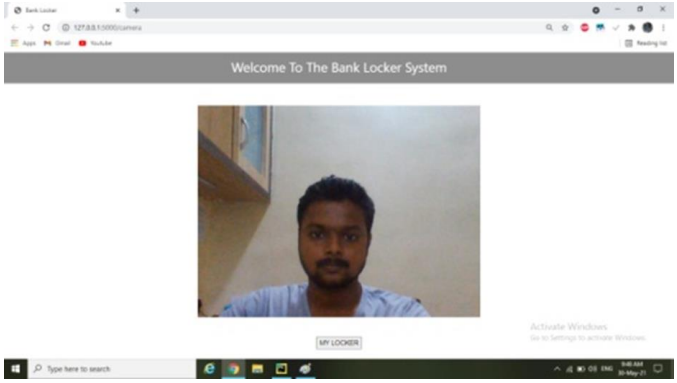
2. Trained the db



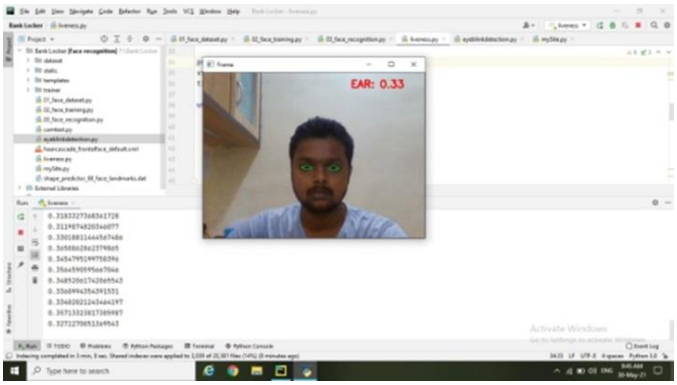
3. Main web application runs.



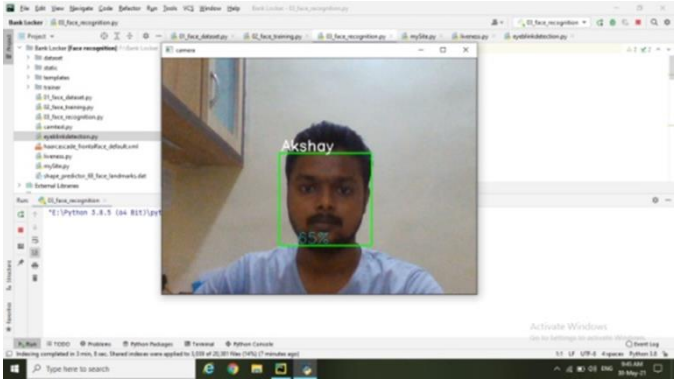

4. Bank locker application



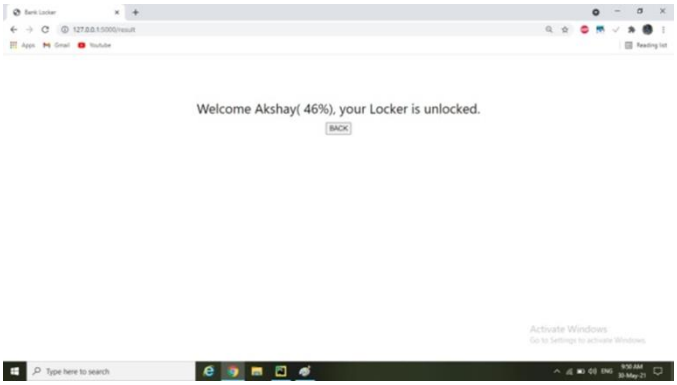

5. Eye blink detection




6. face recognition




7. Locker accessed.




## VI. CONCLUSION

In this paper, we've got projected a machine learning based mostly face detection-recognition and aliveness detection for bank locker. it's extremely reliable system to confirm the safety of our valuables.

## VII. REFERENCES


[1]. G. Pan, L. Sun, Z. Wu, and S. Lao, “Eyeblink - based anti-spoofing in face recognition from a generic webcamera,” in Proc. IEEE 11th Int. Conf. Comput. Vis. (ICCV), Oct. 2007, pp. 1–8.

[2]. Anjos, M. M. Chakka, and S. Marcel, “Motion-based countermeasures to photo attacks in face recognition,” IET Biometrics, vol. 3, no. 3, pp. 147–158, Sep. 2014.

[3]. Pan, Gang, Lin Sun, Zhaohui Wu, and Yueming Wang. "Monocular camera-based face liveness detection by combining eyeblink and scene context." Telecommunication Systems 47, no. 3-4 (2011): 215-225.

[4]. H. S. Choi, R. C. Kang, K.T. Choi, A. T. B. Jin, and J.H. Kim. Fake-Fingerprint Detection using Multiple Static Features. Optical Engineering, 48(4), 2009.

[5]. T. Ojala, and M. Pietikainen. Multiresolution Gray-Scale and Rotation Invariant Texture Classification with Local Binary Patterns. IEEE Transactions on Pattern Analysis and Machine Intelligence, 24

[6]. J. Li, Y. Wang, T. Tan, and A. K. Jain, “Live face detection based on theanalysis of fourier spectra,” In Biometric Technology for HumanIdentification, SPIE vol. 5404, pp. 296-303, 2004.

[7]. Abhishek Jha: ABES Engineering College, Ghaziabad, "Class Room Attendance System Using Facial Recognition System", The International Journal of Mathematics, Science, Technology and Management (ISSN : 2319-8125) Vol. 2 Issue 3

[8]. S. SAYEED, J. HOSSEN, S.M.A. KALAIARASI, V. JAYAKUMAR, I. YUSOF, A. SAMRAJ, "Real-Time Face Recognition For Attendance Monitoring System" Journal of Theoretical and Applied Information Technology 15th January 2017. Vol.95. No.1

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Efficient Monitoring of Agricultural Food Supply Chain Using Block Chain Technology

**Pratiksha Pralhad Survase[1], Vaishali Sunil Kale[1], Sanjivani Anand Durgale[1], Kshitija Babanrao Gade[1], Prof. Nilesh Mali[2]**

[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Block chains are now firmly established as a digital technology that combines cryptographic, data management, networking, and incentive mechanisms to support the verification, execution, and recording of transactions between parties. While block chain technologies were originally intended to support new forms of digital currency for easier and secure payments, they now hold great promise as a new foundation for all forms of transactions. Agribusiness stands to become a key beneficiary of this technology as a platform to execute 'smart contracts' for transactions, particularly for high-value produce. First it is important to distinguish between private digital currencies and the distributed ledger and block chain technologies that underlie them. The distributed and cross-border nature of digital currencies like Bit coin means that regulation of the core protocols of these systems by central banks is unlikely to be effective. Monetary authorities are focused more on understanding 'on-ramps' and 'off-ramps' that constitute the links to the traditional payments system rather than being able to monitor and regulate the currency itself. In contrast to the digital currency feature of block chain, the distributed ledger feature has the potential for widespread use in agribusiness and trade financing, especially where workflows involve many different parties with no trusted central entity.

**Keywords :** Agriculture, supply chain, BCT, Cryptography, etc.

## I. INTRODUCTION

An increasing demand in society for greater information about food reflects the need for more transparency and the lack of trust. At the same time, more and more food products and beverages are branded and accompanied by a variety of certification schemes, with an increasing risk of fraud (selling unqualified product with high-quality labels or claims) and adulteration. In the current situation, much of the compliance data and information is audited by trusted third parties and stored either on paper or in a centralized database and these approaches are known to suffer from many informational problems such as the high cost and inefficiency of paper-based processes and fraud, corruption and error both on paper and in IT systems. These information problems, indicating that current

transparency and trust systems have not been able to solve or at times even have exacerbated the problems of low transparency and trust in agricultural food chains, pose a severe threat to food safety, food quality, and sustainability. In particular, food integrity has become a major concern. Food integrity refers to the fairness and authenticity of food in food value chains both at the physical layer and the digital layer, where the digital layer should provide reliable and trustworthy information on the origin and provenance of food products in the physical layer. Block chain technology provides a means to ensure permanence of records and potentially to facilitate the sharing of data between disparate actors in a food value chain. This potential may lead to an exciting paradigm shift facilitating transparency and trust in food chains that ensures food integrity.

## II. METHODOLOGY

### A. Literature Survey:

Blockchain- Based Soybean Traceability in Agricultural Supply Chain Khaled Salah; Nishara Nizamuddin; Raja Jayaraman; Mohammad Omar
Published in: IEEE Access (Volume: 7) proposed solution eliminates the need for a trusted centralized authority, intermediaries and provides transactions records, enhancing efficiency and safety with high integrity, reliability, and security. The proposed solution focuses on the utilization of smart contracts to govern and control all interactions and transactions among all the participants involved within the supply chain ecosystem. All transactions are recorded and stored in the blockchain's immutable ledger with links to a decentralized file system (IPFS) and thus providing to all a high level of transparency and traceability into the supply chain ecosystem in a secure, trusted, reliable, and efficient manner.

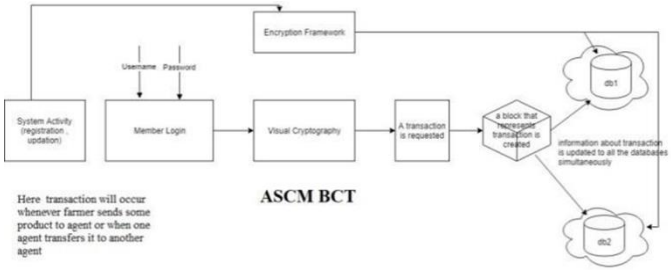
Blockchain-based traceability in Agri-Food supply chain management: A practical implementation Miguel Pincheira Caro; Muhammad Salek Ali; Massimo Vecchio ; Raffaele Giaffreda
Published in: 2018 IoT Vertical and Topical Summit on Agriculture - Tuscany (IOT Tuscany)
This paper presents Agricultural Block IoT, a fully decentralized, block chain-based traceability solution for Agricultural-Food supply chain management, able to seamless integrate IoT devices producing and consuming digital data along the chain. To effectively assess Agricultural Block IoT, first, we defined a classical use-case within the given vertical domain, namely from- farm-to-fork. Then, we developed and deployed such use-case, achieving traceability using two different blockchain implementations, namely Ethereum and Hyperledger Sawtooth. Finally, we evaluated and compared the performance of both the deployments, in terms of latency, CPU, and network usage, also highlighting their main pros and cons.

Block chain Based Provenance for Agricultural Products: A Distributed Platform with Duplicated and Shared Bookkeeping
Jing Hua ; Xiujuan Wang ; Mengzhen Kang ; Haoyu Wang ; Fei-Yue Wang
Published in: 2018 IEEE Intelligent Vehicles Symposium (IV)
In this paper, we propose an agricultural provenance system based on techniques of block chain, which is featured by decentralization, collective maintenance, consensus trust and reliable data, in order to solve the trust crisis in product supply chain. Recorded information includes the management operations (fertilizing, irrigation, etc.) with certain data structure. Applying block chain techniques to the provenance of agricultural product not only widens the application domain of block chain, but also supports building a reliable community among different stakeholders around agriculture production.

An agri-food supply chain traceability system for China based on RFID & block chain technology
Feng Tian
Published in: 2016 13th International Conference on Service Systems and Service Management (ICSSSM)
In this paper, we study the utilization and development situation of RFID (Radio-Frequency Identification) and block chain technology first, and then we analyze the advantages and disadvantages of using RFID and block chain technology in building the agri- food supply chain traceability system; finally, we demonstrate the building process of this system. It can realize the traceability with trusted information in the entire agri-food supply chain, which would effectively guarantee the food safety, by gathering, transferring and sharing the authentic data of agri-food in production, processing, warehousing, distribution and selling links. Blockchain application in food supply information security

Daniel Tse ; Bowen Zhang ; Yuchen Yang ; Chenli Cheng ; Haoran Mu
Published in: 2017 IEEE International Conference on Industrial Engineering and Engineering Management (IEEM)
This article introduces the concept of Blockchain technology, putting forward the application of Blockchain technology in information security of the food supply chain and comparing it with the traditional supply chain system.

## B. Proposed System:




Whenever any transaction will occur in the system , the record of that transaction is maintained in the form of hash value in a block. Each next block will get attached to the previous block and in this way a virtual block chain will occur. The hash value of a current block is generated using the data of a current block and the hash of the previous block. In this way if any of the block is tempered the subsequent all the block's hash must be changed . Such multiple copies are maintained at different servers , which will assure the data security and confidentiality. As everything is through application interface, it will maintain the transparency in the agricultural supply chain management.

## C. Mathematical Model:

Let S be Closed system defined as, S = Ip, Op, Ss, Su, Fi, A
To select the input from the system and perform various actions from the set of actions A so that Su state can be attained.
S=Ip,Op,Ss,Su,Fi,A
Where, IP1=Username, Password, image Set of actions=A=F1,F2,F3,F4 Where F1= Send Mail
F2= Merge Images F3= Encrypt Database F4= Generate Hash S=Set of users Ss=rest state, registration state, login state Su- success state is successful analysis
Fi- failure state Objects:
Input1: Ip1 = Username, Password
Input2 : Ip2= image from mail

1) Output1 : Op1 = Transaction Record

## D. Algorithm:

AES is used to encrypt the database.
The encryption process uses a set of specially derived keys called round keys.
These are applied, along with other operations, on an array of data that holds exactly one block of data, the data to be encrypted.
This array we call the state array.

**STEPS:**

- Derive the set of round keys from the cipher key.
- Initialize the state array with the block data (plaintext).
- Add the initial round key to the starting state array.
- Perform nine rounds of state manipulation.
- Perform the tenth and final round of state manipulation
- Copy the final state array out as the encrypted data (ciphertext).

**SHA 256:**

(secure hash algorithm, FIPS 182-2) is a cryptographic hash function with digest length of 256 bits. It is a keyless hash function; that is, an MDC (Manipulation Detection Code). A message is processed by blocks of 512 = 16 32 bits, each block requiring 64 rounds A cryptographic hash (sometimes called digest) is a kind of signature for a text or a data file. SHA-256 generates an almost-unique 256-bit (32-byte) signature for a text. A hash is not encryption it cannot be decrypted back to the original text (it is a one-way cryptographic function, and is a fixed size for any size of source text). This makes it suitable when it is appropriate to compare hashed versions of texts, as opposed to decrypting the text to obtain the original version.

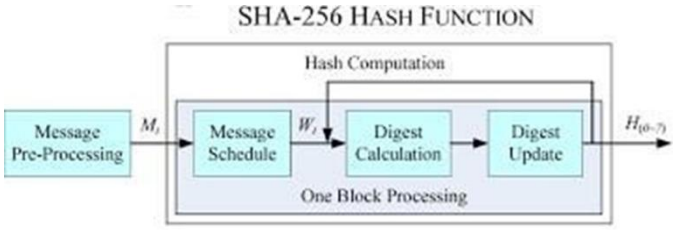



Figure 1. SHA-256 algorithm flow diagram

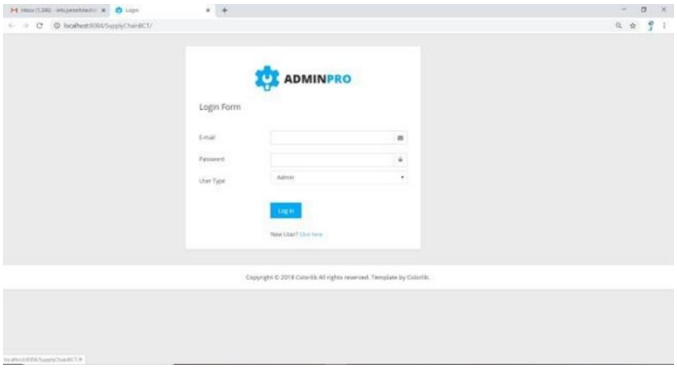



Fig: Login

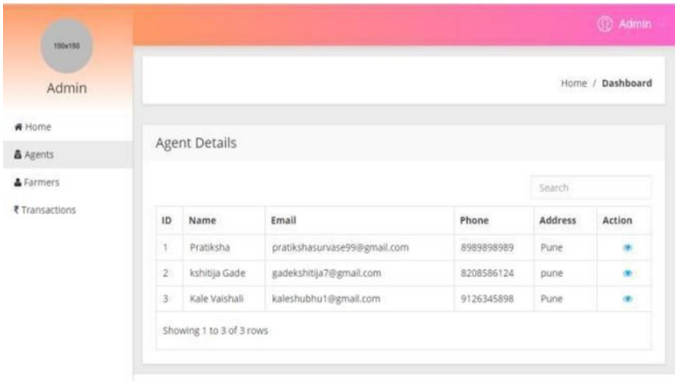



Fig:Agent Details

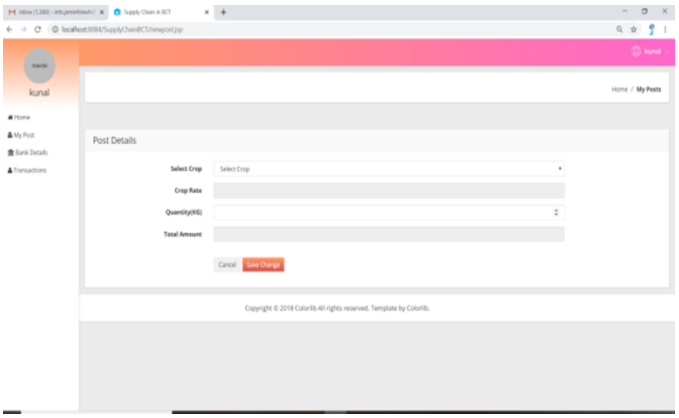



Fig: Farmer Add Post

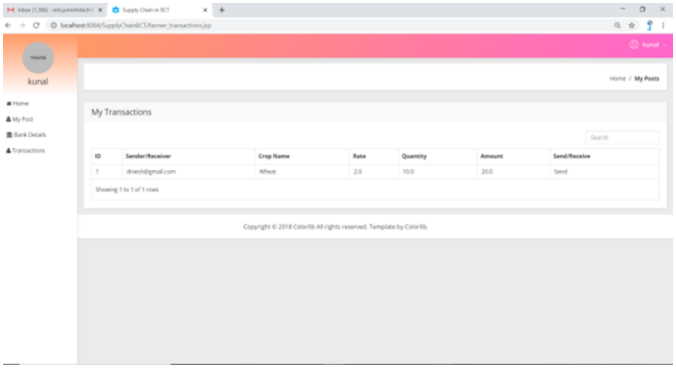



Fig: Farmer Transactions

**E. Experimental Results:**


Fig: Upload Image For Visual Cryptography


Fig: Combine and Share Password

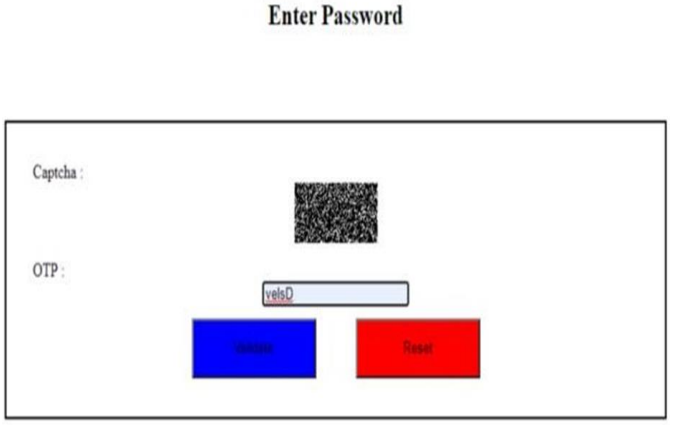



Fig: Get Password For Authentication

## III. CONCLUSION

Thus we are have implemented a prototype web based software application in Java for application of BCT in supply chain management. We have implemented block chain features such as: 1. Decentralization 2. Visual Cryptography 3. Hash Algorithm 4. Encrypted Database.

Thus it is possible to track agricultural supply chain and to give minimum price for agricultural products.

## IV. REFERENCES

[1]. F. Lv and S. Chen, "Research on Establishing a Traceability System of Quality and Safety of Agricultural Products Based on Blockchain Technology," Rural Finance Research, vol. 12, pp. 22-26, 2016.

[2]. Y. Yang and Z. Jia, "Application and Challenge of Blockchain Technology in the Field of Agricultural Internet of Things," Information Technology, vol. 258, pp. 24-26, 2017.

[3]. S. Nakamoto, "Bitcoin: A peer-to-peer electronic cash system," Consulted, 2008.

[4]. Y. Yuan and F. Y. Wang, "Blockchain: The State of the Art and Future Trends," Acta Automatica Sinica, 2016. Y. Yuan, T. Zhou, A. Y. Zhou, Y. C. Duan, and F. Y. Wang, "Blockchain Technology: From Data Intelligence to Knowledge Automation," Zidonghua Xuebao/acta Automatica Sinica, vol. 43, pp. 185-1490, 2017.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Litter Detection Using YOLO V3

**Michelle Trivedi, Mona, Vishal Yadav, Jayshree Chaudhari, Faraz Bagwan**
Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Cleanliness of city streets has an important impact on city environment and public health. Conventional street cleaning methods involve street sweepers going to many spots and manually confirming if the street needs to clean. However, this method takes a substantial amount of manual operations for detection and assessment of street's cleanliness which leads to a high cost for cities. Using pervasive mobile devices and AI technology, it is now possible to develop smart edge-based service system for monitoring and detecting the cleanliness of streets at scale. This paper explores an important aspect of cities - how to automatically analyse street imagery to understand the level of street litter. A vehicle equipped with smart edge station and cameras is used to collect and process street images in real time. A deep learning model is developed to detect, classify and analysis the diverse types of street litters such as tree branches, leaves, bottles and so on. In addition, two case studies are reported to show its strong potential and effectiveness in smart city systems.

**Keywords :** Smart city, street cleanliness.

## I. INTRODUCTION

Urban street surface receives waste deposits from both natural and human sources, such as leaves, soil, sediment, scattered trash, illegal dumpling and so on. When the street cleaning service is ineffective, it could cause a negatively impact on city tourism, reputation, and economy. Furthermore, dirty street have also been recognized as potentially important contributor to air and water pollution. Researches have proved that if there is litter on the streets, people do not hesitate in throwing more litter.

However, if the streets are clean, people tend to think twice before throwing anything and end up not throwing the litter on streets. Therefore, cleanliness of city streets is particularly important as it has a significant effect on city's image and reputation, and on the quality of life for those who live and work in the city.

Currently, many cities have adopted various methods and made great effort to improve the cleanliness of their streets. For instance, New York city used an inspection program called Scorecard to measure the cleanliness of city streets and sidewalks [6]. [5] proposed a cleanliness index for the city of Granada (South of Spain) to measure the level of cleanliness of the streets. In 2015, Imteaj et al. constructed an android based application for the city Dhaka, capital of Bangladesh. The user himself can contribute to clean his city, notify volunteer to come forward or can

inform city corporation. In 2015, Los Angeles had developed a state-of-the-art street-by-street [4] cleanliness assessment system. Los Angeles is the first city to map the cleanliness of every one of its blocks. With this new tool, Sanitation is better equipped to target areas of high need, and to ensure a fair allocation of services.

Despite these methods provided new ideas for cities to clean their streets, most of the current methods for detection litter are not fully automated and still rely on human intervention. The clean-up crews need to capture and identify each picture manually to determine if the street is dirty. Therefore, a promising and optimal solution should automatically and reliably detect litter in each captured image without human intervention.

The major motivation of this paper is providing cities with an automated way to monitor the street cleanliness. In this paper, we have studied a smart clean street service application using the state-of-art advanced technologies in IoT, mobile edge computing, big data analysis, as well as machine learning techniques. The mobile edge processing component located in the vehicle which carries the cameras. It shall be able to process the images using a limited computing power and send those images to the service server which may benefit from deeper scan using the powerful GPU processing on the server. After the images pre- processing at the edge layer, YOLOv3 is used to identify the street litter at the service server. Finally, the analysis results are sent to user layer for evaluation.

The main contribution of this paper can be summarized as follows. First, we constructed a unique litter data set of 12346 images for training deep-learning based detection models. The second contribution is a litter detector which can detect 11 classes of litter with good accuracy. The third contribution is an edge computing framework of deep learning for smart city street cleanliness.

The rest of the paper is organized as follows. In Section 2 we will present what motivated us to make this project. In Section 3, we introduce related work in smart street cleaning, deep learning, and edge computing. In Section 4, we present the architecture, components, and algorithms for the proposed system based on deep learning and edge computing. In Section 4, we describe the implementation details of our system. Section 5 presents the evaluation results. Finally, in Section 6, we make concluding remarks.

## II. MOTIVATION

Keep India Beautiful aims to create a cleaner India and hosts community clean up events across the country. However, their events are done without any strong statistical data. With the data which could be taken from our algorithm, they will be able to identify the locations in the India that needs to be cleaned up the most.

Clean India will lead to decrease in the number of deceases caused by unhygienic atmosphere.

## III. RELATED WORK

This section reviews the existing research work and related projects.

### Smart street cleaning

The cleanliness of city street is directly related to the city's public image. To maintain the streets clean, different methodologies have been developed in the past years. These methodologies can be classified into two directions: evaluating the street cleanliness, monitoring the waste. In order to evaluate the street cleanliness, Seville etal.proposed a clean index for measuring the level of cleanliness of the city streets, such that the quality and governance of public services can be evaluated. However, the process of measurement requires a lot of human intervention like collecting data and rating data. Lopez et al. develop an

App to evaluate the street cleanliness and waste collection service. Specific methods for calculating and evaluating indicators have been designed to give a true reflection of the level of city street cleanliness.

Although this App can collect information from the user end and store information in the application database, it still needs users to fill the information manually in the App. Li et al. put forward a multi level assessment system and showed how the cleanliness status of streets is collected by using mobile stations. The results are transmitted through city network, analysed in the cloud and presented to city administrators online or on mobile. Regarding monitoring the waste, Rovetta . used sensors to monitor waste bins based on distributed sensor technology and geographical information systems. Begur et al.[3] focused on illegal dumping problems in the City of San Jose. They proposed an innovative smart mobile-based service system, which supports real-time illegal dumping detection, altering, monitoring, and management. Alfarrarjeh et al. [1] presented an automating geo-spatial classification approach to determine the level of street cleanliness. The experiments compared various combinations of classifier and image features, which show that SVM classifier based on CNN image features obtained good values on both precision and recall.

Balchandani et al. [2] proposed a deep learning framework for smart street cleaning, which aims at providing any city with an automated way to monitor the cleanliness of its streets. It is a good idea to use deep leaning technology to automatically detect and classify litter, but this paper only provided with a simple example about separating the street and the curb, and the performance of detection and classification was not discussed. The proposed approach in this paper is also based on recent advances in deep learning.

Related work in deep learning is introduced in the next paragraph.

## IV. SYSTEM DESIGN

This section presents the overall infrastructure of the system. All modules are explained in detail.

### System Infrastructure

Due to the recent advances of IoT technologies, mobile edge computing, big data analysis, as well as machine learning, we designed the system architecture of the proposed smart clean street service system, depicted in Fig. 1. It shows that the[7]

system architecture includes three layers: edge layer, cloud layer and user layer. First, images of streets are captured on a mobile device and pre-processed at the edge layer. Also, the end mobile device could record the geological location and provide location awareness for end users. Then, these pre-processed images with location information will be sent from the edge layer to cloud layer. The cloud-based server performs additional processing on the incoming images and then pushed them through a deep learning algorithm for object detection and classification. Finally, the detail results including litter location, types of litter, and litter detection photos are fed into the end user database for visualization and reporting.

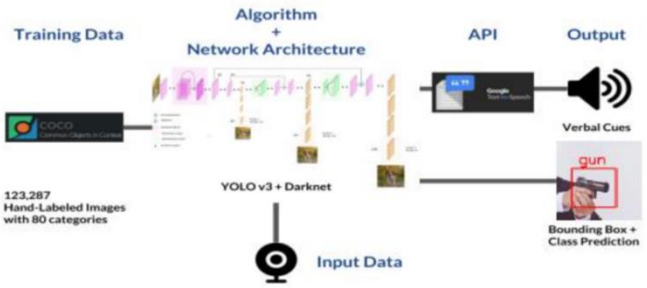



Figure 1: System Architecture [8]

Edge layer: The main goal of this layer is to capture the street images and collect location coordinates from streets using a smart vehicle with a mobile station. This mobile station has two major components: Camera module and Edge processing module. Three cameras in different direction takes high-resolution pictures of the

street. Each camera has a predefined angle and resolution which can be customized and covers defined range 20ft. All these captured pictures are completely in raw or uncompressed, and passed into the edge processing module. The edge processing module is made of several parts. First, an optimized pre-trained deep learning model is used to determine any regions of interest in images which are worth deeper processing in the server, and to check whether the image contains a clear view of the street and is not blur. Then, the selected images are compressed, encrypted, and finally transmitted to the server through the wireless network.[7]

Server layer: This is the layer where the pre- processed images are further analysed on the cloud server, which is configured to use Tensor flow (an open source software interface) for CNN model training and testing. First, the server-side image processor decrypt the image. Then, the decrypted image is fed into the pre-trained deep learning models like Faster-RCNN which detect and classify the object in the image. Lastly, results generated by the object detection and classification are fed into the end user database for visualization and reporting. User layer: This is the layer where reports are generated based on the Cloud processing. These results including litter location, types of litter, and litter detection photos are visualized for city and community.

**Network architectures for litter recognition**

**1) Yolov3:**

YOLO is a Convolutional Neural Network (CNN) for doing object detection. CNN's are classifier-based systems that can process input images as structured arrays of data and identify patterns between them. YOLO has the advantage of being much faster than other networks and still maintains accuracy.

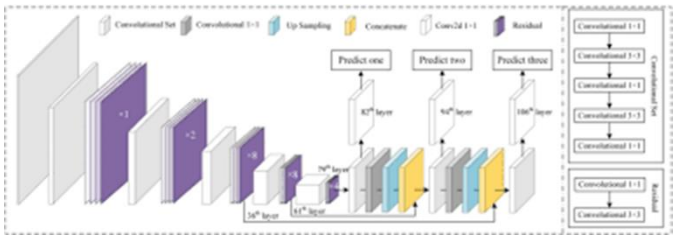



Figure 2: Architecture of YOLOv3 [9]

The YOLOv3 algorithm first separates an image into a grid. Each grid cell predicts some number of boundary boxes (sometimes referred to as anchor boxes) around objects that score highly with the aforementioned predefined classes. Each boundary box has a respective confidence score of how accurate it assumes that prediction should be, and detects only one object per bounding box. The boundary boxes are generated by clustering the dimensions of the ground truth boxes from the original dataset to find the most common shapes and sizes.[8]

## V. OUTPUT

These are some of the outputs of our project

The YOLOv3 algorithm first separates an image into a grid. Each grid cell predicts some number of boundary boxes (sometimes referred to as anchor boxes) around objects that score highly with the aforementioned predefined classes. Each boundary box has a respective confidence score of how accurate it assumes that prediction should be, and detects only one object per bounding box. The boundary boxes are generated by clustering the dimensions of the ground truth boxes from the original dataset to find the most common shapes and sizes.[10]

Figure 3


Figure 6

Figure 4

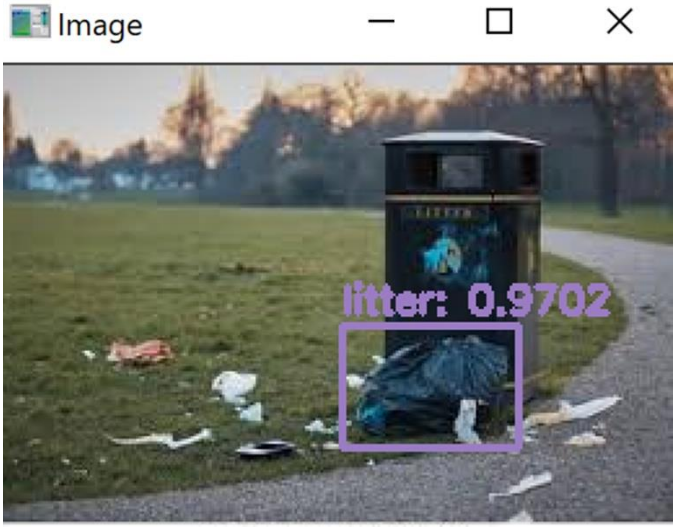



Figure 7


Figure 5

Figure 8

## VI. CONCLUSION

This paper presents a deep learning based smart street cleaning service system that allows for automatic litter detection and classification and real- time monitoring of the streets conditions. In the proposal system, we studied deep learning model for little street object detection and classification. We have successfully learned and studied python language and have also acquired knowing about libraries like tensorflow and have also learned about object detection and image classification algorithms.

edge-based service system for street cleanliness assessment.

## VII. REFERENCES


[1]. Alfarrarjeh, A., Kim, S. H., Agrawal, S., Ashok, M., Kim, S. Y., &Shahabi, C. (2018). Image classification to determine the level of street cleanliness: A case study. In 2018 IEEE Fourth International Conference on Multimedia Big Data (BigMM) (pp. 1–5).

[2]. Balchandani, C., Hatwar, R. K., Makkar, P., Shah, Y., Yelure, P., &Eirinaki, M. (2017). A deep learning framework for smart street cleaning. In 2017 IEEE Third International Conference on Big Data Computing Service and Applications (BigDataService) (pp. 112–117).

[3]. Begur, H., Dhawade, M., Gaur, N., Dureja, P., Gao, J., Mahmoud, M., Huang, J., Chen, S., & Ding, X. (2017). An edge-based smart mobile service system for illegal dumping detection and monitoring in san jose. In 2017 IEEE SmartWorld, Ubiquitous Intelligence Computing, Advanced Trusted Computed, Scalable Computing Communications, Cloud Big Data Computing, Internet of People and Smart City Innovation (SmartWorld/SCALCOM/UIC/ATC/CBDCom/IOP/SCI) (pp. 1–6). doi:10.1109/UIC-ATC.2017.8397575.

[4]. Ladin-Sienne, S. (2017-04-16). Turning dirty streets clean through comprehensive open data mapping. URL: https://datasmart.ash.harvard.edu/news/article/turning-dirty-streets-clean-through-comprehensive-open-data-mapping-1001.

[5]. Sevilla, A., Rodrłguez, M. L., ¢ngelaGarcła-Maraver, &Zamorano, M. (2013). An index to quantify street cleanliness: The case of granada (spain). Waste Management, 33, 1037 – 1046.

[6]. Van Ryzin, G., Immerwahr, S., & Altman, S. (2008). Measuring street cleanliness: A comparison of new york city's scorecard and results from a citizen survey. Public Administration Review, 68, 295 – 303.

[7]. Smart street litter detection and classification based on Faster R-CNN and edge computing - Scientific Figure on ResearchGate. Available from: https://www.researchgate.net/figure/Clean-Streets-Framework- System-Architecture_fig1_338988152 [accessed 23 Nov, 2020]

[8]. S. M. Imran, Engineering-final-year-project

[9]. Z.-F. Xu, R.-S. Jia, H.-M. Sun, Q.-M. Liu, and Z. Cui, "Light-YOLOv3: fast method for detecting green mangoes in complex scenes using picking robots," Appl. Intell., vol. 50, no. 12, pp. ss4670–4687, 2020.

[10]. V. Meel, "YOLOv3: Real-Time Object Detection Algorithm (What's New?)," viso.ai, 31-Mar-2021. [Online]. Available: https://viso.ai/deep-learning/yolov3-overview/#:~:text=YOLOv3%20(You%20Only%20Look%20Once%2C%20Version%203)%20is%20a,Joseph%20Redmon%20and%20Ali%20Farhadi. [Accessed: 04-Jun-2021]

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Design and Implementing Brain Tumor Detection Using Machine Learning Approach

**Swati Jagtap[1], Sadichha Khedkar[1], Meghana Rikibe[1], Sampada Pathare[1], Prof. Amruta Chitari[2]**

[1]Student, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

In this paper, we propose a brain tumor segmentation and classification method for multi-modality magnetic resonance image scans. The data from multi-modal brain tumor segmentation challenge are utilized which are co-registered and skull stripped, and the histogram matching is performed with a reference volume of high contrast. We are detecting tumor by using preprocessing , segmentation, feature extraction ,optimization and lastly classification after that preprocessed images use to classify the tissue .We performing a leave-oneout cross-validation and achieved 88 Dice overlap for the complete tumor region, 75 for the core tumor region and 95 for enhancing tumor region, which is higher than the Dice overlap reported.

**Keywords :** Convolution Neural Network, Image Processing, MRI

## I. INTRODUCTION

The detection and diagnosis of brain tumor from MRI is crucial to decrease the rate of casualties. Brain tumor is difficult to cure, because the brain has a very complex structure and the tissues are interconnected with each other in a complicated manner. Despite many existing approaches, robust and efficient segmentation of brain tumor is still an important and challenging task. Tumor segmentation and classification is a challenging task, because tumors vary in shape, appearance and location. It is hard to fully segment and classify brain tumor from mono-modality scans, because of its complicated structure. MRI provides the ability to capture multiple images known as multimodality images, which can provide the detailed structure of brain to efficiently classify the brain tumor. shows different MRI modalities of brain.

To design a detection and diagnosis of brain tumor from MRI is crucial to decrease the rate of casualties. Brain tumor is difficult to cure, because the brain has a very complex structure and the tissues are interconnected with each other in a complicated manner. Despite many existing approaches, robust and efficient segmentation of brain tumor is still an important and challenging task. Tumor segmentation and classification is a challenging task, because tumors vary in shape, appearance and location. It is hard to fully segment and classify brain tumor from mono-modality scans, because of its complicated structure. So we

overcome that problem classify the brain tissues tumor area.

Robust and efficient segmentation of brain tumor is still an important and challenging task. Tumor segmentation and classification is a challenging task, because tumors vary in shape, appearance and location. It is hard to fully segment and classify brain tumor from mono-modality scans, because of its complicated structure. So we overcome that problem classify the brain tissues tumor area.

The brain images taken as input and that images performs the preprocessing operation after the preprocessing segmentation using the k-means algorithm and on that segmented area we perform the operation feature extraction using the classification SVM and CNN algorithm.

This technique can be developed to classify the tumors based on feature extraction. the detection of brain tumor is fast and accurate when compared to the manual detection carried out by clinical experts.

## II. METHODOLOGY

- Support Vector Machine The objective of the support vector machine algorithm is to find a hyperplane in an N-dimensional space(N—the number of features) that distinctly classifies the data points.

- Possible hyperplanes To separate the two classes of data points, there are many possible hyperplanes that could be chosen. Our objective is to find a plane that has the maximum margin, i.e the maximum distance between data points of both classes. Maximizing the margin distance provides some reinforcement so that future data points can be classified with more confidence.

- Hyperplanes in 2D and 3D feature space Hyperplanes are decision boundaries that help classify the data points. Data points falling on either side of the hyperplane can be attributed to different classes. Also, the dimension of the hyperplane depends upon the number features. If the number of input features is 2, then the hyperplane is just a line. If the number of input features is 3, then the hyperplane becomes a two-dimensional plane. It becomes difficult to imagine when the number of features exceeds 3.

- Support Vectors Support vectors are data points that are closer to the hyperplane and influence the position and orientation of the hyperplane. Using these support vectors, we maximize the margin of the classifier. Deleting the support vectors will change the position of the hyperplane. These are the points that help us build our SVM.

- Large Margin Intuition In logistic regression, we take the output of the linear function and squash the value within the range of [0,1] using the sigmoid function. If the squashed value is greater than a threshold value(0.5) we assign it a label 1, else we assign it a label 0. In SVM, we take the output of the linear function and if that output is greater than 1, we identify it with one class and if the output is -1, we identify is with another class. Since the threshold values are changed to 1 and -1 in SVM, we obtain this reinforcement range of values([-1,1]) which acts as margin.

- CNN (Convolutional Neural Network)

- Mathematical Working and Flow of CNN:

[1] Input Layer — has input size [7, 1] because we have 7 features
[2] conv1d— First convolutional layer
[3] averagePooling1d — First average pooling layer
[4] conv1d — Second convolutional layer
[5] averagePooling1d — Second pooling layer

[6] flatten — Reduce the dimension, reshape input to [number of samples, number of features

[7] dense — Fully connected layer using linear activation function with 1 unit which returns 1 output value

- Convolutional neural network (CNN) is part of the family of neural network (NN) which is a variation of a multilayer perceptron (MLP). CNN consists of an input layer, several hidden layers and an output layer like any other NNs. Input layer is a representation of identity function, f(x) = x. Output layer which makes decisions, passes previously calculated weights through a linear function. Hidden layers are either convolutional, pooling, dropout or fully connected. In addition, all layers have activation functions at the end which gives additional functionality e.g. normalization. sigmoid , tanh and RELU are examples of these activation functions. Weights of convolution layers can be seen as 2D-filters and they apply convolution operation with these filters. Convolution operation is a process which sums the point-wise multiplications of given two functions while sliding the operation window. Pooling layer generalizes the elements in window frame while sliding this window. For example, max pooling outputs the maximum elements for a given window while sliding it. Dropout selects several neurons, that feed the input of next layers and reduces overfitting. Finally, fully connected layers can be thought as a fully connected version of classical MLP. With the explanation of fully connected layers, CNNs can be seen as a combination of MLP and filters which can operate as either convolution or pooling. In order to optimize weights of CNN, we have used an adaptive learning rate method (ADADELTA) optimizer. Apart from the fact that CNNs give noteworthy performance , they require much more data compared to other types of models. With the purpose of solving this issue, we merge all ETFs and create a satisfactory dataset for a financerelated problem. Additionally, merging reveals that we do not have to stick to one set of stock only. The model trained with this dataset, assumed that it performs well, will be universal for all kinds of stocks rather than a particular stock.

tanh(x) = 1 e2x/ 1 + e2x (1)

(x) = 1 1 + ex (2)

R(x) = max(0, x) (3)

yi = 01 + 1xi1 + ... + pxip = xT i , i = 1, ..., n (4)

where T denotes the transpose and xT i is the inner product between two vector.

## A. Project outline

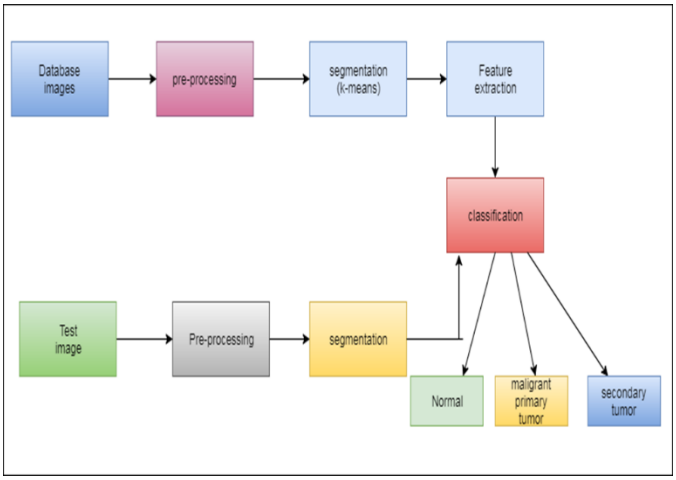



FIG 1. Overall Architecture

## B. Brain image Preprocessing

Due to existing noise disturbance the MR images get affected. For noise reduction the research work proposes local smoothing methods and nonlocal means. In the image there may also exist few significant structures and details that can act as noise; such kind of details are also eliminated. The technique of Image pre-processing involves: data cleaning, data transformation, data integration, data resizing, data reduction etc. The image pre-processing eliminates unnecessary data and smooth up noisy data, detect and eliminate the outlier and rectify the data inconsistencies. Lastly,

normalization and aggregation is performed. The technique of Image-processing proves to be highly significant in determining particular heart image, removing noise and for improvising the quality of the image

### C. Average filtering

The normal channel being the convolution work that is utilized to set the clamor in the images. The Pre-processing step abandons the disturbances in the image but still after applying preprocessing the image doesn't hold suitable for future process. As a result the Average channel resolves this issue by providing acceptable and smooth picture. The Average channel resembles a non-linear channel unlike straight channels. The Average channel replace the pixel esteems with an Average esteem that being nearly accessible (like, 3x3 or 5x5 or pixels near the focal pixel esteem). Moreover, Average channel tends to be edge safeguarding. It helps in abandoning salt and pepper disorder.

**Algorithm:**

Step - 1: the picture is provided as input.
Step - 2: choose a 3X3 window near the current pixelwithin the picture.
Step - 3: perform pixel sorting in expanding request andsave it to vector.
Step - 4: determine the normal of the vector.
Step - 5: the current pixel is replaced with the normalesteem.
Step - 6: Repetition of means 2 to 5 till every single pixelswithin the picture gets prepared.
Step - 7: Output

### D. Pixel based segmentation

Image Segmentation is a common technique of digital image processing. Lately, Brain tumor image sectioning in MRI has spurred up as a popular research in the domain of medical imaging system. The process of Segmentation

### E. Convolution Neural Networks

Convolutional Neural Network – CNN is employed for segmenting the images. It directly extracts features from pixel images with least pre-processing involved. The network utilized is LinkNet which being a light deep neural network architecture that's developed to carry out semantic segmentation. The LinkNet Network contains encoder and decoder blocks which basically manage to split the image and re-build again before it's forwarded via few final convolutional layers. CNN is a significant approach of deep learning which is being employed in image recognition applications. It involves two basic methods of convolution and pooling. Convolution and pooling layers are arranged till high level of classification accuracy is achieved. Moreover, few feature maps are identified in every convolutional layer and weights linked to convolutional nodes (in the same map) are being shared. Such arrangements offer comprehension of various network characteristics at the same time retaining the no: of traceable parameters. CNN possess less specific tasks in contrast to the conventional methods and helps in thoroughly extracting features. Figure 2, depicts the CNN process scheme as.

**Algorithm for CNN based Classification**

Step - 1: convolution filter is applied in the first layer.
Step - 2: The filter sensitivity is minimized by smoothingthe convolution filter that is by sub- sampling.
Step - 3: The activation layer controls the signal transferfrom one layer to other layer.
Step - 4: training period is being fastened by employingRELU (rectified linear unit).
Step - 5: The neurons in proceeding layer is associated witheach neuron in the next layer.
Step - 6: at the time of training, Loss layer is appended inthe end to provide a feedback to NN (neural network).

### F. Evolution metrics

For performance evaluation and measuring system stability, few parameters are computed and examined. These are mentioned as:

The proposed CNNs performance is assessed with RMSE(Root Mean Square Error), recall, sensitivity, precision, F-score specificity, PME (probability of the misclassification error) and accuracy of the training and testing set and throughout performance was examined by making use of the Eqs. (1-8) correspondingly, where Yi denotes actual and Ri denotes result of the ith diagnosis of brain tumor feature acquired, TN (True Negative) denotes prediction for the patients with no brain tumor and were detected with no brain tumor, FN (False Negative) denotes the prediction for the patients with no brain tumor but were detected with a brain tumor, TP(True Positive) denotes the prediction for the patients with brain tumor and were detected with a brain tumor, and FP(False Positive) represents the prediction for the patients having brain tumor but were detected with no brain tumor.

- True Positive (TP): If the instance is positive and it is classified as positive
- False Negative (FN): If the instance is positive but it is classified as negative
- True Negative (TN): If the instance is negative and it is classified as negative
- False Positive (FP): If the instance is negative but it is classified as positive

## III. RESULTS AND DISCUSSION

The proposed method employs a mean field term within the standard CNN objective function. The technique is developed and applied in MATLAB environment by utilizing the image processing tool. Datasets are assembled from the UCI datasets. A comparison is portrayed among all the features and the entire result being depicted in the figures. The accuracy is computed which is then compared with rest of the state-of-arts methods. Efficiency and training accuracy of the proposed brain tumor classification approach is computed

The brain images taken as input and that images performs the preprocessing operation after the preprocessing segmentation using the k-means algorithm and on that segmented area we perform the operation feature extraction using algorithm SGLDM or DWT. Then on that extracted area we perform optimization using genetic algorithm and lastly classify the tumor tissue using the classification NN and POS algorithm. .

The model is for the prediction which is the classification of the best treatment method. The model shows the accuracy which varies from 90% to 97%. Convolutional Neural Networks seem to be good options for classification, process, and prediction according to time series data because lags of unknown duration may take place between major events in a time series.

The datasets are accumulated from online datasets and the MATLAB environment is used for the development process. Fig.4 presented below depicts the overall images of brain tumor detection. Input image undergoes pre-processing depending on the testing process. Thereafter the pre-processed image is enhanced and the image is extracted. Eventually, the brain tumor classified image is retrieved and implemented successfully

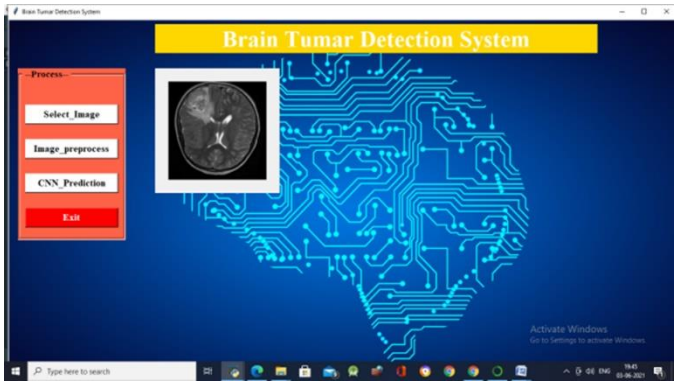



FIG 2. Input Image

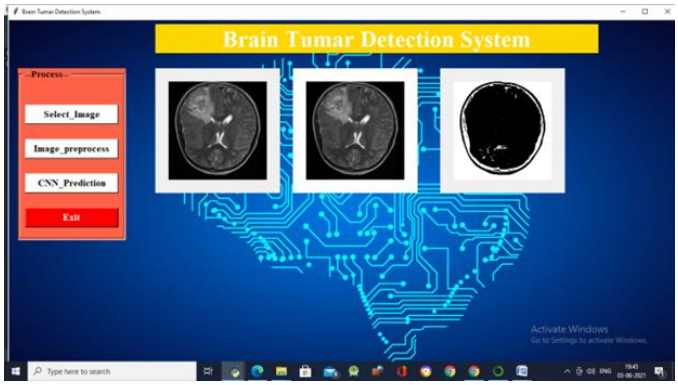



FIG 3. Enhanced Image Feature Extracted Image

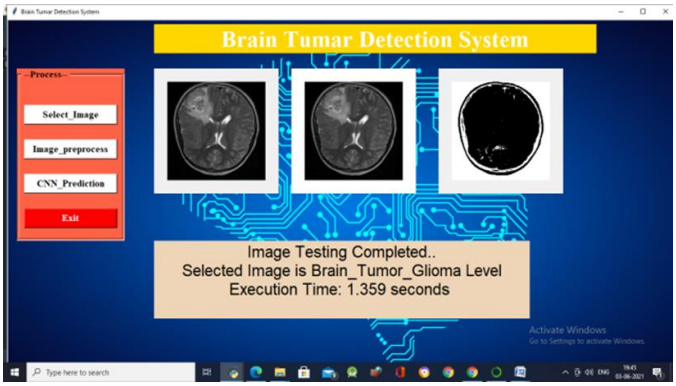



FIG 4. Sample Output of Classified Image

TABLE I

| Sr no | Title | Authors | Year | Description |
|---|---|---|---|---|
| 1 | Semi-Automatic Segmentation Software for Quantitative Clinical Brain Glioblastoma Evaluation | Ying Zhu, MS, Geoffrey S. Young, MD, Zhong Xue, PhD, Raymond Y. Huang, MD, PhD, Hui You | 2011 | Our software adopts the current state-of-the-art tumor segmentation algorithms and combines them into one clinically usable pipeline. |
| 2 | A novel content-based active contour model for brain tumor segmentation | Sachdeva J, Kumar V, Gupta I, Khandelwal N, Ahuja CK | 2011 | Brain tumor segmentation is a crucial step in surgical and treatment planning. Intensity-based active contour models such as gradient vector flow (GVF), magneto static active contour (MAC) and fluid vector flow (FVF) have been proposed to segment homogeneous objects/ tumors in medical images. |

| | | | | |
|---|---|---|---|---|
| 3 | New developments in liposomal drug delivery | B.S. Pattni, V.V. Chupin and V.P. Torchilin | 2014 | Five decades of research in the Field of liposome research have shown their prospective benefits in the medical and cosmetic as well as the food industry. |
| 4 | Liposomal drug delivery systems: From concept to clinical applications | T.M. Allen and P.R. Torchilin | 2014 | The first closed bilayer phospholipid systems, called liposomes, were described in 1965 and soon were proposed as drug delivery systems. |

Performance Analysis

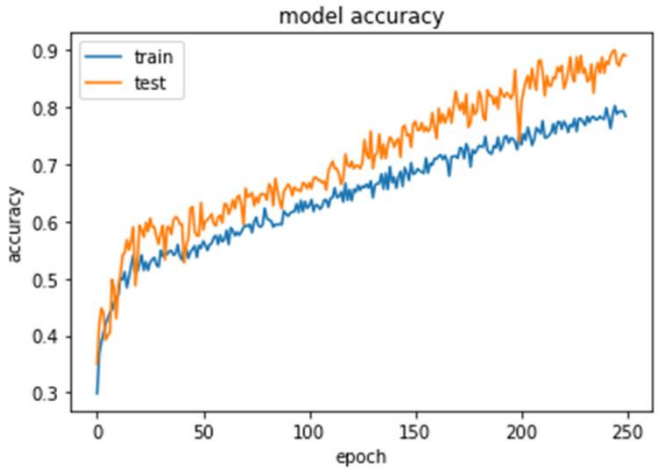



FIG 5. Model Accuracy

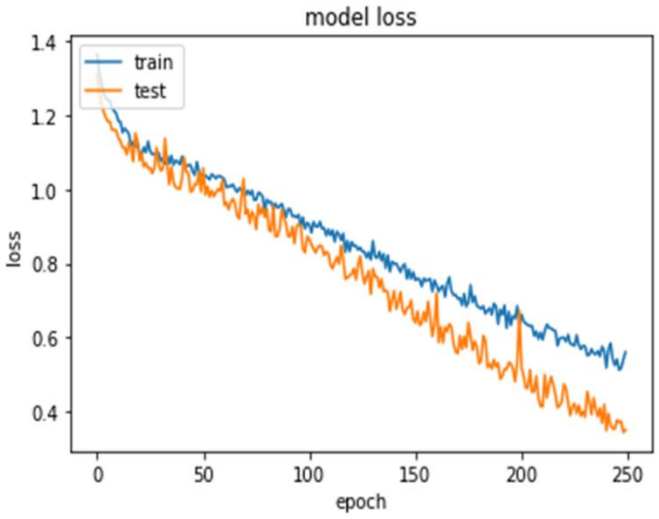



FIG 6. Epochs

## IV. CONCLUSION

This paper presented an algorithm to hierarchically classify the tumor into three regions: whole tumor, core tumor and enhancing tumor. Intensity, intensity difference, neighbourhood information and wavelet features are extracted and utilized on multi-modality MRI scans with various classifiers. The use of SVM and CNN classifier has increased the classification accuracy as evident by quantitative results of our proposed method which are comparable or higher than the state of the art.

## V. FUTURE SCOPE

In Feature , this technique can be developed to classify the tumors based on feature extraction. the detection of brain tumor is fast and accurate when compared to the manual detection carried out by clinical experts.

## VI. REFERENCES

[1]. S. Yazdani, R. Yusof, A. Karimian, Pashna, and A. Hematian, "Image segmentation methods and applications in MRI brain images," IETE Technical Review, vol. 32, no. 6, pp. 413–427, 2015.

[2]. M. P. Arakeri and G. R. M. Reddy, "Computer-aided diagnosis system for tissue characterization of brain tumor on magnetic resonance images," Signal, Image and Video Processing, vol. 9, no. 2, pp. 409–425, 2015.

[3]. E. Dandil, M. Cakiroglu, Z. Eksi, “Computer-aided diagnosis of malign and benign brain tumors on MR images,” ICT Innovations 2014, pp. 157–166, 2015.

[4]. E.-S. A. El-Dahshan , H. M. Mohsen, K. Revett, and A.-B. M. Salem, “Computer-aided diagnosis of human brain tumor through MRI: A survey and a new algorithm,” Expert Systems with Applications, vol. 41, no. 11, pp. 5526–5545, 2014.

[5]. Kailash Sinha, G.R.Sinha," Efficient Segmentation Methods for Tumor Detection in MRI Images", IEEE Student’s Conference on Electrical, Electronics and Computer Science, pp 1-6,2014

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Data Security in Cloud

**Ritesh Hajare[1], Rohit Hodage[1], Om Wangwad[1], Yogesh Mali[2], Faraz Bagwan[3]**
[1]Department Computer Engineering, Savitribai Phule, Pune University, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Savitribai Phule, Pune University, Pune, Maharashtra, India
[3]Assistant Professor, Department Computer Engineering, Savitribai Phule, Pune University, Pune, Maharashtra, India

## ABSTRACT

Data security has been consistent in being a major issue in information technology. In the cloud computing world, becomes specifically critical as the data is situated in different places all over the world.
As per user's concerns about the cloud technology the important factors are privacy protection and data security. In both academics and industries, the topics in cloud computing have been checked by multiple techniques. For the future growth of cloud computing technology in industry, government and business the data security and privacy protection will become more crucial.
Data security and privacy protection challenges are similar to both hardware and software in the cloud architecture. This study is to analyze different security techniques and challenges from both software and hardware aspects to secure data in the cloud and focuses on improving the data security and privacy protection for the trustworthy cloud environment. In this document, we are preparing a relevant research analysis on the existing research work with reference to the data security and privacy protection techniques of cloud computing.

**Keywords :** Data security, Privacy Protection, Cloud Computing

## I. INTRODUCTION

Cloud computing has been emerged as the next generation paradigm in computation. In the cloud computing world, both applications and resources are delivered on demand over the Internet as services. Cloud is an environment of the hardware and software resources in the data centers that provide diverse services over the network or the Internet to fulfill user's requirements. The explanation of "cloud computing" as per the National Institute of Standards and Technology (NIST) states that cloud computing allows unique, convenient. Network access to a shared pool of configurable computing resources like servers, networks, applications, storage, and services and can be provisioned on priority and released with less management effort or service provider interaction on demand.

As per the description, cloud computing provides a convenient on-demand network access to a shared pool of configurable computing resources. Resources

are identical to computing applications, network resources, platforms, software services, virtual servers, and computing infrastructure Cloud computing can be looked upon as a new computing archetype that can provide services on demand at a cheap cost. The three renowned and mostly used service models in the cloud paradigm are software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS). In SaaS, software with the similar data is deployed by a cloud service provider, and users can access it through the web browsers. In PaaS, a service provider delivers services to the users with a set of software programs that can resolve the given tasks. In IaaS, the cloud service provider facilitates services to the users with virtual machines and storage to enhance their business capabilities. Cloud computing is quite similarto but not the same as grid computing.
Grid computing integrates diverse resources together and manages the resources with the unified operating systems to provide better performance computing services, while cloud computing is the combination of computing and storage resources handled by different operating systems to provide services such as large-scaled data storage and top performance computing to users. The overall picture of grid computing has been replaced by cloud computing. Distribution of data isin a new format of cloud computing comparing with the grid computing.

Cloud computing will enable services make the services accessible to be consumed easily on demand. Cloud computing has the features like on-demand self-service, ubiquitous network access, location independent resource pooling, rapid resource elasticity, usage-based pricing, and transference of risk. These achievements of cloud computing have attracted substantial interests from both the industrial world and the academic research world.
Cloud computing technology is currently changing the business strategy in the world. Cloud computing is very promising for the IT applications; however, there are still some concerns to be resolved for personal users and enterprises for data storage and deploy applications in the cloud computing environment. One of the most significant obstacle to adoption is data security, which is accompanied by issues including compliance, privacy, trust, and legal matters.

The characteristic of institutions and institutional evolution is very similar to privacy and security in cloud computing .Data security has been consistent in being a major issue in IT. Data security turns out to be very critical in the cloud computing environment, because data gets scattered in different machines and storage devices including servers, PCs, and different mobile devices like wireless sensor networks and smart phones. Data security in the cloud computing is much more complex than data security in the traditional information systems.

To make the cloud computing adaptive by users and enterprise, the security challenges of users should be resolved first to make cloud world trustworthy.
The trustworthy environment is the basic prerequisite to win confidence of users to get used to such a technology. Discussed the assessment of cloud computing risks. Before the data security concerns are disclosed, the functions of cloud computing are reviewed first. Cloud computing is also known as on-demand service. In the cloud computing world, there is a cloud service provider that facilitates and manages the services.

The cloud provider facilitates all the services over the Internet, while end users use services for meeting their business needs and then pay for the services accordingly. Cloud computing world enables two basic types of functions which includes computing and data storage. In the cloud computing environment, users of cloud services don't need anything and they can get access to their data and

complete their computing tasks just through the Internet devices. During the access to the data and computing, the clients don't even know where the data gets stored and which machines performs the computing tasks. Coming to data storage, data safety and security are the primary factors for gaining user's trust and making the cloud technology successfully used. Many data protections and data security techniques have been launched in the research world of cloud computing. However, data security related techniques need to be further improved. Services of cloud computing has been delivered across the entire computing spectrum. Nowadays, organizations and companies are moving and expanding their business by adopting the cloud computing reduce the cost. This can be a contribution to free more man-powers to focus on developing strategic differentiation and business division of labor is transparent.

The concept of cloud has many implementations based on the services from service providers. For example, Google Apps Engine, Microsoft Azure, and Amazon Stack are famous implementations of cloud computing provided by cloud service providers like Google, Microsoft, and Amazon companies. Apart from the rest, the ACME enterprise implemented VMware based v-Cloud for allowing multiple organizations to share computing resources

As per the difference of access scope, cloud can be distributed into three segments: public cloud, private cloud, and hybrid cloud. Public cloud has the similar property of service provider and is accessible in public, private cloud refers to being the property of a company, and hybrid cloud is the blends of public and private cloud. Most of the existing cloud services are delivered by large cloud service companies such as Google, Amazon, and IBM.

A private cloud is a cloud in which only the authorized users have access to the services from the provider. In the public cloud anybody can access the cloud services whereas the hybrid cloud contains the concept of both public and private clouds. Cloud computing can reduce the cost and save organizations time, but trusting the system is more vital because the actual asset of any organization is the data which they share in the cloud to use the required services by putting it either directly or in the relational database or eventually in a relational database using an application.

Cloud computing brings multiple attributes that requires serious attention when it comes to trusting the system. The trust of the entire system relies on the data protection and prevention techniques used in it. By the researchers numerous different techniques and tools have been introduced and tested for data protection and prevention to gain and remove the hurdle of trust but there are still gaps which need attention and are required to be lined up by making these techniques much better and effective. The meaning of security is plentiful. Security is the combination of confidentiality, the prevention of the unauthorized disclosure of information, integrity, the prevention of the unauthorized amendment or deletion of information, and availability, the prevention of unauthorized withholding of information. The resource monitoring, resource management and resource security are the major issues in cloud computing. Currently, to deploy there are no regulations and standard rules. Applications in the cloud and there is a lack of standardization control in the cloud. In cloud numerous novel techniques had been implemented and designed; however, due to the dynamics of the cloud environment these techniques fall short of ensuring total security.

## II. METHODOLOGY

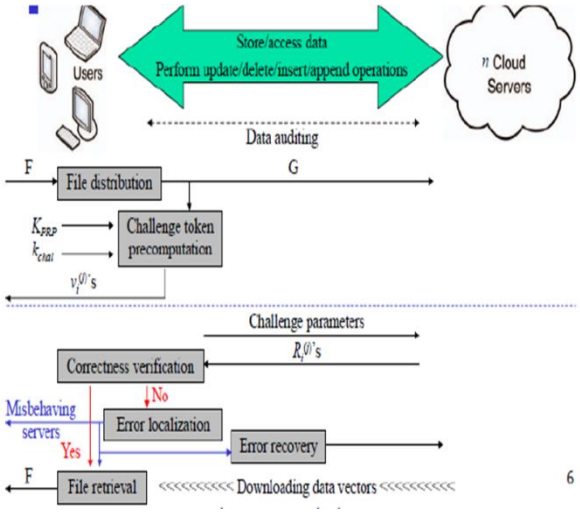


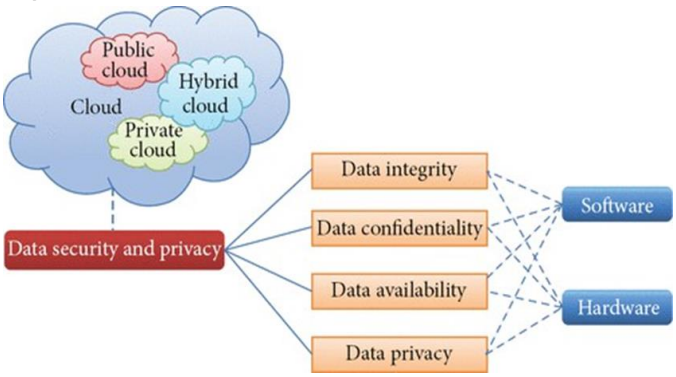

**Fig.Error Correction and Error localization**

Compared to many of its predecessors, which only provide binary results about the storage state across the distributed servers, the challenge-response protocol in our work further provides the localization of data error. Unlike most prior works for ensuring remote data integrity, the new scheme supports secure and efficient dynamic operation on data blocks, including: update, delete and append. We propose an effective and flexible distributed scheme with explicit dynamic data support to ensure the correctness of users' data in the cloud. We rely on erasure correcting code in the file distribution preparation to provide redundancies and guarantee the data dependability.

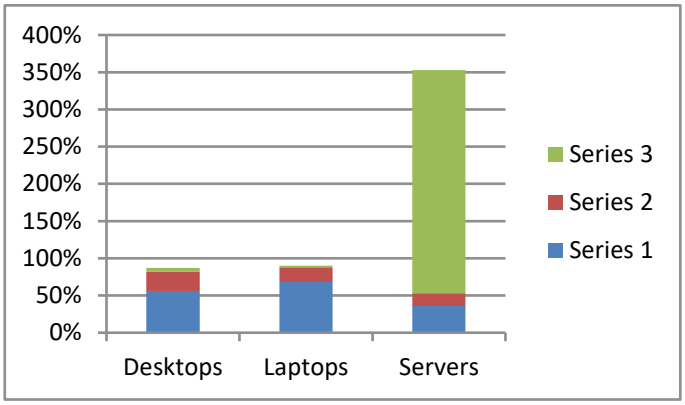
This project drastically reduces the communication and storage overhead as compared to the traditional replication-based file distribution techniques. By utilizing the homomorphism token with distributed verification of erasure-coded data, our scheme achieves the storage correctness insurance as well as data error localization: whenever data corruption has been detected during the storage correctness verification, our scheme can almost guarantee the simultaneous localization of data errors, i.e., the identification of the misbehaving server(s) To eliminate the errors in storage systems key

## III. RESULTS AND DISCUSSION:

**Figures and Tables**

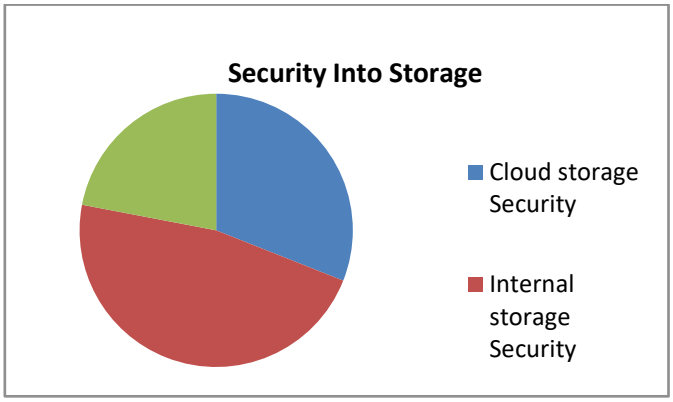



**Current and Planned Uses of Storage Devices**




As we can see the Series 3 of servers users are getting more reliable on the Servers. More the storing the data into the Desktops and Laptops.

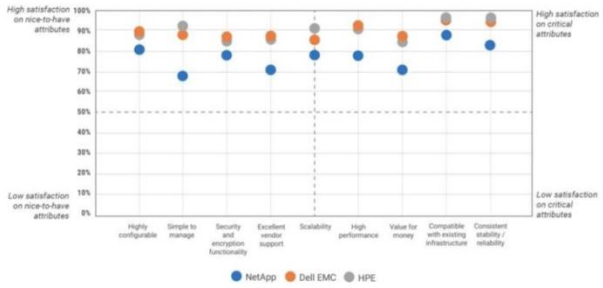
**Importance of Storage Security Array and Internal component Security Array:**




As we can see nowadays the 31% Cloud storage security for users are getting more reliable to get their

data more secure. More than storing the data into the Portable storage.

**Customer Satisfaction for Select Storage Vendors**




To dive deeper into Cloud Security pick one over other we have various options decision makers to compare three prominent satisfactions across key consideration factors for users. On the different parameters score very similarly, with high customer satisfaction ratings on key factors such as consistent reliability/stability, compatibility with existing infrastructure, scalability, and high performance.

## IV. CONCLUSION

Cloud computing is a promising and emerging technology for the next generation of IT applications. The barrier and hurdles toward the rapid growth of cloud computing are data security and privacy issues. Reducing data storage and processing cost is a mandatory requirement of any organization, while analysis of data and information is always the most important tasks in all the organizations for decision making. So no organizations will transfer their data or information to the cloud until the trust is built between the cloud service providers and consumers.

A number of techniques have been proposed by researchers for data protection and to attain highest level of data security in the cloud. However, there are still many gaps to be filled by making these techniques more effective. More work is required in the area of cloud computing to make it acceptable by the cloud service consumers. This paper surveyed different techniques about data security and privacy, focusing on the data storage and use in the cloud, for data protection in the cloud computing environments to build trust between cloud service providers and consumers.

## V. REFERENCES

[1]. "Forbes: Cloud computing forecast," https://www.forbes.com/sites/louiscolumbus/2017/04/29/roundup-of-cloud-computing-forecasts2017/#5c42322c31e8/, 2020.

[2]. "Microsoftonedrive, "https://products.office.com/en-us/onedrive/online-cloud-storage, 2020.

[3]. C.Wang, N. Cao, J. Li, K. Ren, and W. Lou "Enabling Secure and Efficient Ranked Keyword Search over Outsourced Cloud Data", IEEE Transactions on Parallel and Distributed Systems, vol.23, No.8, Aug.2012.

[4]. S. Karen, "Iot big data security and privacy versus innovation," IEEE Internet of Things Journal, vol. 6, no. 2, pp. 1628 – 1635, 2019.

[5]. Z. Lei, F. Anmin, Y. Shui, S. Mang, , and K. Boyu, "Data integrity verification of the outsourced big data in the cloud environment: A survey," Journal of Network and Computer Applications, vol. 112, pp. 1–15, 2019.

[6]. T. Ye, X. Peng, and J. Hai, "Secure data sharing and search for cloud-edge-collaborative storage," IEEE Access, vol. 7, pp. 15 963 – 15972, 2019

[7]. J. Wei, W. Liu and X. Hu, "Secure and efficient attribute-based access control for multi authority cloud storage", IEEE Syst. J., vol. 12, no. 2, pp. 1731-1742, Jun. 2018.

[8]. A. Hussain, C. Xu, and M. Ali, "Security of Cloud Storage System using Various Cryptographic Techniques," International Journal of Mathematics Trends and Technology ( IJMTT ), vol. 60, no. 1, pp. 45–51, 2018

[9]. Balogh, Z., Turčáni, M.:Modeling of data security in cloud computing. In: IEEE Annual Systems Conference, pp. 1–6.IEEE (2016)

[10]. Namasudra, S., Roy, P.: Secure and efficient data access control in cloud computing environment: a survey.J.Multiagent Grid Syst. 12, 69–90 (2016)

[11]. S. Karen, "Iot big data security and privacy versus innovation," IEEE Internet of Things Journal, vol. 6, no. 2, pp. 1628 – 1635, 2019.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Concealed Face Recognition

**Sanika Aier*[1], Ankita Salunke[1], Pooja Sharma[1], Sonam Patil[1], Prof. Dr. Pankaj Agarkar[2], Prof. Pooja Shinde[3]**
*[1]Student, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Savitribai Phule Pune University, Pune, Maharashtra, India
[2]Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Savitribai Phule Pune University, Pune, Maharashtra, India
[2]Head of Department, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Savitribai Phule Pune University, Pune, Maharashtra, India

## ABSTRACT

So as to forestall the spread of CORONA otherwise known as COVID-19 infection, nearly everybody wears a veil during COVID-19 scourge. This makes the old facial acknowledgment framework ineffectual by and large, for example, network access control, face access control, facial participation, facial security checks at train stations, and so on Along these lines, it is exceptionally earnest to improve the acknowledgment execution of the current face acknowledgment innovation on the veiled appearances with internal heat level identification. Current progressed facial acknowledgment frameworks are planned dependent on profound realizing, which rely upon a more noteworthy number of face tests. Be that as it may, as of now, there are no covered face acknowledgment datasets. To this end, there are three kinds of concealed face datasets, including Masked Face Detection Dataset (MFDD), Real-world Masked Face Recognition Dataset (RMFRD) and Simulated Masked Face Recognition Dataset (SMFRD). These datasets are effectively accessible, in light of which different applications on veiled countenances can be created. So, we reason a dependable technique dependent on dispose of veiled locale and profound learning-based highlights so as to address the issue of concealed face acknowledgment measure with internal heat level identification.

## I. INTRODUCTION

The COVID-19 infection can be spread through contact and surface contact, thusly, the biometric frameworks dependent on passwords or fingerprints can't be utilized further in the perspective on wellbeing. It is demonstrated that most germs are spread with our hands. In this way a contactless validation framework adequately lessens the danger of spread of disease. Face acknowledgment are more protected with no compelling reason to contact any gadget. A late investigation on COVID-19 has demonstrated that wearing a face veil by solid and contaminated populace diminishes significantly the transmission of this infection. Nonetheless, wearing the veil face causes the confirmation are become exceptionally troublesome errands when a fabulous piece of the face is covered up by a veil. existing face acknowledgment techniques are not productive when

wearing a cover which can't give the entire face picture to portrayal. uncovering the nose area is significant in the undertaking of face acknowledgment since it is utilized for face standardization, present remedy, and face coordinating. Because of these issues, face veils have essentially tested existing face acknowledgment techniques. To handle these issues, we separate two unique assignments to be specific:

1) face cover acknowledgment
2) masked face acknowledgment
3) Body temperature recognition.

The first checks whether the individual is wearing a cover or no. This can be applied in broad daylight places where the cover is necessary. Veiled face acknowledgment, then again, intends to perceive a face with cover, in light of the eyes and the brow areas. Furthermore, the third one the internal heat level as fever is one of the side effects of the COVID19 So it will check internal heat level except if it comes to (37°c) or higher. In this paper we handle the subsequent errand utilizing profound learning-based technique model so as to separate highlights from the exposed face locales (out of the veil area). It is Touchless passage framework with face/cover and fever acknowledgment. The validation framework can be incredibly useful to encourage general society in packed places, for example, clinics, schools, IT parks, and so on just as in lessening the spread of contamination.

## II. RELATED WORKS

Later designs, for example, Res Net have presented skip associations which permits further organizations to keep away from immersion in preparing precision. These structures are frequently utilized for starting element extraction in face identification organizations. In our strategy, we are utilizing design as the base organization for face recognition and a Fully Convolutional Network for division. Even though the dominant part of division designs depends on down inspecting and sequential up examining of info picture, Fully Convolutional Networks are humble and have an exact methodology.

Impediment work is a critical restriction of true 2D face acknowledgment strategy. By and large, it comes out from wearing caps, eyeglasses, covers just as whatever other articles that can impede a piece of the face while leaving others unaffected. In this manner, wearing a veil is considered as the most difficult facial impediment challenge since it blocks a fabulous portion of the face including the nose. Numerous methodologies have been proposed to deal with this issue. We can group them into three classifications in particular: nearby coordinating methodology, rebuilding approach, and disposal of impediment-based methodology. Coordinating methodology: Aims to analyze the similitude between pictures utilizing a coordinating cycle. By and large, the face picture is examined into various patches of a similar size. Highlight extraction is then applied to each fix. At long last, a coordinating cycle is applied among test and exhibition faces. The benefit of this methodology is that the examined patches are not covered, which maintains a strategic distance from the influence of impeded locales on the other useful parts. For instance, Martinez et aleix. tested the face area into a fixed number of neighborhood patches. coordinating is then applied for comparability measure.

Different techniques identify the central issues from the face picture, rather than neighborhood patches. For example, Weng et al. proposed to perceive people of interest from their halfway faces. To achieve this assignment, they firstly recognized central issues and concentrate their textural and mathematical highlights. Next, point set coordinating is completed to coordinate the acquired highlights. At long last, the comparability of two appearances is acquired through the separation between these two adjusted capabilities. Central issue-based coordinating technique is presented in Duan et al. Filter keypoint descriptor is applied to choose the suitable central

issues. Gabor ternary example and point set coordinating are then applied to coordinate the neighborhood key focuses for fractional face acknowledgment. Rather than the previously mentioned strategies dependent on fixed-size patches coordinating or key focuses recognition, McLaughlin et al. applied a biggest coordinating zone at each purpose of the face picture with no inspecting. Reclamation approach: Here, the blocked locales in the test faces are reestablished by the exhibition ones. For example, Bag chi et al. proposed to reestablish facial impediments. The location of the blocked districts is done by thresholding the profundity map estimations of the 3D picture. At that point, the reclamation is taken on by Principal Component Analysis (PCA). There are likewise a few methodologies that depend on the assessment of the blocked parts. Deira et al. applied a factual shape model to foresee and reestablish the halfway facial bends. Iterative nearest point (ICP) calculation has been utilized to eliminate impeded locales. The reclamation is applied to utilize a bend, which utilizes a factual assessment of the bends to deal with the impeded parts. Halfway watched bends are finished by utilizing the bends model created through the PCA strategy. Dispose of impediment-based methodology: In request to dodge a terrible reproduction measure, these methodologies plan to distinguish districts discovered to be blocked in the face picture, and dispose of them totally from the component extraction and classification measure. The division-based methodology is perhaps the best strategy that distinguishes firstly the blocked district part, and utilizing just the non-impeded part in the accompanying advances. For example, Priya and Banu separated the face picture into little neighborhood patches. Next, to dispose of the blocked area, they applied the help vector machine classifier to identify them. At last, a Mean put together weight lattice is utilized concerning the non-impeded areas for face acknowledgment. Soyuz et al. applied an impediment evacuation and reclamation. They utilized the worldwide concealed projection to eliminate the impeded areas. Next, the fractional Gappy PCA is applied for the reclamation utilizing eigenvectors. Also, Yu et al. completed a halfway coordinating system to successfully takes out the impeded areas and afterward utilizing the non-blocked locales in the coordinating cycle. Since the distribution of Alex Net engineering in 2012 by Krichevsky et al, profound CNN has become a typical methodology in face acknowledgment. It has likewise been effectively utilized in face acknowledgment under impediment variety. We find profound learning-put together technique based on the way that human visual framework naturally overlooks the impeded districts and just spotlights on the non-blocked ones. For instance, Song et al. proposed a veil learning strategy to dispose of the element components of the concealed locale for the acknowledgment cycle. Enlivened by the superior of CNN-based strategies that have solid vigor to enlightenment, outward appearance, and facial impediment transforms, we propose in this paper a dispose of impediment-based strategy and profound CNN-based model to address the issue of concealed face acknowledgment during the COVID-19 pandemic. Exploratory outcomes are completed on the Real-world Masked Face Recognition Dataset (RMFRD) introduced.

- RMFRD: A python crawler instrument is utilized to creep the front-face pictures of people of note and their comparing veiled face pictures from gigantic Internet assets. At that point, we physically eliminate the preposterous face picture coming about because of wrong correspondence. The way toward separating pictures takes a great deal of labor. Additionally, we crop the precise face zones with the assistance of self-loader comment apparatuses, such as Labeling and LabelMe. The dataset incorporates 5,000 pictures of 525 individuals wearing veils and 90,000 pictures of similar 525 subjects without covers.

This is as of now the world's biggest true covered face dataset. Fig. 1 shows sets of facial picture tests.

- SMFRD: In request to grow the volume and variety of the veiled face acknowledgment dataset, we in the interim have taken elective methods, which is to put on covers on the current public huge scope face datasets. To improve information control effectiveness, we have built up cover-wearing programming dependent on the D-lib library to perform veil-wearing consequently. This product is then used to wear veils on face pictures in the mainstream face acknowledgment datasets, as of now including LFW and Web face datasets. Along these lines, we moreover built a reenacted concealed face dataset covering 500,000 face pictures of 10,000 subjects. By and by the reenacted concealed face datasets can be utilized alongside their unique exposed partners.

An easy way to comply with the conference paper formatting requirements is to use this document as a template and simply type your text into it.

## III. MOTIVATION

We start by confining the cover area. Our principle reason for existing is to unhide the covered district. Right off the bat, we will begin with concealed district. To do so we apply an editing channel so as to get just the useful districts of the covered face. (for example, temple and eyes ones). By applying an editing channel to temple and eyes which isn't covered this assist with getting the basic view to coordinate the specific character.

Next, we portray the chose areas utilizing profound learning model. Profound learning model are constructed utilizing neural organizations. A neural organization takes in inputs which are then handled in concealed layers. This technique is more appropriate in certifiable applications contrasting with reclamation draws near. Notwithstanding the ongoing achievements of profound learning structures in design acknowledgment assignments they have to gauge a large number of boundaries in the completely associated layers that require amazing equipment with high preparing limit and memory.

To address this issue, we present in this paper an effective quantization based pooling technique for face acknowledgment utilizing VGG-16 pre prepared model. To do so we just consider the component maps at the last convolutional layer. The fundamental plan to speak to pictures as request less arrangements of neighborhood highlights.

SBTL8033 is a Touchless Indoor Speed Gate based passage control arrangement with internal heat level recognition capacities. The passageway control framework is incorporated with cutting edge ZK facial acknowledgment terminals highlighted with PC vision innovation and keen facial acknowledgment calculations.

This gadget joins obvious light facial acknowledgment innovation with infrared temperature recognition for exact and quick internal heat level estimation during client check.

The profound quantization procedure presents numerous preferences. It guarantees a lightweight portrayal that makes true concealed face acknowledgment an achievable errand. In addition, the covered districts change from face to another, which prompts educational pictures from various sizes. The proposed profound quantization permits grouping pictures from various sizes so as to deal with this issue. Moreover, the Deep BoF approach utilizes a differentiable quantization plot that empowers concurrent preparing of both the quantizer and the remainder of the organization, rather than utilizing fixed quantization just to limit the model size. It merits expressing that our proposed strategy doesn't have to learn on the mission area subsequent to eliminating the veil. It rather improves the

speculation of face acknowledgment measure within the sight of the cover during the pandemic of Covid.

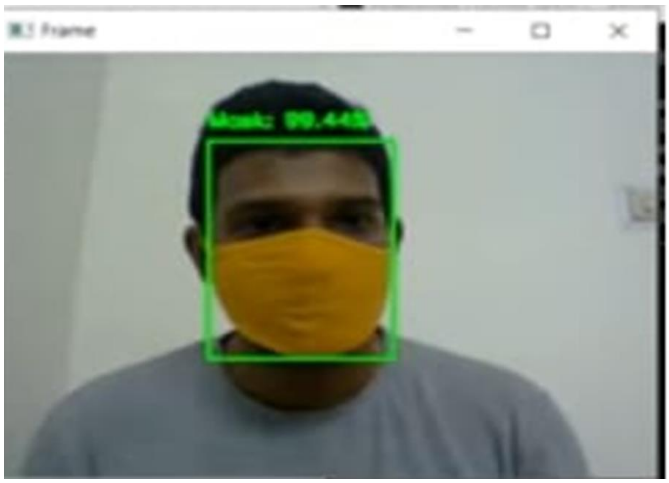
## IV. LITERATURE REVIEW

Face acknowledgment has gotten huge consideration. Yet at the same time, the machine acknowledgment framework has arrived at just a specific degree of development. Model, acknowledgment office at outside climate with consistent change in stance and light is an unsolved issue.

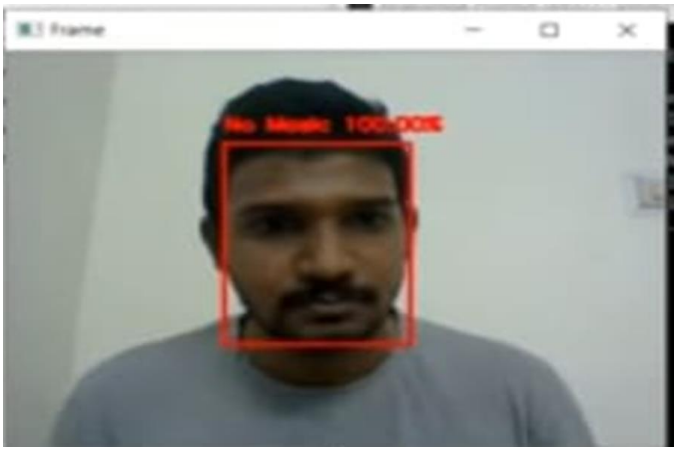
This paper gives a basic study of still face acknowledgment research. Presently, because of the current COVID-19 pandemic face acknowledgment has reached another level. Significant pieces of the face i.e lips, nose, jaw are been stowing away because of the face veil. Face acknowledgment simply through eyes and forehead is a major test.

Indeed, even security is additionally one of the significant factors. The solid requirement for easy-to-understand frameworks that can make sure about our personality in an ocean of numbers is self-evident. Albeit, entirely dependable technique for thumbprint biometric individual distinguishing proof exists, it isn't protected in the present state of the COVID-19 pandemic. It is demonstrated hazardous. Consequently, face acknowledgment is more secure.

## V. RESULT AND DISCUSSION




This is the result observed after the complete execution of the program. The first screenshot captured is with mask recognize in the green bar on the face with mask detection as higher and in the second snapshot is observed as without mask in a red bar with a lower percentage.




## VI. CONCLUSION

In genuine situations (for example unconstrained conditions), human countenances may be blocked by different articles, for example, facial cover. This makes the face acknowledgment measure an exceptionally testing task. The proposed strategy accomplished a high acknowledgment execution. To the best of our insight, this is the main work that tends to the issue of concealed face acknowledgment during the COVID-19 pandemic. It merits expressing that this examination isn't restricted to this pandemic period since many individuals are mindful continually, they deal with their wellbeing and wear veils to ensure themselves against contamination and to lessen different microbes' transmission.

## VII. REFERENCES

[1]. Zhongyuan Wang, Guangcheng Wang, Baojin Huang, Zhangyang Xiong, Qi Hong, Hao Wu, Peng Yi, Kui Jiang, Nanxi Wang, Yingjiao Pei, et al. Masked face recognition dataset and

application. arXiv preprint arXiv:2003.09093, 2020.

[2]. Nizam Ud Din, Kamran Javed, Seho Bae, and Juneho Yi. A novel gan-based network for unmasking of masked face. IEEE Access, 8:44276–44287, 2020

[3]. Sehla Loussaief and Afef Abdelkrim. Deep learning vs. bag of features in machine learning for image classification. In 2018 International Conference on Advanced Systems and Electric Technologies (IC_ASET), pages 6–10. IEEE, 2018.

[4]. Erik Hjelmås Department of Informatics, University of Oslo, P.O. Box 1080, Blindern, Oslo, N-0316 and Boon Kee Low Department of Meteorology, University of Edinburgh, JCMB, Kings Buildings, Mayfield Road, Edinburgh, Scotland, EH9 3JZ, United , Computer Vision and Image Understanding, September 2001

[5]. S Mavaddati - Journal of AI and Data Mining, 2019 - jad.shahroodut.ac.ir

[6]. Nikolaos Passalis and Anastasios Tefas. Learning bag-of-features pooling for deep convolutional neural networks.In Proceedings of the IEEE international conference on computer vision, pages 5755–5763, 2017.

[7]. Davis E King. Dlib-ml: A machine learning toolkit. The Journal of Machine Learning Research, 10:1755–1758,2009.

[8]. Karen Simonyan and Andrew Zisserman. Very deep convolutional networks for large-scale image recognition. arXiv preprint arXiv:1409.1556, 2014.

[9]. https://www.researchgate.net/publication/263964949_Software_Hardware_for_Face_Detection

[10]. https: //arxiv.org/pdf/2003.09093.pdf

[11]. https: //eandt.theiet.org/content/articles/2020/03/facial-recognition-software-peers-behind-the-mask/

[12]. https://theconversation.com/face-masks- and-facial-recognition-will-both-be-common-in-the-future-how-will-they-co-exist-144417

[13]. https://arxiv.org/pdf/2008.11104.pdf

[14]. https://www.electronicsforu.com/new-products/ai-based-intelligent-face-mask-and-body-temperature-detection-system

[15]. https://www.embedded-computing.com/news-releases/intelligent-face-mask-and-body-temperature-detection-system

[16]. https://www.researchgate.net/figure/Masked-face-recognition-flow-chart_fig2_340690545

[17]. https://www.researchgate.net/publication/263964949_Software_Hardware_for_Face_Detection

[18]. https://www.quora.com/What-are-the-requirements-need-to-be-considered-for-face-recognition-software-i-e-software-hardware-requirements.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Crop Suggestion based on Regional Soil Quality using Machine Learning Techniques

**Mayuresh Kulkarni[1], Rutuja Jade[1], Apekshita Bhosale[1], Bhagyashree Ramteke[1], Sunil Rathod[2]**

[1]Students, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Agriculture in India plays a major role in economy and employment. The common difficulties present among the Indian farmers are they don't opt for the proper crop based on their soil necessities. Because of this productivity is affected. This problem of the farmers has been solved through precision agriculture. This method is characterized by a soil database collected from the farm, crop provided by agricultural experts, achievement of parameters such as soil through soil testing lab dataset. Agribusiness assumes a prevailing job in the development of the nation's economy. Atmosphere and natural changes have become a genuine danger inside the agri-field. Machine Learning ML is a significant methodology for accomplishing reasonable and compelling answers for this disadvantage. Harvest Yield Prediction technique includes foreseeing yield of the harvest from reachable historical and possible data like climate parameter, soil parameter and yield prediction. Real information of the state was utilized for building this model and furthermore the models were tried with tests acquired from the information. The expectation can make the farmer to foresee the yield of harvest before developing into the agribusiness zone. To anticipate the harvest yield in future precisely Random Forest, the most remarkable and popular administered machine learning rule is utilized.

With the impact of climate change in India, the majority of the agricultural crops are being badly affected in terms of their performance over a period of last two decades. Predicting the crop yield well ahead of its harvest would help the policy makers and farmers for taking appropriate measures for marketing and storage. Such predictions will also help the associated industries for planning the logistics of their business. Several methods of predicting and modeling crop yields have been developed in the past with varying rates of success, as these don't take into account characteristics of the weather, and are mostly empirical.

This software provides proper information to farmers and for that Data mining and machine learning is still an emerging technique in the field of agriculture and horticulture. In this paper we have proposed a method for classifying the soil according to the macro nutrients and micro nutrients and predicting the type of crop that can be cultivated in that particular soil type. Several types of machine learning algorithms are used such as K-Nearest Neighbor (K-NN), Support vector machine (SVM) and logistic regression.

**Keywords:** Machine learning, Agriculture, Soil, Classification, KNN Algorithm.

## I. INTRODUCTION

Machine learning is a field of computer science where new developments evolve at recent times, and also helps in automating the evaluation and processing done by mankind, thus by reducing the burden on human power. In simple terms, machine learning provides basic algorithms that can provide information about a dataset without writing code to solve a program manually. Instead of writing code you provide data or the basic algorithm and it forms its own conclusions based on this data. In machine learning, the methods are derived from the learning process. Those methodologies need to learn through experiences to perform a particular task.

Classification is a data mining technique [1] based on machine learning which is used to categorize the data item in a dataset into a set of predefined classes. It helps in finding the diversity between the objects and concepts. Among these various machine learning techniques that are being used in this field; this system builds an efficient and accurate model to classify the soil type according to nutrients of soil and predict the type of crop that can be yielded in that particular soil. Also this information can further be used by the Minister of Agriculture, Food & Marketing Industrialist, etc. to grow the business and economy of the country.

India is one of the biggest producers of agricultural products and still has very little farm productivity. Productivity needs to be increased so that farmers can get more income from the same piece of land with less labor.

## II. LITERATURE REVIEW

The requirements and planning are needed for developing software models. The author's [2] start from the basics of precision farming and move towards developing a model that would support it. It deeply studies the basics of precision farming. A model that applies Precision Agriculture (PA) principles to small, open farms at the individual farmer and crop level, to affect a degree of control over variability. This model has been designed for the scenario in Kerala State where the average holding size is much lower than most of India. Hence this model can be positioned elsewhere in India only with some modifications. The comprehensive objective of the model is to deliver direct advisory services to even the smallest farmer at the level of his/her smallest plot of crop, using the most accessible technologies such as SMS and email.

The algorithms [3] used for yield prediction in this system are Support Vector Machine and K-nearest neighbor algorithm. The importance of crop selection and the factors deciding the crop selection like production rate, market price and government policies are discussed. This system will propose a Crop Selection Method (CSM) [4] which solves the crop selection problem and improves net yield rate of the crop. It suggests a series of crops to be selected over a season considering factors like weather, soil type, water density, crop type. The predicted value of influential parameters determines the accuracy of CSM. Hence there is a need to include a prediction method with improved accuracy and performance.

The system [5] aims to solve the crucial problem of selecting the classifiers for ensemble learning. The proposal aims to achieve higher accuracy and performance. This project emphasizes the need for accuracy because it depends on the dataset and the learning algorithm. The performance of the models was compared with accuracy and computational time. It proposes a framework which would predict the production, and import for that particular year. At the end of the process we would be able to visualize the amount of production import, need and availability. Therefore, it would help to make decisions on whether food has to be further imported or not. The soil dataset is analyzed and category predicted.

Table 1: Literature Survey

| Sr. No. | Title | Author | Methodology Used | Result |
|---|---|---|---|---|
| 1. | Crop Recommendation System for Precision Agriculture | S.Pudumalar, E.Ramanujam, 2016 | 1. Random tree<br>2. CHAID<br>3. KNN<br>4. Naïve Bayes<br>5. WEKA Tool | 1. Pre-processing of Data<br>2. Handling missing and out of range values<br>3. Feature extraction<br>4. Ensemble model to get higher accuracy<br>5. Rule generation |
| 2. | Agriculture decision support system using data mining | Prof. Rakesh Shirsath, 2017 | 1. Subscription based system<br>2. ANN<br>3. Android application | 1. Android app with login module<br>2. Previously planted crops known to system<br>3. User feedback mechanism<br>4. Maintenance of crops |
| 3. | A Study on Various Data Mining Techniques for Crop Yield Prediction | Yogesh Gandge, Sandhya, 2017 | 1.Attribute selection<br>2. Multiple Linear Regression<br>3. Decision Tree using ID3<br>4. SVM<br>5. Neural Networks<br>6. C4.5 K-Means and KNN | 1. Selection of agricultural field<br>2. Selection of crop previously planted<br>3. Input from user<br>4. Pre-process<br>5. Attribute Selection |
| 4. | RSF: A Recommendation System for Farmers | Miftahul Jannat Mukarrama, 2017 | 1. Location Detection<br>2. Data analysis and storage<br>3. Similar location detection<br>3. Recommendation generation module | 1. Physiographic, thermal, crop growing period, crop production rate<br>2. Seasonal crop database<br>3. Similar location detection |

## III. TAXONOMY CHART

The Taxonomy chart represents the comparison of some existing systems with the proposed system. The chart clearly depicts that drawbacks of existing systems are overcome in the proposed system as shown in the following table.

Table 2: Taxonomy Chart

| Attributes → Approaches ↓ | K-Nearest Algorithm | Precision Agriculture | Agro-consultant | Recommendation generation module |
|---|---|---|---|---|
| Crop Prediction System using ML | Yes | No | No | No |
| Crop Recommendation System for Precision Agriculture | Yes | Yes | No | Yes |
| **Proposed System** | **Yes** | **Yes** | **Yes** | **Yes** |

## IV. PROPOSED SYSTEM

**A. Problem Statement:** To develop the system that classifies the soil type according to temperature and moisture content of soil and predicting the type of crop that can be yielded in that particular soil. The main target of the system are farmers and as most farmers are not experienced internet users to find the relevant information and services on the system, the proposed system should be easy for them. In the service requests with respect to these applications initiated using different delivery channels would be processed by the system.

**B. Proposed System Overview:** This project is made in consideration of farmers facing so many difficulties in which crops are suitable for production. Crop cultivation depends on the nature and the nutrients of the soil increasing the cultivation of land which brings a loss of supplements present in the soil. In crop cultivation, soil plays an important role. In this project, Machine learning is implemented using Python and KNN algorithms. Data mining is a challenging technology in the field of agriculture. Nowadays data mining has been used in the field of agriculture for soil classification, wasteland management, and crop and pest management. A soil test is carried out to identify the nutrients content, composition and other components contained in the soil. Soil tests are mainly conducted to measure the fertility and other decencies present in the soil so that suitable measures can be taken to resolve it. In simple terms, the meaning of machine learning is that basic algorithms can provide information about a dataset without writing code to solve this program manually.

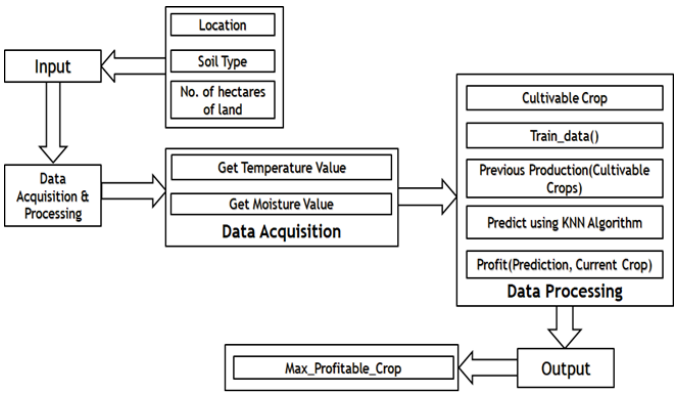



Figure 1: Proposed System Architecture

### C. Algorithm: K-Nearest Neighbour (KNN)

**Working:**

Step 1 -For implementing any algorithm, we need a dataset. So during the first step of KNN, we must load the training as well as test data.

Step 2 -Next, we need to choose the value of K i.e. the nearest data points. K can be any integer.

Step 3 -For each point in the test data do the following –

- 3.1 – Calculate the distance between test data and each row of training data with the help of any of the methods, namely: Euclidean, Manhattan or Hamming distance. The most commonly used method to calculate distance is Euclidean.
- 3.2 – Now, based on the distance value, sort them in ascending order.
- 3.3 – Next, it will choose the top K rows from the sorted array.
- 3.4 – Now, it will assign a class to the test point based on the most frequent class of these rows.

Step 4 -End

**Pseudo Code:**

1. Calculate "d(x, xi)" i =1, 2, ….., n; where d denotes the Euclidean Distance between the points.
2. Arrange the calculated n Euclidean distances in non-decreasing order.
3. Let k be a +ve integer, take the first k distances from this sorted list.
4. Find those k-points corresponding to these k-distances.
5. Let ki denotes the number of points belonging to the ith class among k points i.e. $k \geq 0$
6. If ki >kj $\forall$ i ≠ j then put x in class i.

**Mathematical Model:**

Euclidean Distance is calculated using the following formula:$d=\sqrt{((x2-x1)^2+(y2-y1)^2)}$

## V. RESULTS AND DISCUSSION

**A. Experimental Setup:** The system is built using the Flask framework on Windows platform. The PyCharm IDE is used as a development tool. The system doesn't require any specific hardware to run; any standard machine is capable of running this application.

**B. Experimental Result:** The following Figure 2 shows the accuracy of KNN Algorithm.

```
Confusion Matrix:
 [[ 16   0   0 ...   0   0   0]
 [  0  51   0 ...   0   0   0]
 [  0   1 132 ...   0   0   0]
 ...
 [  0   0   0 ...  50   0   0]
 [  0   0   0 ...   0  53   0]
 [  0   0   0 ...   0   0  70]]
Accuracy:  0.9921520033044197
```

Figure 2: Accuracy of KNN Algorithm

Figure 3 shows that for the given values the system predicts the accurate crop.

```
Confusion Matrix:
 [[ 16   0   0 ...   0   0   0]
 [  0  51   0 ...   0   0   0]
 [  0   1 132 ...   0   0   0]
 ...
 [  0   0   0 ...  50   0   0]
 [  0   0   0 ...   0  53   0]
 [  0   0   0 ...   0   0  70]]
Accuracy:  0.9921520033044197
Prediction on 36,625:
 ['Rice,Sugar beet ,Sunflower']
```

Figure 3: Prediction of Crop

Figure 4 shows the plotting of data points in which the testing module classifies the dataset in two sections.

When the value of K=1, it is represented by the red dots and when the value of K>1, it is represented by the green dots.

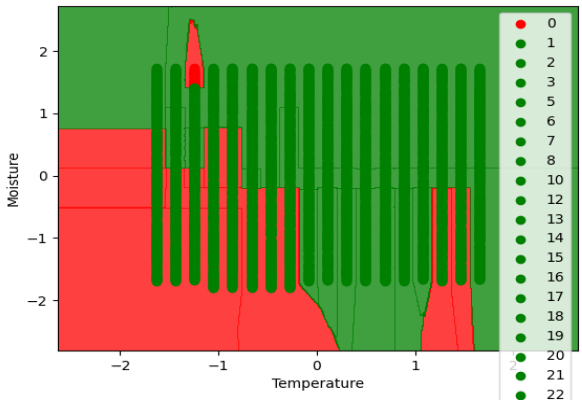



Figure 4: Plotting of Data Points

## VI. FUTURE WORK

1. Crop disease detection using Image Processing where users can upload pictures of diseased crops and get pesticide recommendations.
2. Implementation of Smart Irrigation System to monitor weather and soil conditions, plant water usage etc. to automatically alter watering schedule.

## VII. CONCLUSION

The application would definitely help in bridging the gap between the farmers and technology, and would prove beneficial to all sectors associated with farming. The proposed tool helps the farmer in determining crop based on contents of the soil like temperature and moisture. It also makes sure that the crops suggested follow crop rotation patterns so as to make sure that the land remains fertile for long. Our work would help farmers to increase productivity in agriculture, prevent soil degradation in cultivated land, and reduce chemical use in crop production and efficient use of water resources. Our future work is aimed at an improved data set with a large number of attributes and also implements yield prediction.

## VIII. ACKNOWLEDGEMENT

It gives us great pleasure in presenting the paper on “Crop Suggestion based on Regional Soil Quality using Machine Learning Techniques”. We would like to thank Dr. Pankaj Agarkar, Head of Computer Engineering Department, DYPSOE, Pune for giving us all the help and support we need during the course of the Paper writing work. We are really grateful to him for giving us an opportunity to work with the R&D cell of our department.

Our special thanks to Dr. Ashok Kasnale, Principal DYPSOE who motivated us and created a healthy environment for us to learn in the best possible way. We also thank all the staff members of our college for their support and guidance.

## IX. REFERENCES

[1]. V. Rajeshwari and K. Arunesh, “ Analyzing Soil Data using Data Mining Classification techniques,” Vol 9(19),May 2016.

[2]. Satish Babu (2013), ‘A Software Model for Precision Agriculture for Small and Marginal Farmers’, at the International Centre forFree and Open Source Software (ICFOSS) Trivandrum, India.

[3]. Anshal Savla, Parul Dhawan, Himtanaya Bhadada, Nivedita Israni, Alisha Mandholia , Sanya Bhardwaj (2015), ‘Survey of classification algorithms for formulating yield prediction accuracy in precision agriculture', Innovations in Information,Embedded and Communication systems (ICIIECS).

[4]. Rakesh Kumar, M.P. Singh, Prabhat Kumar and J.P. Singh (2015), ’Crop Selection Method to Maximize Crop Yield Rate using Machine

Learning Technique', International Conference on Smart Technologies and Management for Computing, Communication, Controls, Energy and Materials (ICSTM).

[5]. Liying Yang (2011), 'Classifiers selection for ensemble learning based on accuracy and diversity' Published by Elsevier Ltd. Selection and/or peer-review under responsibility of [CEIS].

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information TechnologyISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Implementation and Detection of Phishing Websites Using Extreme Learning Machine Based on URL

**Omkar Ambegave*[1], Mahesh Dhumal[1], Shubham Ware[1], Vishal Singh[1], Sandhyarani Shinde[1], Amruta Chitari[2]**
[1]BE Scholar, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Phishing sites which expect to take the victims confidential data by diverting them to surf a fake website page that resembles a honest to goodness one is another type of criminal acts through the internet and its one of the especially concerns toward numerous areas including e-managing an account and retailing. Phishing site detection is truly an unpredictable and element issue including numerous components and criteria that are not stable. Proposed an intelligent model for detecting phishing web pages based on Machine Learning. Types of web pages are different in terms of their features. Hence, we must use a specific web page features set to prevent phishing attacks. We proposed a model based on Machine Learning techniques to detect phishing web pages. We have done analysis of three models of Machine Learning Algorithms and we have suggested some new rules to have efficient feature classification.

**Keywords:** Phishing websites, Machine Learning, SVM, NB, ELM

## I. INTRODUCTION

Technology is growing rapidly day-by-day and with this rapid growing technology internet has become an essential part of human's daily activities. Use of internet has grown due to the rapid growth of technology and intensive use of digital systems and thus data security has gained great importance. The primary objective of maintaining security in information technologies is to ensure that necessary precautions are taken against threats and dangers likely to be faced by users during the use of these technologies. Phishing is the fraudulent attempt to obtain sensitive information such as usernames, passwords and credit card details by disguising as a trustworthy entity in an electronic communication. Typically carried out by email spoofing or instant messaging, it often directs users to enter personal information at a fake website, the look and feel of which is identical to the legitimate site. Information security threats have been seen and developed through time along development in the internet and information systems. The impact is the intrusion of information security through the compromise of

private data, and the victims may lose money or other kinds of assets at the end. Internet users can be affected from different types of cyber threats such as private information loss, identity theft, and financial damages. Hence, using of the internet may suspect for home and official environments. Identify and defend against privacy leakage efficient analytical tools are required for users to reduce security threats. Effective systems that can improve self-intervention must be formed using artificial intelligence-based information security management system at the time of an attack. Phishing is an Internet-based attack that seduces end users to visit fake websites and give away personal information.

## II. RELATED WORK

With the event of Information and Communication Technology, various varieties of information security threats may be seen. These threats are important within the prevention of damage to person or institution to guard data on computer systems. Studies on various phishing detection methods are seen when the literature is reviewed. In these studies, it is observed that ML is challenging techniques may be used. Santhana Lakshmi and Vijaya they used techniques of Machine learning to verify supervised learning algorithms and modeling the prediction task that Multi-Layer Perceptron. Decision tree and Naive bayes classifications were used for observing technique for web Phishing Detection. It can detec. As compared to other learning algorithms the choice tree classifier is more accurate [2]. Zou Futai, Pei Bei and Panli proposed Uses Graph Mt some potential phishing which can't be detected by URL analysis. It uses contact of user and website. To induce dataset from the real traffic of a an oversized ISP. After anonym zing these data, they need cleansing dataset. Every record that includes eight fields: User node number (AD),Visiting URL (URL),User Agent (UA), User SRC IP (SRC-IP) access time (TS), ), Reference URL (REF),, access server IP (DSTIP), User cookie (cookie)[3]. Kaytan and Hanbay proposed determining phishing websites supported neural network. Around 30 input attributes, and output attribute1 is used for that experiment. The values 1, 0, and -1 were used for input attributes and therefore the values 1, and -1 were used for output attribute. To evaluate the system performance 5-fold cross validation method was used. The simplest classification accuracy has been measured as 92.45%. And hence the average accuracy has been measured as 90.61%[1]. Yasin Sonmez, TurkerTuncer perform Extreme Learning Machine(ELM) for 30 feature. That has phishing websites in database of machine learning repository. They compare ELM with SVM, Naivesbayes.These are othe methods of machine learning[6].X. Chen, find the impact of phishing attacks as consider to risk levels and potential market value that downs which is losses experienced by the target companies. It absolutely was analyzed 1030 phishing alerts released on a public database, and financial data related to the targeted firms employing a hybrid method. This is the prediction that the he attack was survive around 89% accuracy using supervised classification and text phrase extraction It's been identified some important textual and financial variables within the study. Impact the severity of the attacks and potential loss has been investigated[7]. Giovanni Armano and Samuel Marchal[4] proposed a systemwhich is based upon minimum enclosing ball support vector machine (BVM) to find out phishing website. It has been aimed toward achieving high speed and high accuracy to detect phishing website. Studies were exhausted order to reinforce the integrity of the feature vectors. Firstly, an analysis of the topology structure of website was performed consistent with Document Object Model (DOM) tree. Then, the net crawler was accustomed extract 12 topological features of the web site. Finally the BVM classifier detects the feature vectors . When the proposed methodisget compared with DVM then observed that the proposed method

has relatively high precision of detecting. Additionally it absolutely was observed that the proposed method complements the disadvantage of slow speed of convergence on large-scale data. It is been shown that the proposed method has better performance than SVM within the experimental results. Finally the proposed systems accuracy and validity has been evaluated. Gowtham and Krishnamurthi[5] studied the characteristics of legitimate and phishing web content thorough. Heuristics were proposed to extract 15 features from similar kinds of web pages supported the analysis. The heuristic results which was proposed are fed as an input to a trained machine learning algorithm to find out phishing websites. Before the applying the heuristics to the net pages, two preliminary screening modules were employed in the system. By the preapproved site identifier that is the primary module, sites were checked against a non-public white-list maintained by the user. By the login form finder that's the second module, web pages were classified as legitimate when no login forms present. Unnecessary computation within the system was reduced by helping the used modules. Additionally, the speed of false positives without compromising on the false negatives was reduced by helping the used modules. To detect new output algorithms uses historical data as a input. The extreme module websites having 0.4% false positive rate and 99.8% precision. It's been shown that the proposed method is efficient for safeguarding users from online identity attacks. The primary topic is about the computation of required thresholds to describe the three email groups. And also the second topic is that the interpretation of the cost-sensitive characteristics of spam filtering. They calculate the decision-theoretic rough set model continue which are based on thresholds.

## III. PROPOSED METHODOLOGY

The planned methodology that imports knowledge of phishing and legit URLs from the information and so the foreign data is pre-processed.

Detecting phishing website is performed supported four categories of URL features:

- Domain based
- Address based
- Abnormal based
- HTML, JavaScript features

These URL features are extracted with processed data and values for every URL attribute are generated. The analysis of URL is performed by using intelligent phishing detecting scheme algorithm which computes range value and the threshold value for URL attributes. Then it will distinguish between phishing and legitimate URL. The attribute values are worked using feature extraction of phishing websites and it is used to notify the value like range value and threshold value. Features of phishing website as attribute value range from {-1 , 0, 1} as values indicating low , medium and high. The classification of phishing and suspicious website is relies on the values of attributes extracted by getting four kinds of phishing classes and a deep learning approach.

The Figure shows system architecture wherein any given website is input. The feature extracted are address based,Domain based HTML javascript based and Abnormal based. 2,000 phishing websites collected from Phishtank (http://www.phishtank.com/). Collected data sets carry label values, "legitimate" and "phishing". In this data set randomly selected 70% for training, 30% for the test. The training dataset is used to train the model and and adjust the weight of the in the network, while the test dataset remains unchanged and used to evaluate the performance of the both models. After training, run the test data set on the optimized models to evaluate performance

### A. System Architecture

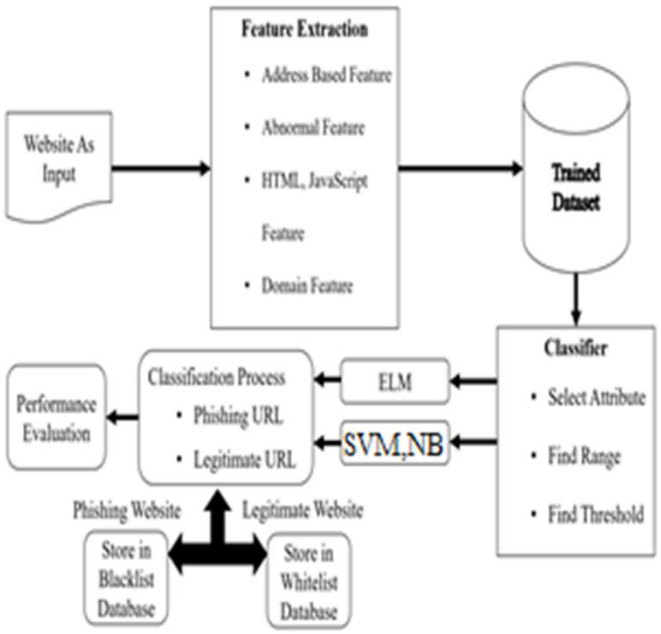



Fig 1: System Architecture

## B. Algorithms

a. Extreme Deep Learning

Machine Learning is such that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. Deep Learning algorithms use historical data as input to predict new output values. Extreme Learning Machine are feed forwards networks for classification, regression, clustering, sparse approximation, compression and feature learning with a single layer or multiple layers of hidden nodes, where the parameters of hidden nodes (not just the weights connecting inputs to hidden nodes) need not be tuned. These hidden nodes can be randomly assigned and never updated (i.e. they are random projection but with nonlinear transforms), or can be inherited from their ancestors without being changed. In most cases, the output weights of hidden nodes are usually learned in a single step, which essentially amounts to learning a linear model. The name "extreme learning machine" (ELM) was given to such models by its main inventor Guang-Bin Huang.

## C. Mathematical Model

Set Theory, Let the system be described as S, then dataset preprocessor, feature extraction, content based, classification and Deep Learning can be give as

S= {D, DP, FE, CB, C, ML}

Where S is the system

D: Set of Input Dataset.

DP: Dataset Preprocessing.

FE: Feature Extraction.

CB: Content Based.

WC: Classification.

ML: ELM

For the input dataset D

D= {d1, d2...dn}

F= {f1, f2...fn}

Y= {DP, FE, CB, C, ML}

Where D: Set of Input Dataset.

F: Set of Function.

Y: Set of techniques use for Phishing Web Sites Features Classification.

Here,

Fn1: Source File.

Fn2: Data Preprocessing.

Fn3: Feature Extraction.

Fn4: Classification.

Fn5: ELM

## D. Development Environment

1. 1.Hardware Resources Required
   - Hard Disk : 200 GB
   - RAM: 8 GB
   - Processor : Intel Pentium i5 and above
2. 2.Software Resources Required
   - Technology Used : Python
   - IDE: Python IDE
   - Operating System : Windows XP or above
3. Dataset Required
   - PhisTank

The set of phishing URLs are collected from opensource service called PhishTank. This service provide a set of phishing URLs in multiple formats like csv, json etc. that gets updated hourly. From this dataset, 5000 random phishing URLs are collected to train the DL models.

## IV. RESULTS AND DISCUSSION

### A. Analysis

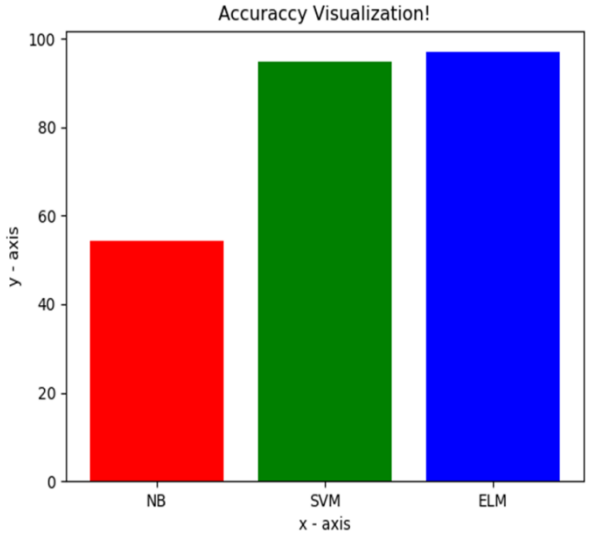



Fig 2: Accuracy Visualization

Three machine learning Algorithms are experimented to give accuracy of ELM to be the best and this used for further performance for detecting phishing websites.

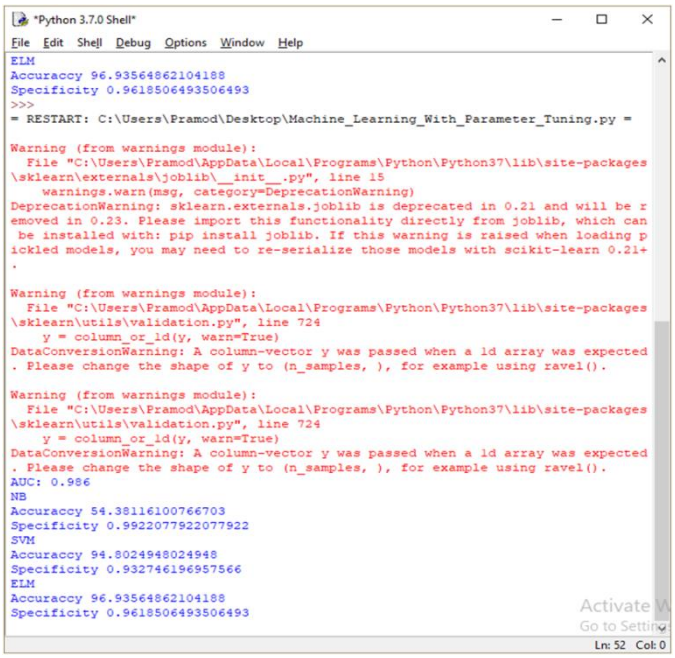



Fig 3: Accuracy Calculation

### B. Results

The fig.4 first checks whether the website is legimate.Fig.5 shows screen shot with result that we can visit the site.

The fig. 6 checks the site and fig 7 shows that it is phishing website and must be visited.

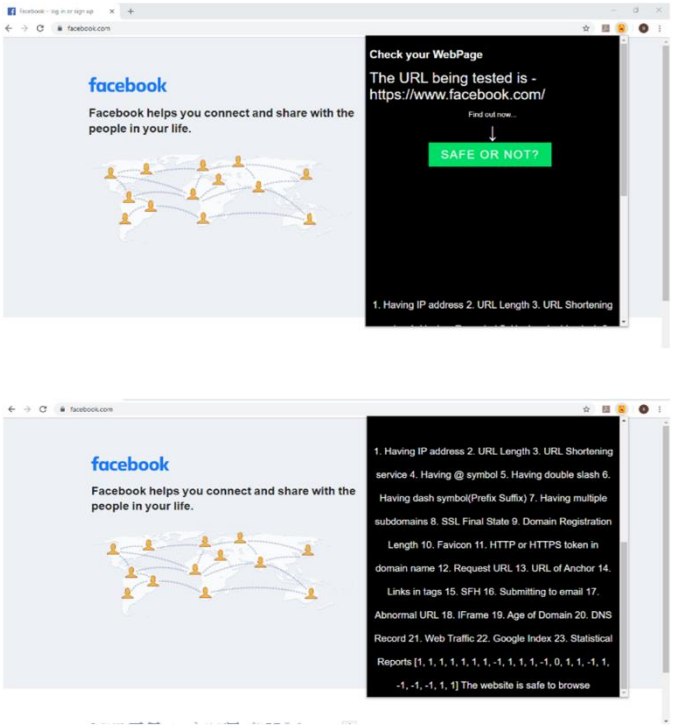



Fig 4: Face book Website

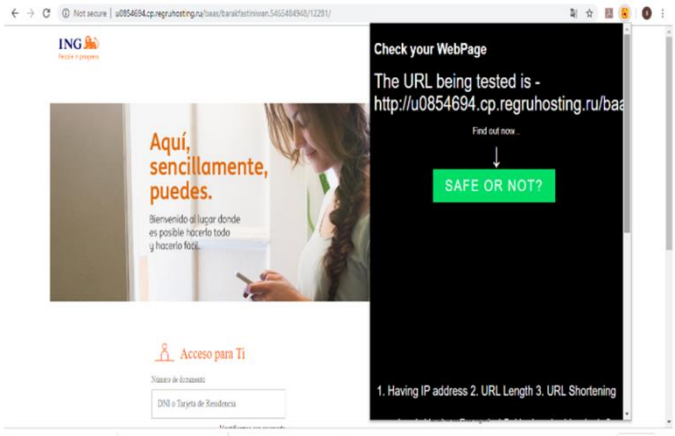



Fig 5: Facebook Website Legimate

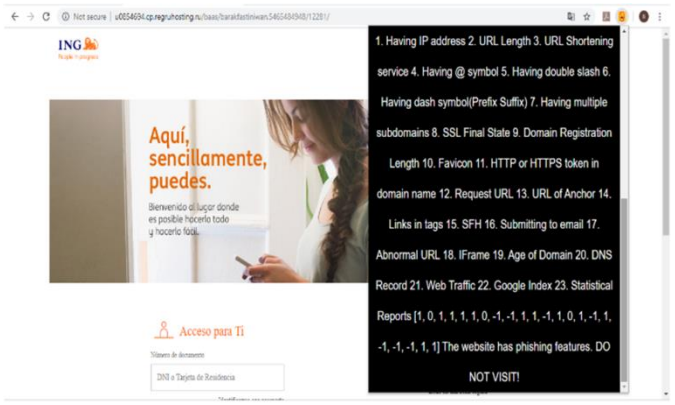



Fig 6: Other Website

Fig 7 : Phishing Website

## V. CONCLUSION

Systems varying from data entry to information processing applications can be made through websites. The entered information can be processed; the processed information can be obtained as output. Nowadays, web sites are used in many fields such as scientific, technical, business, education, economy, etc. Because of this intensive use, it can be also used as a tool by hackers for malicious purposes. One of the malicious purposes emerges as a phishing attack. A website or a web page can be imitated by phishing attacks and using various methods. Some information such as users credit card information, identity information can be obtained with these fake websites or the web pages. The purpose of the application is to make a classification for the determination of one of the types of attacks that cyber threats called phishing.

## VI. REFERENCES

[1]. Mustafa KAYTAN and Davut HANBAY, "Effective Classification of Phishing Web Pages Based On New Rules By Using Extreme Learning Machines" , Anatolian Journal of Computer Sciences, Vol:2 No: 1, pp: 15-36, 2017

[2]. V. Santhana Lakshmi and M. Vijaya, "Efficient prediction of phishing websites using supervised learning algorithms", Procedia Engineering, 30, pp.798-805, 2012.

[3]. Zou Futai, Gang Yuxiang, Pei Bei , Pan Li, Li Linsen "Web Phishing Detection Based on Graph Mining " 2nd IEEE International Conference on Computer and Communications 978-1-4673-9026-2116 ©20 16 IEEE

[4]. Giovanni Armano, Samuel Marchal, N. Asokan "Real-Time Client-Side Phishing Prevention Add-on" IEEE 36th International Conference on Distributed Computing Systems 1063-6927/16 © 2016 IEEE

[5]. Ramesh Gowtham, Ilango Krishnamurthi "A comprehensive and efficacious architecture for detecting phishing webpages" researchgate.net/publication/259118063

[6]. Yasin Sonmez, TurkerTuncer, based HuseyinGokal, EnginAvci, "Phishing Web Sites Features Classification Based On Extreme Learning Machine " IEEE 2018 6th International Symposium on Digital Forensic and Security (ISDFS), DOI: 10.1109/ISDFS.2018.8355342

[7]. X. Chen, I. Bose, A. C. M. Leung and C. Guo, "Assessing the severity of phishing attacks: A hybrid data mining approach", Decision Support Systems, 50(4), pp.662-672, 2011

[8]. Yi, P., Guan, Y., Zou, F., Yao, Y., Wang, W., & Zhu, T. (2018). Web phishing detection using a deep learning framework. Wireless Communications and Mobile Computing, 2018.

[9]. Singh, C. (2020, March). Phishing Website Detection Based on Machine Learning: A

Survey. In 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS) (pp. 398-404). IEEE.

[10]. Adebowale, M. A., Lwin, K. T., & Hossain, M. A. (2020). Intelligent phishing detection scheme using deep learning algorithms. Journal of Enterprise Information Management.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information TechnologyISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# House Price Prediction System

**Mayur Doke, Rohit Ganguli**
Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

The housing sector has hike as it is the one of the basic need. Housing the main domain of real estate. In the major metropolitan cities and the cities with many prestigious Educational institutions and IT Parks have reasonable price increase in housing. Home buying plans can derails the family's financial planning and other goals. Now a day's house price changing rapidly according to various parameters. The buyer gets confused in choosing his dream home as difference in price making it challenging. Both the buyer and seller should satisfy so they do not overestimate or underestimate price. So to build the platform where buyer can find home according to its needs and friendly to its financial condition. House price prediction on different parameters is our goal. Doing that we are going to use regression algorithms using machine learning on dataset so it can extract features from dataset. Result of this approach provide maximum efficiency and minimum errors.

**Keywords:** House price prediction, Regression algorithm, Machine learning, Feature extraction.

## I. INTRODUCTION

The real estate's is not only the living requirement; it also represents the personal wealth and glory. In addition, the real estate's price fluctuation may impact the households 'investment and consumption situation. It is also an important impact factor for investing company, real estate's developer, banker and policy makers. Hence, it can be concerned as an important economic index. How to establish the real estate's price variation prediction model is an interesting research topic.

Studies on housing market forecasting investigate the house values, growth trend, and its relationships with various factors. The improvement of machine learning techniques and the proliferation of data or big data available have paved the way for real estate studies in recent years. There is a variety of research leveraging statistical learning methods to investigate the housing market

In India, the property is sold as per the wish of seller. Thus, it is a biased procedure to buy a house in India since there is no standard way to list the selling price of the property. Very less work on real estate valuation is done in India. People in India believe on what is shown on the mass media. But mass media can manipulate the content as per their convenience and profits. So we require a trusted medium which can predict the house prices with noteworthy precision and least mistake. Here we are proposing a model which predicts house prices based on various factors affecting on house price using machine learning.

**Problem Statement:**

To design and implement a web based application which predicts price of houses by considering many factors effecting on price and suggest basic architectural plan for houses

## II. METHODS AND MATERIALS

This paper seeks useful models for house price prediction. It also provides insights into the Cities Housing Market. Preparation of original data is the first step and then it transformed into a cleaned dataset ready for analysis. Stepwise and PCA techniques are used for data reduction and transformation. Data reduction is done to minimize data by eliminating the useless, noisy data. Transformation transform the data into single format so the operation can be done on it. Different methods are then implemented and evaluated to achieve an optimal solution. The evaluation phase is the combination of Step-wise and Support Vector Machine (SVM) model and it's a competitive approach. Therefore, it could be used for further deployment. This research can also be applied for transactional datasets of the housing market from different locations across country. [1].

A system is developed which can predict the actual price of house using regression algorithm. The system makes use of Linear Regression, Forest regression, and Boosted regression algorithms. For increasing the efficiency of algorithms the neural network is used. The system will satisfy customers by providing accurate output by considering the input given by customer and preventing the risk of investing in the wrong house. Without disturbing the core functionality of the system additional features can be added to the system. Additional features are added accordingly to the need of customer .A major future update could be the addition of larger cities to the database, which will allow our users to explore more houses in order to get maximum profit, get more accuracy, minimize errors and risk thus come to a proper decision. [2].

The Radial Basis Neural Network (RBF) and Back Propagation Neural Network (BPF) neural networks are introduced to model the complicated correlation function between macro-economic parameters variation and house price index variation. 40 seasons leading data sets are used to employed on training the neural network. Then, the less 13 season's data sets are used to evaluate the prediction accuracy between Neural Network (NN) model output and the Cathay or Sinai house price index. The results of data analysis show that the house price variation prediction results is not accurate enough. However, for establishment of investor, developer and government reference house price prediction trend is used. [3].

The large set of data can be analyzed by series analysis. In addition to the parameters mentioned in the research paper, we could use dynamic parameters like inflation rate, GDP which has a huge impact on the real estate prices. This study can be extended in several ways. First, it could be desirable to investigate other problem domains like real estate market prediction, interest rate, economic growth rate and stock price index forecasting to generalize and improve the results. This system will be helpful to many people once it gets deployed. However, practical implementation of this system comes with a various challenges. The dataset used is bound to get outdated after sometime due to various reasons like changes in government policies, geographical changes in that area and therefore needs to be constantly updated which is hard to do. Graphical User Interface of the system uses the English language. Those who are not familiar with this language would find it difficult to interact and use the system effectively and unable to understand the system and may be not able to used its full functionality. Including the all languages for the Graphical User Interface (GUI) can be hard. [4]

**System Feature 1**

The system will help non-technical people in learning sql queries using voice and text.

**System Feature 2**

User can fire their own queries for demo database using voice or text.

**System Feature 3**

User can also search their query in Wikipedia.

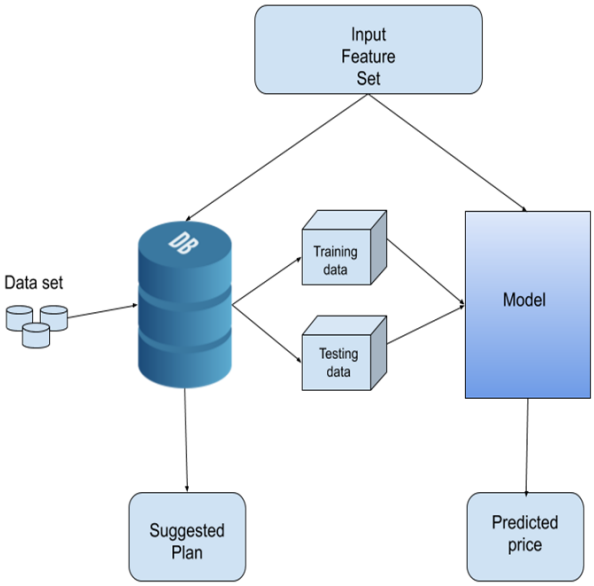



Fig 1. System architecture

## III. RESULTS AND DISCUSSION

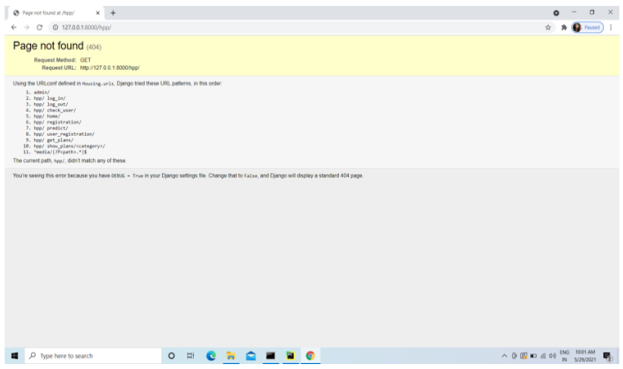



Fig 2.

There are two parts in our project the admin and the user part as shown in above picture.

Now we can see the admin part

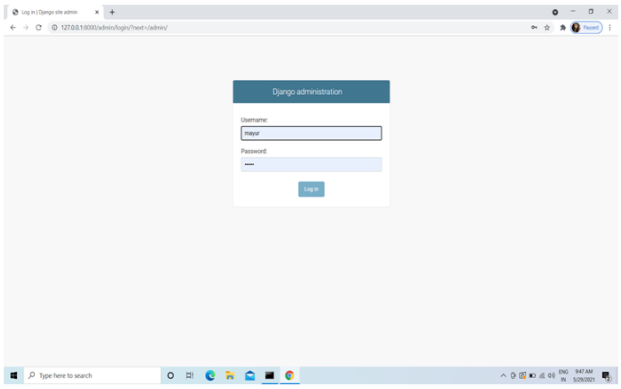



Fig 3.

This is the admin log in page.

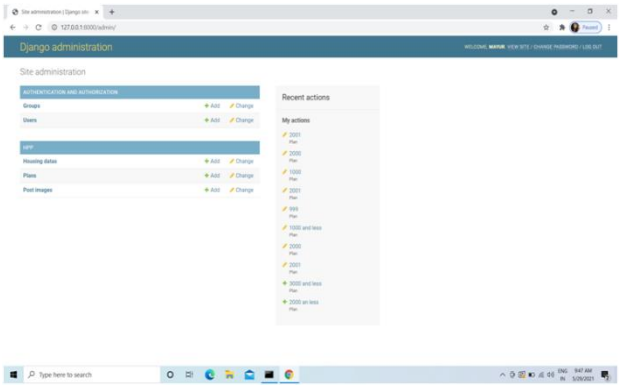



Fig 4.

In this picture we can see the admin authorities i.e. admin can control the whole project and access the databases, make changes, add and remove users, watch the datasets seen by the users, add plans etc.

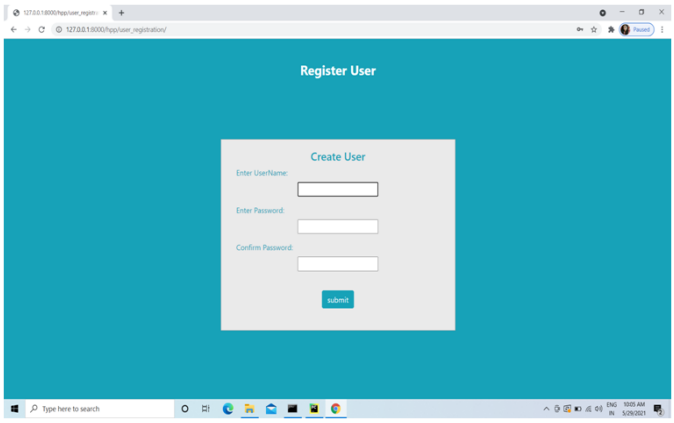



Fig 5.

On this step system ask the user to register himself for accessing the further data. Once the user finish

registration he will be asked to log in again using registration id and password. In the below photo shows log in page for user.

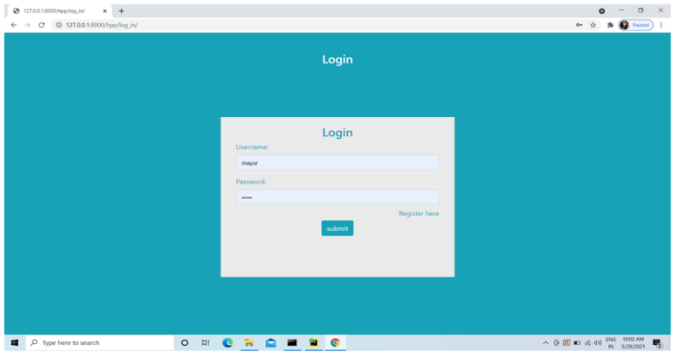



Fig 6.

Now the next part is selecting the criteria.

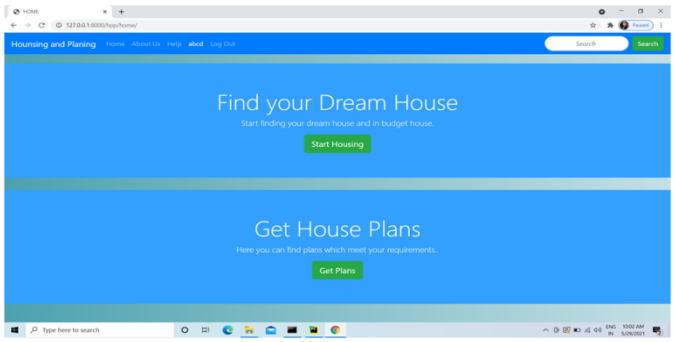



Fig 7.

After log in of user he will see the 2 options “Find your Dream House” and “Get house plans”.
Lets see the first part.

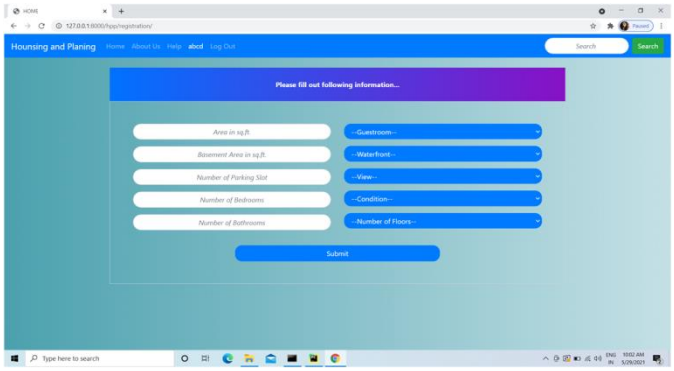



Fig 8.

On this step the software asks user his requirements like how much area of house he wants, Area of basement, number of bathrooms, guestrooms, parking lots etc.

E g.

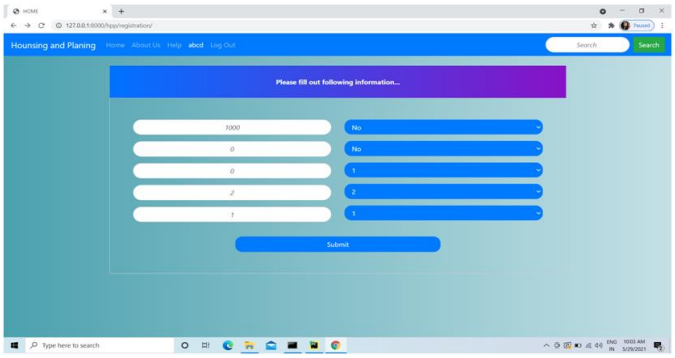



Fig 9.

This is the data filled by user.
On the next step it will predicts the approximate price of house as per given requirements of user.

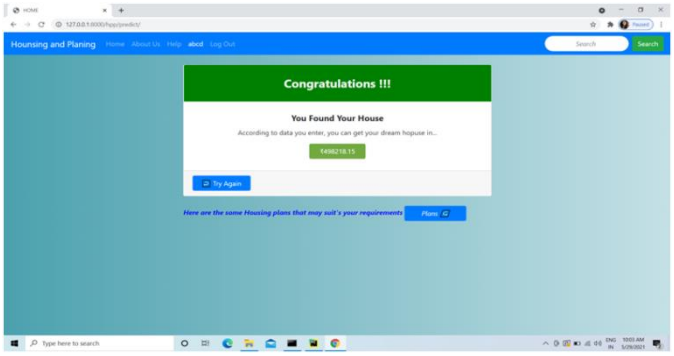



Fig 10.

From this step user can go back and do another search or get the plans for his house as per the area he gave in the requirements. Below image shows that

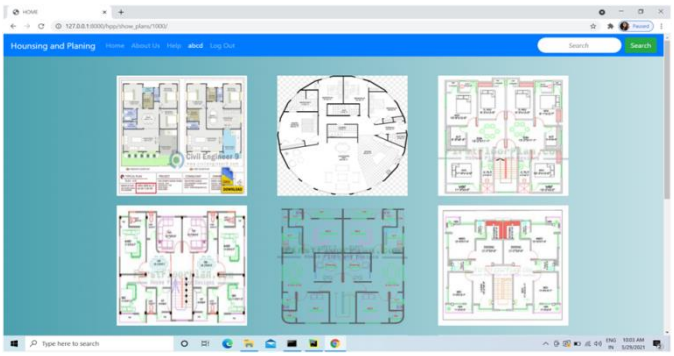



Fig 11.

Now the second part “’get plans”

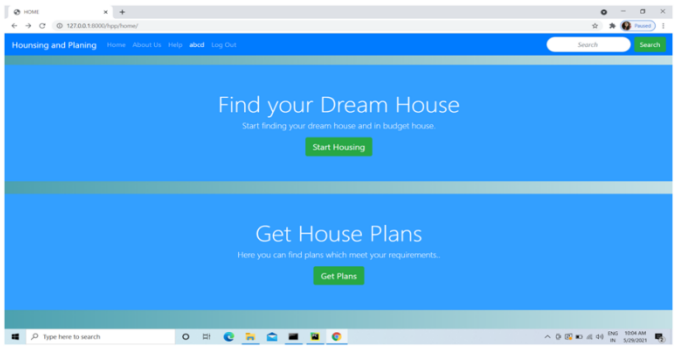



Fig 12.

It shows the various category plans added in the database

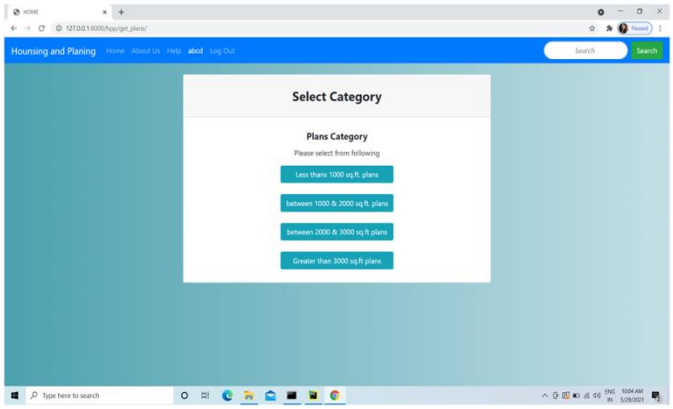



Fig 13.

It has four types less than 1000 sq. ft. 1000 to 2000 sq. ft. 2000 to 3000 sq. ft. and the last more than 3000 sq. ft.

Below images shows the plans for types.

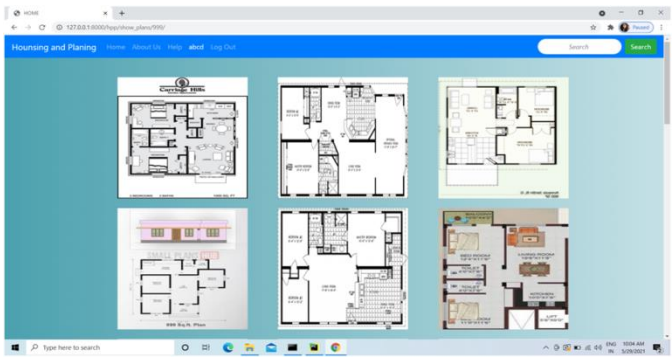



Fig 14. 1000sqft plans

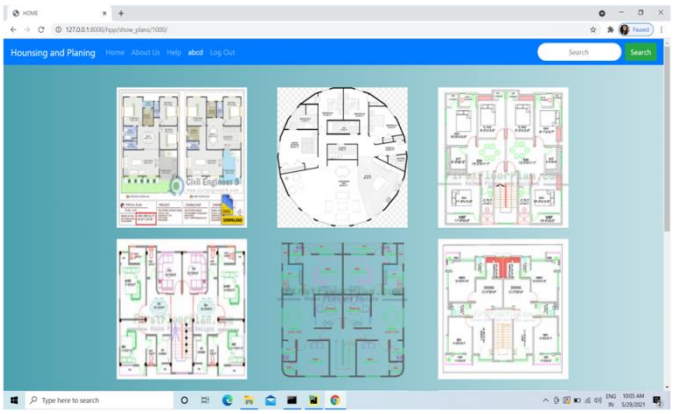



Fig 15.1000 to 2000 sq. ft. plans

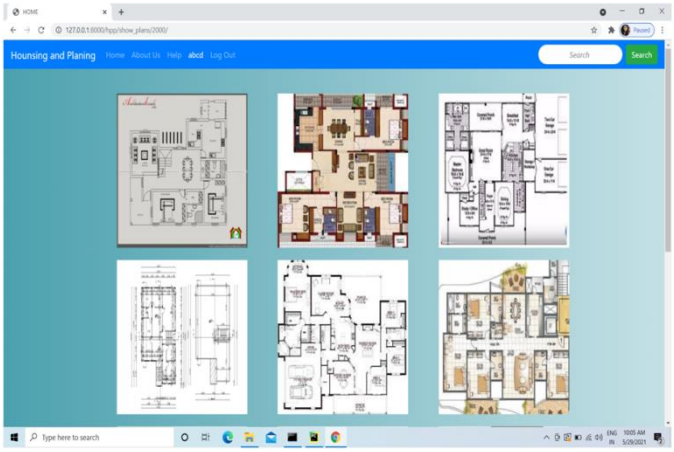



Fig 16. 2000 to 3000 sq. ft. plans

## IV.CONCLUSION

Machine learning is very useful for finding the relation between the attributes and building the model according to the relation that attributes contain. By using regression algorithm which is part of machine learning the house price prediction can be done. House price prediction helps the customer to buy its dream house among the different price variation, attributes and needs. Algorithm find relation among the training data and the result is applied on test data which will be users input. According to attributes specified the plans gets provided.

## V. REFERENCES


[1]. F. Siasar djahantighi, M. Norouzifard, S.H.Davarpanah, M.H.Shenassa, "USING NATURAL LANGUAGE PROCESSING IN ORDER TO CREATE SQL QUERIES", in Proceedings of the International Conference on Computer and Communication Engineering, Kuala Lumpur, May 2008, pp. 600-604.

[2]. NATURAL LANGUAGE PROCESSING USING PYTHON International Journal of Scientific Engineering Research Volume 8, Issue 5, May-2017 19 ISSN 2229-5518[IEEE]

[3]. Natural Language Processing Techniques Applied in Information Retrieval-Analysis and Implementation in Python, TulikaNarang, International Journal of Innovations Advancement in Computer Science IJIACS ISSN 2347 – 8616 Volume 5, Issue 4 April 2016

[4]. Anuradha Mohite, Varunakshi Bhojane, "Natural Language Interface to Database Using Modified Co-occurrence Matrix Technique 2015 International Conference on Pervasive Computing (ICPC)

[5]. Levin E., Pieraccini R., Eckert W. "Learning dialogue strategies within the Markov decision process framework", Automatic Speech Recognition and Understanding IEEE Proceedings, pp. 72-79, 1997.[IEEE]

[6]. Liddy, E. D. In Encyclopedia of Library and Information Science, 2nd Ed. Marcel Decker, Inc.

[7]. J. Allan. Perspectives on information retrieval and speech. In Information Retrieval Techniques for Speech Applications: LNCS 2273, pages 1–10, 2002.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Troll Detection and Anti-Trolling Solution using Artificial Intelligence/Machine Learning

**Saloni Dangre*[1], Shubham Sharma*[1], Swati Balyan*[1], Tanisha Jaiswal*[1], Dr. Pankaj Agarkar[2], Prof. Pooja Shinde[3]**
[1]BE Scholar, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Head of Department, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[3]Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

With the increase in usage of social media platforms, due to which trolling and use of abusive language has burgeoned proportionately. The sole reason for this is that there is no surveilling authority on these platforms. Anyone from kids, teenagers to adults can fall prey to trolling. This paper focuses on using Artificial Intelligence and Machine learning algorithms to invigilate such bullies and further classify them for enhanced analysis. We will be introducing lexical, aggression, syntactic and sentiment analyzers to examine the data and determine if it was meant to be a troll or not. The output of these analyzers will be then fed to algorithms such as Naive Bayes and classifiers like Decision Tree, Random forest, Multinomial, Logistic regression to segregate the trolls in different categories like offensive, targeted, individual, group etc and use visual representation tools to improve the analysis.

**Keywords:** Social Media, Offensive, Trolling, Bullying, Abusive, Artificial Intelligence, Machine Learning, Detection, Anti Trolling, Tweets, Analysis

## I. INTRODUCTION

For many people round the world social media sites are an integrated part of their lifestyle. There are many different social media sites supporting a good range of practices and interests. Social networks like Facebook, Twitter, Instagram and Linkedin have become a source for news and a platform for political and moral debate for tons of users this is where trolling comes in, particularly, a troll often uses an aggressive offensive language and has the aim to hamper the normal evolution of a web discussion and possibly to interrupt it. Only recently has it been possible to pay proper attention to the present problem, in order that many renowned press bodies and magazines have begun to address the difficulty and to write down articles both on the overall description of the phenomenon and on particular events that have caused a stir, favored by the increasing occurrence of behavior just like the one

described above. Stories with different degrees of truthfulness accompanied by abusive language and trolling of either individual or a group are spread and tiny source criticism is applied by regular people also as journalists. Such an implementation would be interesting to the politicians, media, social networks or organizations that are targeted since it might be used to clear their name.

In this paper we discuss our system implemented by using Artificial Intelligence concept NLP - Natural Language Processing and Machine learning algorithms which Pre-process the data, Trains and tests the model, classifies the data into suitable categories of trolls and finally predicts and displays the result using visual representation tools like bar graph and pie chart.

## II. ALGORITHMS AND TECHNIQUES

### A. Naive Bayes

Naive Bayes is a simple technique for constructing classifiers: models that assign class labels to problem instances, represented as vectors of feature values, where the class labels are drawn from some finite set. There is not a single algorithm for training such classifiers, but a family of algorithms based on a common principle: all naive Bayes classifiers assume that the value of a particular feature is independent of the value of any other feature, given the class variable. For example, a fruit may be considered to be an apple if it is red, round, and about 10 cm in diameter. A naive Bayes classifier considers each of these features to contribute independently to the probability that this fruit is an apple, regardless of any possible correlations between the color, roundness, and diameter features. Abstractly, naïve Bayes is a conditional probability model: given a problem instance to be classified, represented by a vector.

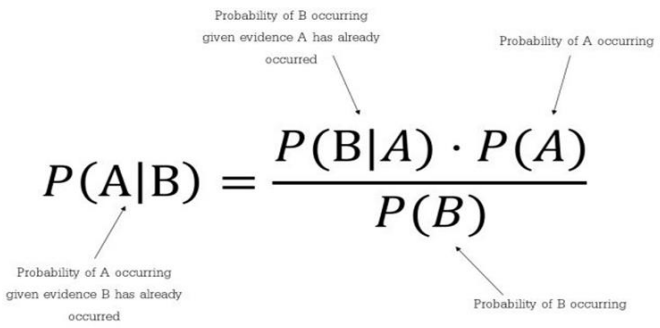



Fig. 1 - Naive Bayes Formula

### B. Random Forest

Random forest is a supervised learning algorithm which is used for classification problems. Random forest algorithm creates decision trees on data samples and then gets the prediction from each of them and finally selects the best solution by majority of voting. While working with random forest in the first step, we create a bootstrap dataset out of the original dataset. Bootstrap dataset means shuffling of records, removal of duplicates and creating samples. In the second step, we prepare a decision tree from the bootstrap dataset. Prediction which holds the output is returned to the classifier shows the final answer as 0 or 1.

### C. Working

The tweets collected need to be analyzed so as to assign labels. Using classifier labels are assigned to twitter data. Using Naive Bayes Technique tweets are classified either into a troll or not a troll. In Naïve Bayes, if a certain attribute is present then it is labelled as “1” or else it is “0”. By Naive-Bayes rule, probability of relevance for a document is calculated. It is assumed that attributes are not related to each other. For identification purposes, a feature is also labelled as an attribute. Classifying the tweets has various processes like collecting the tweets from twitter. Preprocessing the tweets, dividing the tweets and classifying by trainer. In dividing the tweets, the

training dataset is grouped into 5 different sets. While comparing, the validation part includes around 25 tweets. Grouping of selected tweets are done randomly. So these are some basic steps incorporated in this process. The NLTK library from python is used to carry out sentimental analysis. Naïve-Bayes algorithm classifies sentiments for remaining tweets. Previous trained data is implemented as input for this purpose.

Now to carry out sentimental analysis, Naïve Bayes classifier algorithm is used. Firstly, a training set consisting of positive words and negative words is created. The positive words are labelled as class "1" whereas the negative words are labelled as class "0". This training set consists of 2005 positive words and 4783 negative words. New training sets can be made after scaling up this Dataset. The accuracy of the predicted labels is analyzed through performance parameters. The performance is represented in a form of matrix which is called confusion matrix. Confusion matrix is plotted to sum up the performance of the learning model. A confusion matrix for classes "P" and "N" can be represented as-

| | | Predicted class | |
|---|---|---|---|
| | | *P* | *N* |
| Actual Class | *P* | True Positives (TP) | False Negatives (FN) |
| | *N* | False Positives (FP) | True Negatives (TN) |

Here,

TP - The actual class as well as the predicted class is positive.

FN - The actual class is positive but the predicted class is negative.

FP - The actual class is negative but the predicted class is positive.

TN - The actual class as well as predicted class is negative.

Performance parameter are as follows:

Accuracy-

It replies to the question of "How often is the classifier correct?"

$$Accuracy = \frac{TrueNegatives + TruePositive}{TruePositive + FalsePositive + TrueNegative + FalseNegative}$$

In this paper using Naïve bayes technique the tweets are classified into eight categories i.e. Offensive, Not offensive, NULL, Individual, Group, Targeted, Untargeted and Others according to the trainer's perception. This perception may vary with different dataset and situations

A specific amount of tweets are taken into consideration for this process and some keywords are selected from tweets for perception training. For example, 50 tweets are selected, then 40 tweets are trained and remaining is the test data. The results were verified by the trainer which were obtained by classification using the Naïve Bayes technique. Tweets collected are pre-processed and then given to naïve bayes classifiers. By training and verifying the sentiment classification by the same person, we could achieve a high degree of accuracy using Naïve Bayes technique. This method is suitable to train and classify sentiment from twitter and other social network data.

## III. DATA AND METHODOLOGY

The dataset is given in *csv* file format with columns namely, ID, INSTANCE, SUBA, SUBB, SUBC where ID represents the identification number for the tweet, INSTANCE represents the tweets, SUBA consists of

the labels namely Offensive (OFF) and Not Offensive (NOT), SUBB consists of the labels namely Targeted Insult and Threats (TIN) and Untargeted (UNT) and SUBC consists of the labels namely Individual (IND), Group (GRP) and Other (OTH).

The dataset has 13240 tweets. All the instances are considered for Sub Task A. However, we have filtered and considered the data that are labelled with "TIN/UNT" and "IND/GRP/OTH" for Sub Task B and Sub Task C respectively by ignoring the instances labelled with "NULL". Thus, we have obtained 4400 and 3876 instances for Sub Task B and Sub Task C respectively.

We have preprocessed the data by removing the URLs and the text "@USER" from the tweets. Tweet tokenizer 4 is used to obtain the vocabulary and features for the training data.

We have employed both traditional machine learning and deep learning approaches to identify the offensive language in social media. In deep learning (DL) approach, the tweets are vectorized using word embeddings and are fed into encoding and decoding processes. We have employed two attention mechanisms namely Normed Bahdanau (NB) and Scaled Luong (SL) in this approach. These two variations are implemented to predict the class labels for all the three sub tasks. These attention mechanisms help the model to capture the group of input words relevant to the target output label.

For example, consider the instance in Task C: "we do not watch any nfl games this guy can shove it in his pie hole". This instance clearly contains the offensive slang "pie hole" and about watching the "nfl games". The attention mechanism captures these named entities or groups of words and correctly maps to the label "GRP".

In the traditional learning (TL) approach, the features are extracted from the tokens with a minimum count of two. The feature vectors are constructed using TF-IDF scores for the training instances. We have chosen the classifiers namely Multinomial Naive Bayes (MNB) and Support Vector Machine (SVM) with Stochastic Gradient Descent optimizer to build the models for Task B and Task C respectively. These classifiers have been chosen based on the cross validation accuracies. The class labels namely "TIN/UNT" and "IND/GRP/OTH" are predicted for Task B and Task C using the respective models.

## IV. IMPLEMENTATION

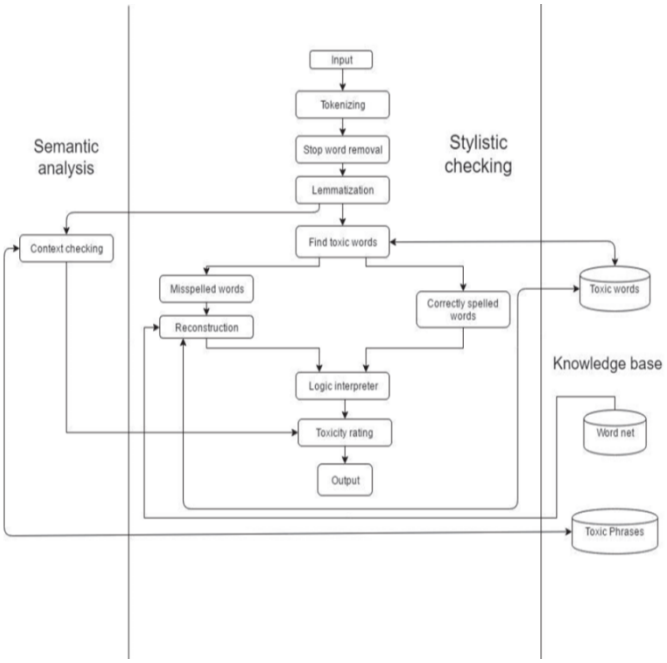



Fig.2 - System Architecture

The different phases of implementation and working of the system is discussed:

### A. Semantic Analysis

In this layer, the contextual meaning of the sentence is going to be analyzed.

Context checking*:* The precise meaning of the sentence cannot be always understood by the literal meaning of the words utilized in the sentence. Hence during this part, the contextual meaning is taken into account.

### B. Stylistic Checking

Input: The data used are tweets which is taken in csv file format and further processed in the following phases:

1) Tokenizing: The given sentence can't be easily understood by considering the whole sentence in one go. Hence, the sentence is weakened into the little part, i.e. one word per part referred to as a token. This manner helps in better understanding of the sentence.
2) Stop Word Removal: The words which don't contribute within the increase of toxicity of the sentence are mentioned as stop words. Such words (e.g. the, and, or) are deleted from the sentence during this step.
3) Lemmatization: The basic form of a word or its dictionary form is named lemma. Hence, during this part of the method, the basic form of the word is going to be returned, which can help in removing the inflectional endings and can make the method easier.
4) Stemming: It is the process of reducing a word to its word stem that affixes to suffixes and prefixes or to the roots of words known as a lemma. Stemming is important in natural language understanding (NLU) and natural language processing (NLP).
5) Data cleaning: It is a very crucial step in any machine learning model, but more so for NLP. Without the cleaning process, the dataset is often a cluster of words that the computer doesn't understand. Here, we will go beyond steps done in a typical machine learning text pipeline to clean data.
6) Words Recognition: The words which are recognized with the toxic words are categorized as offensive, targeted, individual, group etc and the words which don't contain any toxicity are categorized as not offensive or null.
7) Output: The output of the data received after being processed is accurate, reduced and free of any duplication making the further process easy.

### C. Classification

1) Converting Words to Vector: Word Embeddings or Word vectorization is a methodology in NLP to map words or phrases from vocabulary to a corresponding vector of real numbers which is used to find word predictions, word similarities/semantics. The process of converting words into numbers are called Vectorization.
2) Loading and Labelling of Data: In NLP applications using Machine learning, loading the data is a crucial phase. As this data is loaded for 3 main purposes that is training the model, testing model, prediction. This is also where the data is labelled into different categories to make the model more effective.
3) Classification: It is also known as text tagging or text categorization is the process of categorizing text into organized groups. By using Natural Language Processing (NLP), text classifiers can automatically analyze text and then assign a set of pre-defined tags or categories based on its content.

### D. Knowledge Base

This domain comprises all the databases that are required for training, testing and prediction stages of the system. It embodies toxic words and phrases classified in different categories which will be incorporated during training, testing and prediction phases.

## V. RESULT AND EVALUATION

The performance is analyzed using the metrics namely precision, recall and training and testing accuracy.

The results of our approaches along with the Confusion matrix for our best run are presented in Tables 1, 2 and 3 for Task A, Task B and Task C respectively. We have obtained the best results for Task A MNB, Task B SVM, Task C RF models for Task A, Task B and Task C respectively.

```
Building Model Subtask A...
Preparing Test Data...
Training Accuracy: 1.0
Test Accuracy: 0.765625
Confusion Matrix:
[[243   0]
 [ 75   2]]
```

Table 1: Results of Confusion matrix for Sub-task A.

```
Building Model Subtask B...
Preparing Test Data...
Training Accuracy: 0.8484848484848485
Test Accuracy: 0.44155844155844154
Confusion Matrix:
[[34  0  0]
 [ 4  0  0]
 [39  0  0]]
```

Table 2: Results of Confusion matrix for Sub-task B.

```
Building Model Subtask C...
Preparing Test Data...
Training Accuracy: 1.0
Test Accuracy: 0.7647058823529411
Confusion Matrix:
[[ 0  4  0  0]
 [ 0 26  0  0]
 [ 0  3  0  0]
 [ 0  1  0  0]]
```

Table 3: Results of Confusion matrix for Sub-task C.

The attention mechanism Scaled Luong performs better when more data is available for training. The Normed Bahdanau attention mechanism performs better even for a small dataset. The deep learning model could not learn the features appropriately due to less domain knowledge imparted by the smaller data set. Thus, traditional learning performs better with the given data size when compared to deep learning for Task C.

Results obtained are represented by using tools like bar graph and pie chart shown below:

Pie Chart for Offensive and Non-Offensive are presented in Fig 1 with 33.2% of Offensive data and 66.8% of Non-Offensive data

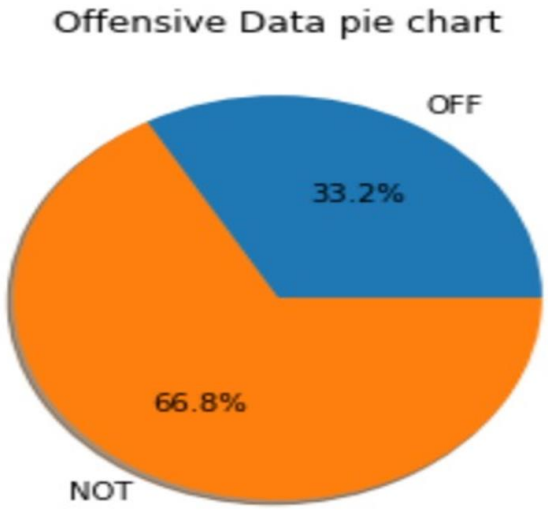



Fig 1: Pie Chart for Offensive and Non Offensive.

The following Bar Graphs have Number of Tweets on Y-axis and Types of tweet on X-axis

Bar graph for sub task A in fig 2, based upon the offensive (OFF) and non offensive (NOT) data.

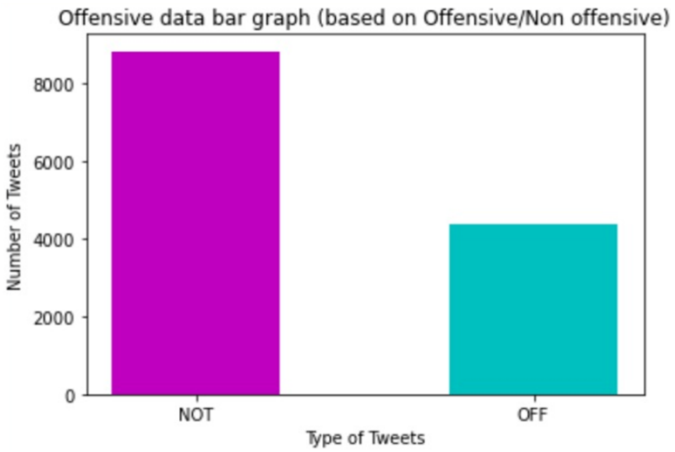



Fig 2: Bar Graph for Subtask A

Bar graph for sub task B in fig 3, based upon targeted (TIN) and untargeted data (UNT)

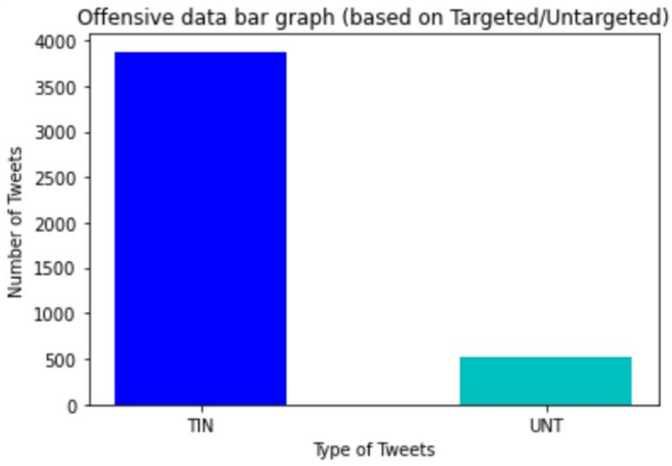



Fig 3: Bar Graph for Subtask B

Bar graph for sub task C in fig3, based upon individual (IND), group (GRP) and others (OTH).

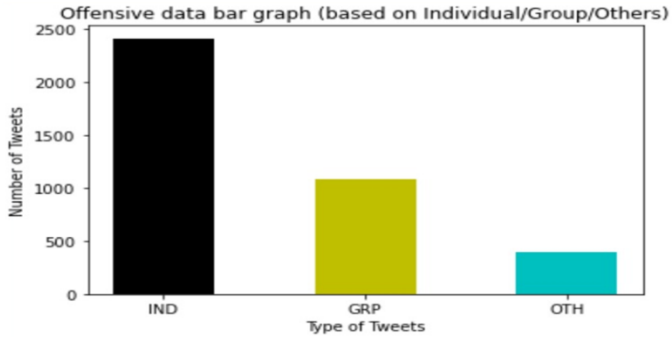



Fig 4: Bar Graph for Subtask C

## VI. CONCLUSION

This paper has discussed the problems created by the presence of trolls in social media contexts and has presented the main approaches to tackle this problem.
We have implemented a System using Artificial Intelligence and Machine learning, we have used different analysers like stylistic, syntactic etc this model uses Naïve bayes algorithm to get better accuracy in order to classify troll tweets.
Our system provides various graphical analysis of the data, which helps users to identify the ratio of troll tweets and intensity of trolls.

The classifiers namely Multinomial, Naive Bayes and Support Vector Machine with Stochastic Gradient Descent optimizer were employed to build the models for the sub tasks. Deep learning with Scaled Luong attention, deep learning with Normed Bahdanau attention, and traditional machine learning with SVM give better results for Task A, Task B and Task C respectively. Our models outperform the baseline for all the three tasks.

## VII. REFERENCES

[1]. Zannettou, S.; Sirivianos, M.; Caulfield, T.; Stringhini, G.; De Cristofaro, E.; Blackburn, J. Disinformation warfare: Understanding state-sponsored trolls on twitter and their influence on the web. In Proceedings of the Web Conference 2019—Companion of the World Wide Web Conference, WWW 2019, San Francisco, CA, USA, 13–17 May 2019; pp. 218–226.

[2]. Badawy, A.; Lerman, K.; Ferrara, E. Who falls for online political manipulation? In Proceedings of the Web Conference 2019—Companion of the World Wide Web Conference, San Francisco, CA, USA, 13–17 May 2019; pp. 162–168.

[3]. Fornacciari, P.; Mordonini, M.; Poggi, A.; Sani, L.; Tomaiuolo, M. A holistic system for troll detection on Twitter. Comput. Hum. Behav. 2018, 89, 258–268.

[4]. Donath, J.S. Identity and deception in the virtual community. In Communities in Cyberspace; Routledge: Abingdon-on-Thames, UK, 2002; pp. 37–68.

[5]. Chun, S.A.; Holowczak, R.; Dharan, K.N.; Wang, R.; Basu, S.; Geller, J. Detecting political bias trolls in Twitter data. In Proceedings of the 15th International Conference on Web Information Systems and Technologies, WEBIST 2019, Vienna, Austria, 18–20 September 2019; pp. 334–342. [6] "https://perspectiveapi.com/", last retrieved on 10th January 2017

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Training an Agent using Deep Reinforcement Learning: Snake Game

**Kartik Kaushik[1], Reetej Chindarkar[1], Rutuja Vetal[1], Ronak Thusoo[1], Prof. Pallavi Shimpi[2]**
[1]Student, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India
[2]Assistant professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

Deep Reinforcement Learning has become a commonly adopted method to enable agents to hunt out complex control policies in various video games. Deep-Mind used this technique to play Atari games. However, similar approaches should get to be improved when applied to tougher scenarios, where reward signals are sparse and delayed. This paper illustrates a refined Deep Reinforcement Learning model to enable an autonomous agent to play the classical Snake Game, whose constraints get stricter as the game progresses further. Specifically, to train this model we have used Deep Neural Network (DNN) with a variant of Q-learning where agent will learn from its past experiences. Moreover, we have proposed a designed reward mechanism to properly train the network, adopt a training gap strategy to temporarily bypass training after the situation of the target changes, and also introduces dual experience replay method through which different experiences for better training can be categorized. The final results show that our agent in an environment outperforms the baseline model and surpasses the human-level performance in terms of playing the Snake Game.

**Keywords:** Deep reinforcement learning, Q-Learning, Deep Neural Network, Deep Learning, Experience replay.

## I. INTRODUCTION

Neural Networks when combined along with the reinforcement algorithms can beat human experts playing various Atari video games. Deep-mind's AlphaGo, an algorithm that had beaten the world champions of the Go board game. At DeepMind they pioneered the mixture of these approaches i.e. deep reinforcement learning - to form the first artificial agents to understand human-level performance across many challenging domains.

Reinforcement learning is an area of Machine Learning. It is about taking suitable action to maximize reward during a particular situation. It is employed by various software and machines to seek out the simplest possible behaviour or path it should absorb a selected situation. Reinforcement learning differs from the supervised learning during a way that in supervised learning the training data has the solution key with it therefore the model is trained with the correct answer itself whereas in reinforcement learning, there's no answer but the

reinforcement agent decides what to try to perform the given task. It is bound to learn from its experience. Reinforcement learning also differs from the unsupervised learning. Where unsupervised learning deals with associative rule mining and clustering and on the other hand Reinforcement learning deals with exploration, decision process of Markov, Value learning, deep learning and Policy learning. Unsupervised learning deals with the data which is unlabelled where output is based on some perception or collection of perception. As name suggests unsupervised learning is not supervised and reinforcement learning is less supervised which is totally dependent on the agent identifying the output. To summarize in supervised learning, we generate formula based on input and output we provide. In unsupervised learning we find the relation or association between input and output values. In Reinforcement learning agent learns using delayed feedback by communicating with the environment. In this paper, our agent learns how to play the snake Game by interacting with the environment. Agent choose some action get feedback from environment. The feedback is in the form of states or rewards. This cycle is continued till our agent end up in the terminal state. Then learning of new episode starts.

Episode is the length of simulation. At the end of simulation system end up in terminal state. We have used Deep Q-Network (DQN). DQN is known to be first step of Reinforcement learning. DQN is reinforcement learning algorithm that combines deep learning neural networks with Q-learning to let Reinforcement learning work for high dimensional, complex environments like video games, or robotics. So, we rely specifically on deep Q-learning network (DQN) that chooses the best action based on both the observations i.e. from the environment & prior learned knowledge to train an agent, In order to successfully learn to play this Snake Game is quite challenging because the restrictions of this AI Snake Game gets stricter & stricter as the snake grows in length & the game gets going. Also, to add, an apple once it is eaten by the snake, using random function a new one is immediately spawned at a random location.

This is changing target issue. We have studied various techniques & used the best ones to handle this issue. You can see the results between the DQN model and human level performance. this performance can be viewed in terms of time or score. After that total reward can be calculated by network. The way humans learn by using their memory from past experiences, similarly DQN uses this technique too. Experience reply and reply memory are part of this technique. Experience reply allows our agent to store or memorize along with reusing the past experiences just as humans tend to replay crucial experiences and generalize them to the situation at hand. Replay Memory is like a stack which stores the agent's experiences and it is mainly used to train the DQN. We will be more focusing on the learning and training the agent rather than the game.

## II. METHODS AND MATERIAL

### A. Deep Reinforcement Learning

Deep reinforcement learning combines artificial neural networks with a reinforcement learning architecture that permits software-defined agents to learn the best actions possible in a virtual environment to realize their goals. It unites function approximation & target optimization and it maps state-action pairs to get expected rewards.

The network exists of layers with nodes, the primary layer is that the input layer. Then the hidden layers will rework with all the information along with weights and activation functions. The last layer is the output layer, where the target is expected. Adjusting the weights will help the network to learn patterns and improve its predictions.

### B. Q-Learning

Q-learning is a model-free reinforcement learning algorithm [1]. Q-learning is a values-based learning algorithm. Value based algorithms updates the value function based on an equation (particularly Bellman equation) [1]. Whereas the other type, greedy policy obtained from the last policy improvement is estimated by policy-based value function [1].

Here are some definitions which are used in Q-Learning:

- Q*(s,a) is the expected value (cumulative discounted reward) of doing a in state s and then following the optimal policy[1].
- Temporal Differences (TD) is used by Q-learning uses to estimate the value of Q*(s,a). Temporal difference is an agent learning from an environment through episodes with no prior knowledge of the environment [1].
- The agent maintains a table of Q [S, A], where S is the set of states and A is the set of actions [1].
- Q [s, a] represents its current estimate of Q*(s,a) [1].

Q-Table is a data structure that guides us to the best action at each state. Q-Learning algorithm is used to learn each value of the Q-table.

Bellman Equation is used for Q-function and it takes two inputs i.e. State (s) & Action (a).

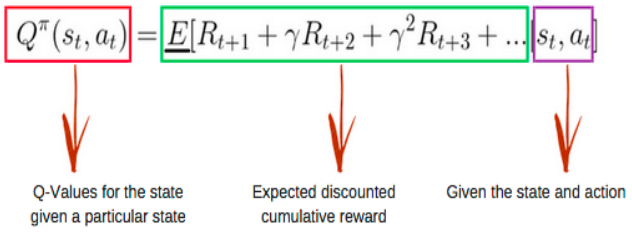



**Fig 1.** General Bellman Equation

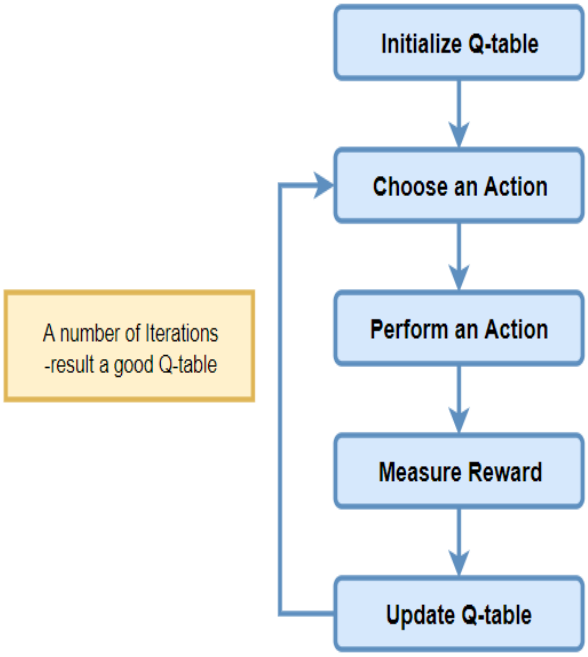



**Fig 2.** Q-learning Algorithm Process

**The steps that Q-Learning Algorithm follows are:**

**Step 1: Initialising the Q-Table**

First the Q-table has to be built. The table is divided into 'n' columns & 'm' rows, where 'n' is the number of actions and 'm' is the number of states.

**Step 2: Choosing an action**

In this stage, the agent will choose an action to perform

**Step 3: Performing an action**

During this stage, steps 2 & 3 will be performed for an undefined amount of time. Initially, an Action (a) in State (s) is chosen according to the Q-Table. Every Q-value is zero when the episode initially starts. The Q-values are then updated according to the Bellman Equation.

Epsilon greedy strategy concept is used here. Initially, the epsilon rates are higher & the agent explores the environment and randomly chooses actions to perform. This happens logically, since the agent does not know anything about the environment. As the

agent starts to explore the environment, the epsilon rate will decrease and the agent will then start to exploit the environment. The agent becomes more confident in estimating the Q-values, as the level of exploration done by the agent increases. [5]

**Step 4: Measure Reward**

In this stage, we measure the reward by observing the outcome based on the action taken.

**Step 5: Evaluate**

In this stage, the function Q(s,a) is updated. This process will be repeated till the learning process is completed. In this way, the Q-table keeps getting updated & the value function Q will get maximised. Here, Q(s,a) returns the expected future reward of the action performed in that state.

Initially, to update the Q-table we will explore the environment using the agent. After the Q-table has been finished updating, the agent will start exploiting the environment & will start taking better actions.

### C. Deep Q-Network (DQN)

A DQN, or Deep Q-Network, approximates a state-value function in a Q-Learning framework with a neural network [2].

Here are some definitions that are used in DQN:

Agent: An **agent** is something that takes actions.

Action (a): 'a', it is the set of all the possible moves that an agent can make. An **action** is something that the agent chooses from a discrete list of possible actions. In our case, the agent can choose from the moment set of left, right, up and down.

Discount Factor: The **discount factor** is multiplied by future rewards as discovered by the agent in order to dampen these rewards' effect on the agent's choice of action [3]. Discount factor is designed to make immediate rewards more significant than future rewards. It is expressed with the lower-case Greek character, gamma: γ.

Environment: **Environment** can be described as the world that the agent belongs in and the world that responds according to what the agent does. The environment will take the agent's current state and action as input, while giving the agent's reward and its next state as the output.

State (s): A **state** can be described as the current and the immediate situation of the agent i.e. a specific place or moment, any configuration that puts our agent in relation to obstacles and prizes.

Reward (r): A **reward** is the feedback by which we measure the success or failure of an agent's actions in a given state [3]. It is the measurement of whether the agent's action in that given state were successful or not. Rewards can be immediate or delayed.

Policy (π): The **policy** is defined as the strategy that the agent employs to determine the next action based on the current state. It maps states to actions that promise the highest reward.

Value (v): **Value** is the expected long-term return with discount, when compared to the short-term reward 'r'. 'vπ(s)' is defined as the expected return of the current state & the policy 'π'.

Q-value (Q): **Q-value** is almost similar to Value but it takes an extra parameter i.e. action 'a'. Qπ (s, a) refers to the expected return which includes the action 'a', policy 'π' & the current state 's'. Q-value maps state-action pairs to rewards.

DQN overcomes unstable learning by mainly using four techniques:

Experience Replay:

It is hard to produce various experiences, once DNN is overfitted. In order to overcome this problem, Experience Replay stores experiences including state transitions, rewards and actions, which are necessary data to perform Q learning. It also makes mini-batches to update the neural network [4]. This technique has the following advantages:

- It will reduce the correlation between experiences when updating the DNN.
- It will also increase the learning speed with the help of mini-batches.
- It will reuse past transitions to avoid catastrophic forgetting.

Target Network:

Target function is changed frequently with DNN while calculating TD error. Training data could be difficult when using unstable target function. Target Network technique is used to fix the parameters of target function and replace them with the latest network every thousand steps.

$$Q(s_t,a) \leftarrow Q(s_t,a) + \alpha \left[ r_{t+1} + \gamma \max_p Q(s_{t+1},p) - Q(s_t,a) \right]$$

***Fig 3****. Target Q-function in the red box shown is fixed*

Clipping Rewards:

Clipping Rewards technique is used to clips scores, according to which all positive rewards are set +1 and all negative rewards are set -1 [6, 7].

Skipping Frames:

Skipping Frames technique is defined such that the DQN calculates the Q-value every four frames and uses the past four frames as input which in return reduces the computational cost and helps in gathering more experience [6, 8].

**Algorithm: Deep Q-learning with Dual Experience Replay**

**Requirements:**

- $MP_1$ and $MP2$ = replay memory functions.
- N = Memory Pool for storing the experience replay.
- $a_t$ = Action done at time t.
- $s_t$ = State at time t.
- $r_t$ = Reward at time t.
- $e_t$ = Experience at time t.
- η (eta) = sampling proportion.

Initialize replay memory $MP_1$ & $MP2$ to $N/2$
Initialize $Q$ with random weights

**for** all training steps **do**
Initialize state $s1$ for the new episode
Pre-process $\varphi 1 = \varphi(s1)$
**repeat**
Using Exploration probability ε select a random action $at$
otherwise select $at = argmax_a A Q(\varphi(st), a)$
Decay exploration probability ε
Execute $at$ in game then observe $rt$ and $st+1$
Pre-process $\varphi t+1 = \varphi(st+1)$
**if** $|rt| \geq 0.5$ **then**
Store $et = (\varphi t, at, rt, \varphi t+1)$ in $MP_1$
**else**
Store $et = (\varphi t, at, rt, \varphi t+1)$ in $MP_2$
Sample mini-batch of $ek$ from $MP1$ & $MP2$
In segments of $\eta$ and $(1 - \eta)$ respectively
Decrease sampling proportion $\eta$
**if** episode terminated at $\varphi k+1$
Target value $Q^*_k = rk$
**else**
$Q^*_k = rk + y max_{a \in A} Q(\varphi k+1, a)$
Define loss function $loss = (Q^*_k - Q(\varphi k, ak))^2$
Update neural network parameters by performing optimization algorithm Adam on $loss$
**until** episode terminates
**end for**

| **Actions** | |
|---|---|
| Snake moves up | 0 |
| Snake moves right | 1 |
| Snake moves down | 2 |
| Snake moves left | 3 |

| **Rewards** | |
|---|---|
| Snake eats an apple | 10 |
| Snake comes closer to the apple | 1 |
| Snake goes away from the apple | -1 |
| Snake dies (hits his body or the wall) | -100 |

| **State** | |
|---|---|
| Apple is above the snake | 0 or 1 |
| Apple is on the right of the snake | 0 or 1 |
| Apple is below the snake | 0 or 1 |
| Apple is on the left of the snake | 0 or 1 |
| Obstacle directly above the snake | 0 or 1 |
| Obstacle directly on the right | 0 or 1 |
| Obstacle directly below the snake | 0 or 1 |
| Obstacle directly on the left | 0 or 1 |
| Snake direction == up | 0 or 1 |
| Snake direction == right | 0 or 1 |
| Snake direction == down | 0 or 1 |
| Snake direction == left | 0 or 1 |

**Fig 4**. Action, Reward State as we have defined.

Different types of state space that we have used:

Maybe it's possible to change the state space and achieve similar or better performance than when the agent learns to play snake using experience reply. The following four state spaces were tried:

- State space 'no direction': The agent was not given the direction the snake was going in.
- State space 'coordinates': We replaced the location of the apple (up, right, down and/or left) with coordinates like apple (x, y) and the snake (x, y). The coordinates can be scaled between 1 and 0.
- State space 'direction 0 or 1': This is the original state space.
- State space 'only walls': We did not give the agent the direction of the body, only tell it if there's a wall.

```
# epsilon sets the level of exploration and decreases over time
param['epsilon'] = 1
param['epsilon_min'] = .01
param['epsilon_decay'] = 1/100

# gamma: value immediate (gamma=0) or future (gamma=1) rewards
param['gamma'] = .95

# the batch size is needed for replaying previous experiences
param['batch size'] = 500

# neural network parameters
param['learning_rate'] = 0.00013629
param['layer_sizes'] = [128, 128, 128]
```

**Fig 5.** Parameters Defined for DQN

Epsilon (ε) defines the probability of exploration & it will decrease as the agent explores the environment more & more.

Gamma is also known as the discount factor. It is designed to make future rewards less than the immediate rewards.

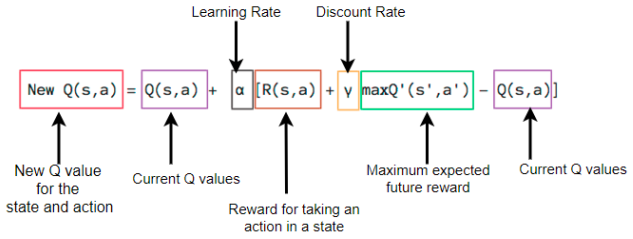
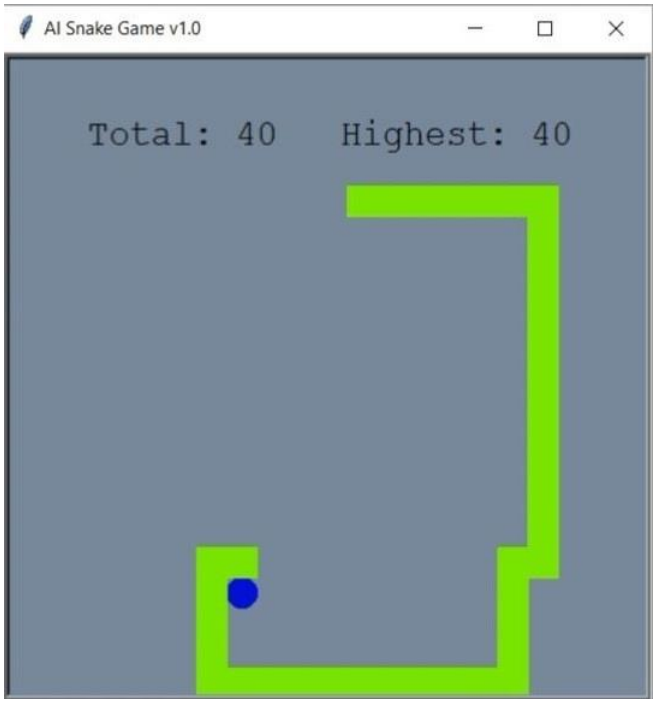


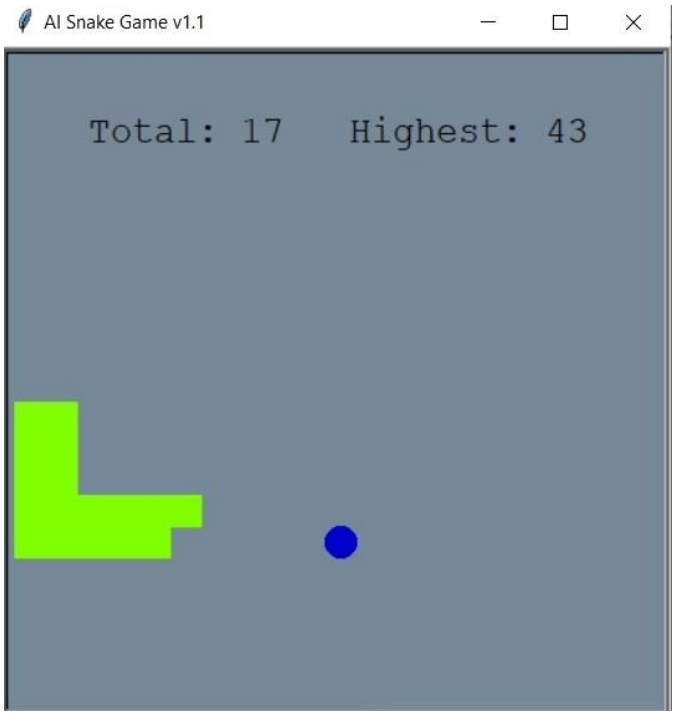

**Fig 6.** Bellman Equation

## III. EXPERTIMENTAL RESULTS

Firstly, we decided to use different parameters for our AI Snake Game by creating two different versions i.e. v1.0 & v1.1. In these versions, the basic difference was only of the parameter 'Epsilon Decay' & 'Learning Rate'. We used the values '.995' & '1/100' for Epsilon Decay respectively. According to our observation, the epsilon decay with value '1/100' had better results when compared to epsilon decay with value '.995'. We also used the values '0.00025' & '0.00013629' for the learning rate in our Neural Network.



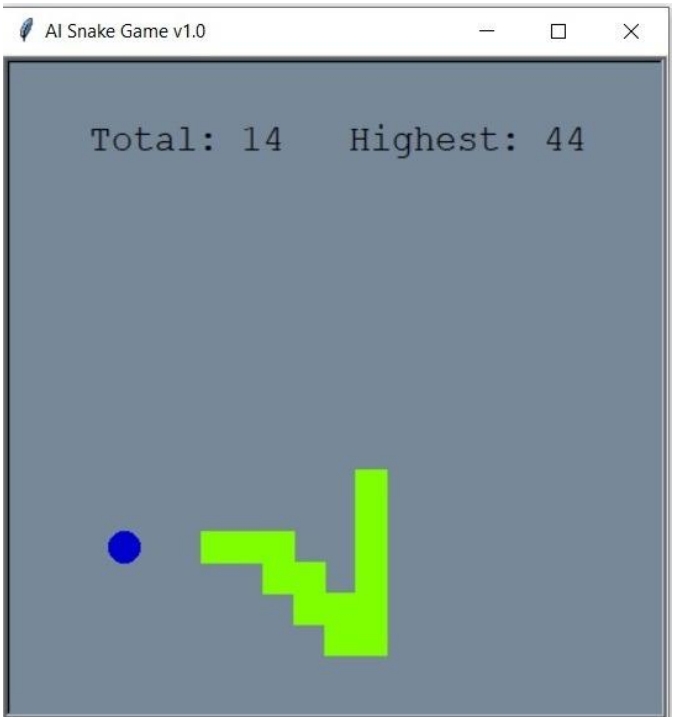

**(a)** Version 1.0



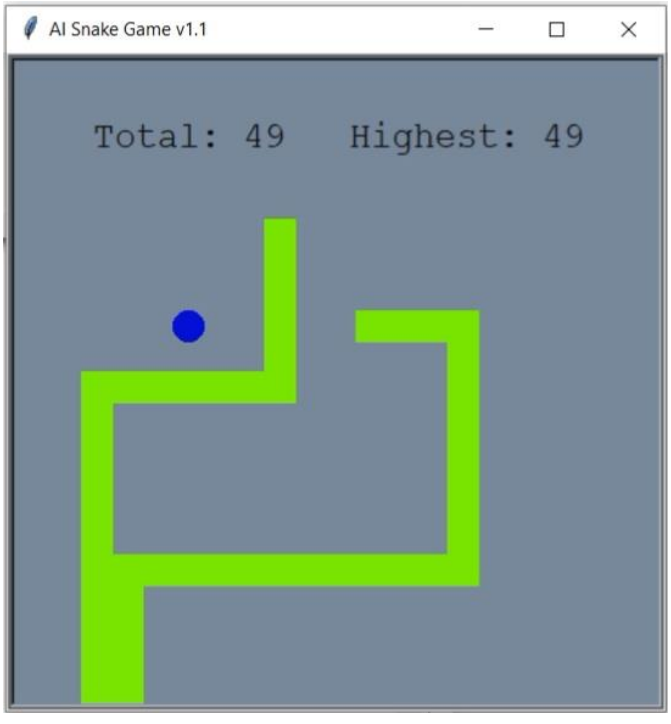

**(b)** Version 1.1

**Fig 7.** High Score of 50 Episodes

According to our observation, version 1.1 of the AI Snake Game which has the values of 1/100 & 0.00013629 for Epsilon Decay & Learning Rate respectively performed better when compared to version 1.0 of AI Snake Game. The highest score observed in version 1.0 was 40 for 50 Episodes (E), similarly for 50 Episodes v1.1 observed 43 as the highest score.




**(a)** Version 1.0




**(b)** Version 1.1

**Fig 8.** High Score of 100 Episodes

After observing that 50 Episodes were not enough to train our agent, so the number of episodes were increased to 100. As can be seen in the figures above, version 1.0 only had an increase of four points in the highest score while version 1.1 had an increase of six points.

## IV. CONCLUSION

In this paper, we have tried to implement the classical snake game using Deep Reinforcement Learning & DQN (Deep Q-Network), while also using python libraries like turtle, seaborn, TensorFlow, NumPy, Keras, etc. We have used Adam optimization for our deep learning model, as it helps in faster convergence. Improper training experiences have been eliminated and proper function of agent has been done which helps in better performance with increase in levels. It will provide relatively better results as when compared to the existing techniques.

As we have observed our model still has some issues like enclosing problem where the Snake cannot see the whole environment and the agent will enclose itself and die. This issue was observed especially when the Snake was of larger length.

To solve the issue of enclosing we can use pixels and CNN (Convolutional Neural Network) in State Space. Also, we can assign regulated weights for a better model. We can also use Double Deep Q-Learning Algorithm instead of the normal Deep Q-Learning Algorithm to get a more precise convergence. Bayesian Optimization can also be used to further improve the network.

## V. REFERENCES

[1]. Chathurangi Shyalika, “A Beginners Guide to Q-Learning,” Towards Data Science, 15 Nov, 2019.

[2]. V. Mnih, K. Kavukcuoglu, D. Silver, A. Graves, I. Antonoglou, D. Wierstra, and M. Riedmiller, “Playing atari with deep reinforcement learning,” ArXiv e-prints, 2013.

[3]. Chris Nicholson, “A Beginner's Guide to Deep Reinforcement Learning,” Path Mind.

[4]. L.-J. Lin, “Reinforcement learning for robots using neural networks,” Ph.D. dissertation, Pittsburgh, PA, USA, 1992, UMI Order No. GAX93-22750.

[5]. R. S. Sutton and A. G. Barto, “Reinforcement learning: An introduction,” IEEE Transactions on Neural Networks, vol. 9, no. 5, pp. 1054–1054, 1998.

[6]. V. Mnih, K. Kavukcuoglu, D. Silver, A. A. Rusu, J. Veness,M. G. Bellemare, A. Graves, M. A. Riedmiller, A. Fidjeland, G. Ostrovski, S. Petersen, C. Beattie, A. Sadik, I. Antonoglou, H. King, D. Kumaran, D. Wierstra, S. Legg, and D. Hassabis, “Human-level control through deep reinforcement learning,” Nature, vol. 518, no. 7540, pp. 529–533, 2015.

[7]. D. Wang and A.-H. Tan, “Creating autonomous adaptive agents in a real-time first-person shooter computer game,” IEEE Transactions on Computational Intelligence and AI in Games, vol. 7, no. 2, pp. 123–138, 2015.

[8]. H. Y. Ong, K. Chavez, and A. Hong, “Distributed deep Q-learning,” ArXiv e-prints, 2015.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Crime Awareness and Registration System

**Pranav Lonari[1], Sudarshan Jagdale[1], Shraddha Khandre[1], Piyush Takale[1], Prof Yogesh Mali[2]**
[1]Student, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Assistant Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

The Crime rate has always been very high in India. Country has been on top in list for most of the years. The most relevant reason of such crime rate is slow judicial process and absence of knowledge in field. Many of the crimes can be prevented or reported early with an efficient user friendly system. The perspective of citizens about the judicial system and police has not been so good or falsely understood. Many of the cases do not get registered for above reasons. The reachability is poor as well as do not work for everyone. Records can be easily destroyed or fabricate.

Law and rules are not known by everyone in this country and in many of the cases victim does not know that they have been accused or any criminal activity is happening around them this absence of knowledge leads to increase in crime but decrease in registering complaints. Hence crime happens which damages the society and we may not be able to overcome the situation because of absence in records and knowledge

We can overcome this gap using an efficient user friendly system which allows us to know about crimes around us and help us to file complaint of crime easily. A platform for both user and authority to connect with each other.

**Keywords :** Machine learning, Neural networks, IPC, Chatbot.

## I. INTRODUCTION

This system has static and dynamic behaviour as most of the system the registration and filing complaint part is static where we do not need any other mathematical computation to provide these services. Where steps are predefined and data goes through the fixed number of stages and either accept or reject the request. But system also contains a Chatbot which is as important as the other static systems. Core function of system is to handle crime related queries and respond with user understandable manner. Chatbot replies with the text or with the other informational representational formats. Information which will be provided by the chatbot goes through various steps. The origin of the information is raw data which contains information about criminal law. This data is converted and stored for business Specific purpose. Data goes through the process to make it more useful for the system.

System will hold sensitive data of users and complaint records which drags the attraction of professional attackers and offenders. The system should be secure and robust enough against these attackers.

## II. METHODS AND MATERIAL

### A. Existing System

There are two ways to file our complaint in country. These types have been practiced for several years now. One of them includes physically visiting the police station or a police. Other one is registering online and communicating through the available ways at convenience.

**Visit and oral:**

This is most famous and well practice type of filing complaint. In which the general process is to visit the police station or a police and record the statement by yourself if you are victim or you can file complaint on behalf of other when certain conditions match. Then police will take action on it with respect to law and procedure. After this the victim or person which performing all the activities on behalf of the victim needs to pay the visit to police station or police for several times where the police have total control over the investigation and visiting process.

This has actual human person contact which ensures the existence of a person with respect to information. This point is important in modern world of artificial intelligence, Cybercrime and all related technologies which has ability to fake one self.

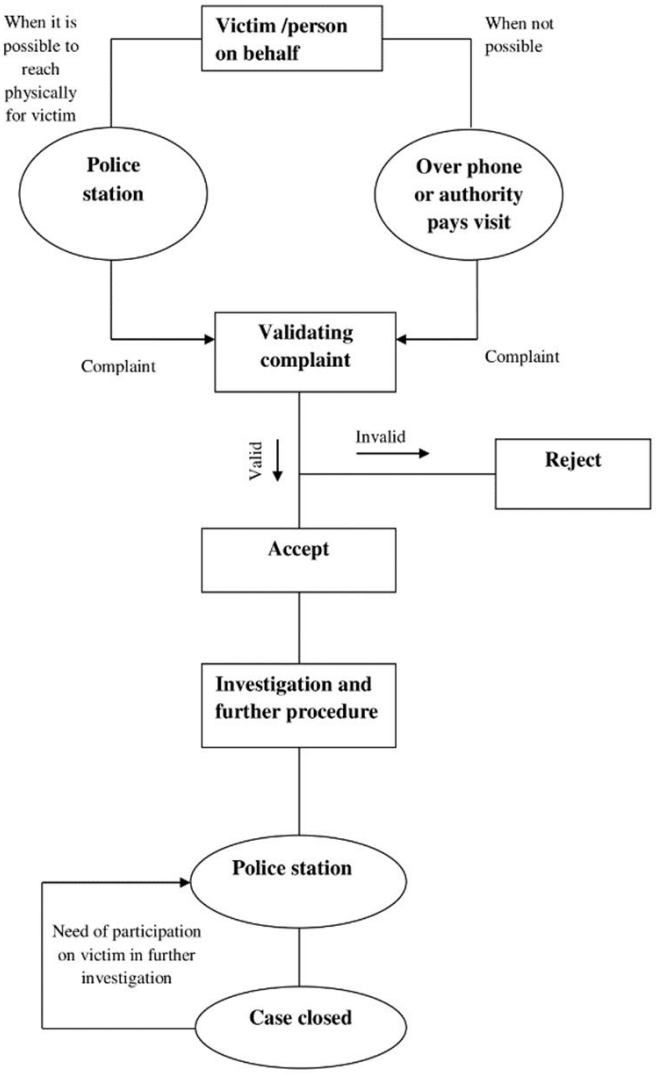



Fig: Traditional/Existing System

Other than investigation time this process is quite time consuming and hectic for victim. In many cases victim gets harassed by the process or authority this leads to delay for justice or injustice where victim has to go through the process over and over. By statistics % of the victims founds this experience inconvenient and helpless.

We can see the loop in above diagram where victim might need to pay visits time to time for further procedures. There is also other option of phone call which is not practiced well in country due to tampering, sniffing, inaccessibility of certain resources and more importantly validation.

This plays an important role in investigation where we in most of the cases police needs to contact personally with victim. Victim may have to go through this loop for number of times to get justice. Which is not the ideal process for all times.

**Online registration:**

We can observe that the first information report (FIR) only can be filed with the system other than that we have to follow same procedures again and again.

The online registration system is not consistent in country each and every state, districts and regions have different portals for same activity. Portals are also less interactive and less user-friendly which makes simple process more complicated and victim tends to choose the offline way to achieve this activity. Many of the systems only responsible for filing the very first report after that it does not interact with victim and does not hold any interaction management system for user and authority.

We observe these absence of services which can be easily filled with user-friendly and secure system we are proposing.

## B. Chatbot

Chatbot is a conversational bot which assist you in business specific or a general manner in our project we are using this as business specific purpose where our purpose is to deliver the information about different criminal laws and acts in understandable manner. Complete chatbot system's function is to understand the scenario analyse the situation and replay with relevant output in the form of text and other information representational format if needed. Chatbot works on the predefined inputs and outputs (message and reply) and also on the dynamically generated reply. To make it more interactive and user-friendly we need to train the bot with appropriate machine learning algorithm. After that the model will able to give response in the form of business requirement which will be useful to get the actual data to be send to user. To train the model we need to feed the specific amount of data to model this data may or may not be out final output which user wants. After training process we will able to use the model in our business model as per our need.

## C. Proposed System

In existing system we have loop of processes for further investigation but this process can be easy with an online interaction system for user and police which with require proper authentication and validation.

Not just interaction but the system will also provide online registration system on which user can file complaint these complaints can be view on the other side by police and proper contact can be done with interaction system or any other resources if police needs to.

Other than that system has Chatbot which solves any queries regarding the criminal law it can be also used as information system as the Chatbot is an interactive and user-friendly system built with different machine learning approaches has ability to recognize the natural language with NLP and process it and give the output in natural language. These Chatbots are mainly used by companies where they assist the users on website with any queries regarding the business.

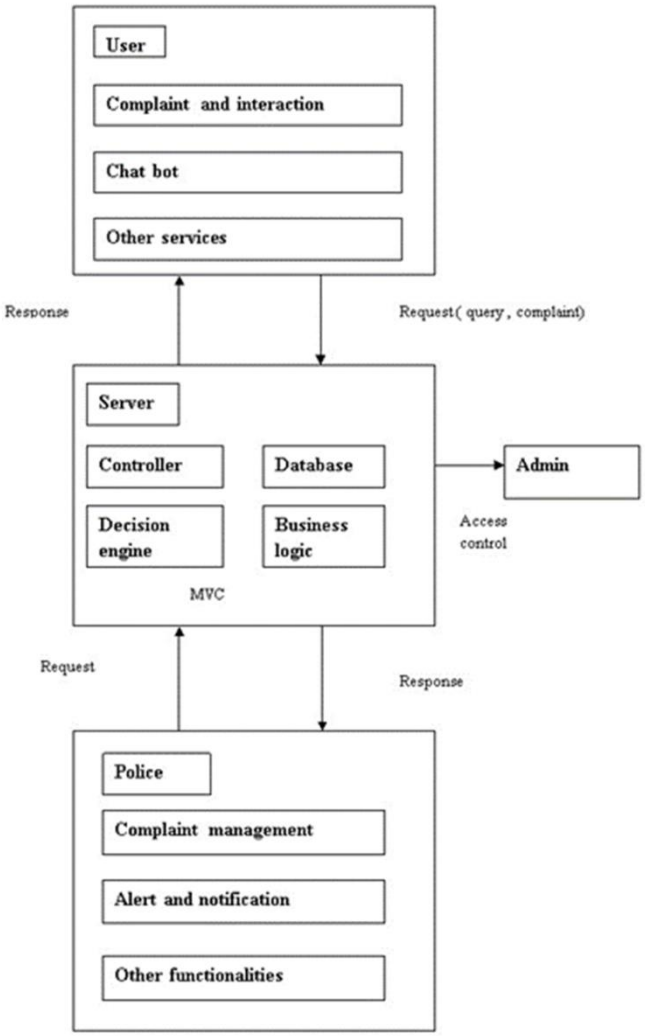
We are using the same logic to complete our business purpose which is provide information about crime laws and related information about it.

Registration and interaction:

1. When user decided to file complaint user can go the specific resources (page).
2. Enter all details about the crime happened which mainly includes victim, accused location, type, etc. and submit.
3. These complaint goes to the other side to police department. Now police are responsible for responding to complaint. After the verification and other procedure done police can interact

with user with interaction system provided. Or contact in their own way and change the status of complaint accordingly.

4. System also provides feature to attach the media files, links and documents. Which will help police to investigate.
5. Interaction system will be robust and format as all the messages and responses will be recorded for security.




## Chatbot:

The process of using Chatbot is simple:

1. User will enter query
2. Chatbot will identify the scenario and category of information will be needed
3. Chatbot will able to give all the information about what user wants (crime related data only). Which includes the law description, statistics, precautions, next steps, any emergency helplines.
4. Based on query Chatbot will also able to recognize that if user needs to file complaint or take any actions against the crime. Chatbot will also provide the reference to registration system and act as a registration system in same interaction.

In this way user will get to know about any law which will help them for taking further actions if needed and crime rate will be less as possible.

System will not completely eliminate the traditional visit system but rather reduce it. System has a user-friendly and interactive complaint portal which will eliminate the most of the unnecessary time consuming processes. And reduces time and efforts of the victim as well as police.

Chat-bot will able to help in both scenarios as it is core purpose is to reduce human efforts and make all information available to user.

## Other Functionalities and Services:

The system can also be used to reduce the gap between the authority and citizens as well.

1. An Alert system can be used by the authority/police officers to give any alters about the crime in areas. User can be notified with alerts.
2. Missing reports of person or belongings of a person and unidentified bodies are the areas where system can play vital role. These data will be available for citizens and anyone can help in investigation using this data.
3. System can also news related to surroundings of the citizens which will make them more aware.
4. With proper personalization policies and conditions user can also help system to provide more relevant information. We can use data of user activities in system in statistics, (ex. To see most searched crimes) to understand what user

needs to search which helps in surveys to understand the current standings of the country with respect to crime and criminal laws. With proper judgement and predictions this data can also help in investigation.

5. With respect to user privacy any user data will be send to the server only if user wants.

## D. Related Work

Proposed system includes static as well as dynamic behaviour of system. The physical architecture is general and most used architecture where we does not need any other external device to support our requirements.

### a) Physical Architecture:

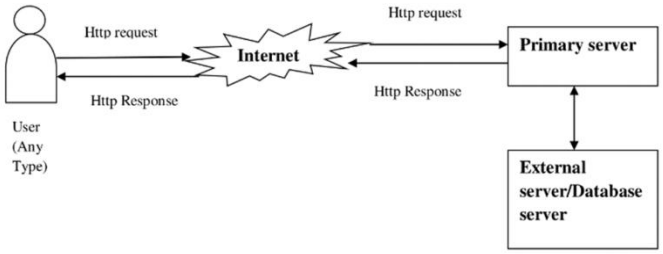



Fig. Physical Architecture

Above we can observe that this is general physical architecture

- HTTP request from user device to server using internet.
- Server (primary) process the request
- Other server may use for system database of or accessing external database (ex. Government data). HTTP response send from server (primary) to user after processing request with business requirements.

### b) User end

- The user has various options in system
- User can chat with the Chatbot which will provide solutions to problems and answer to any question related to crime
- Helplines and other relevant services are also available on the application

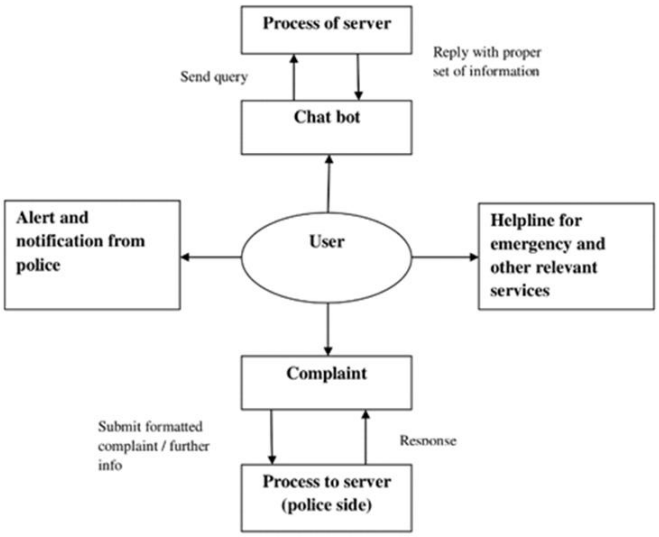



Fig. User end

- Alerts and notifications can be seen send by user
- Complaint can be register also the Chatbot will act as a complaint registration system if detects the need.

### c) Police end:

- Police gets complaint where they can validate the complaint, ask for more information from user and accept or reject.

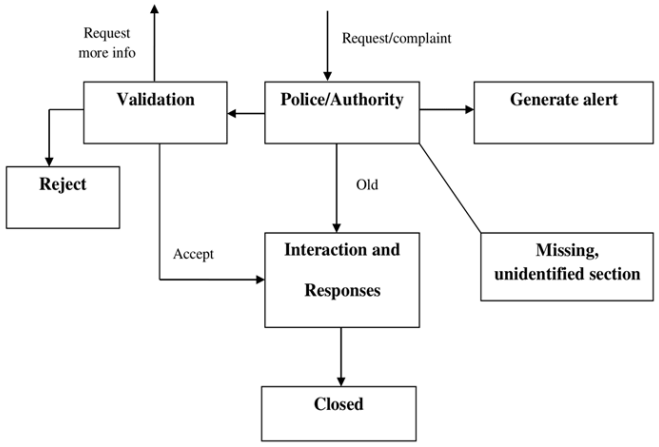



Fig. Police end

- Generate alerts in order to make citizens aware about particular activity
- Can control the missing persons and belongings section.
- Interact with user when he/she needs to.

### d) Server process

- When request gets to server it can be classified to static resources and query.
- These two requests goes from different stages.
- Static resources can be the simple database fetching and display. Where we do not need any mathematical computations to get the output.

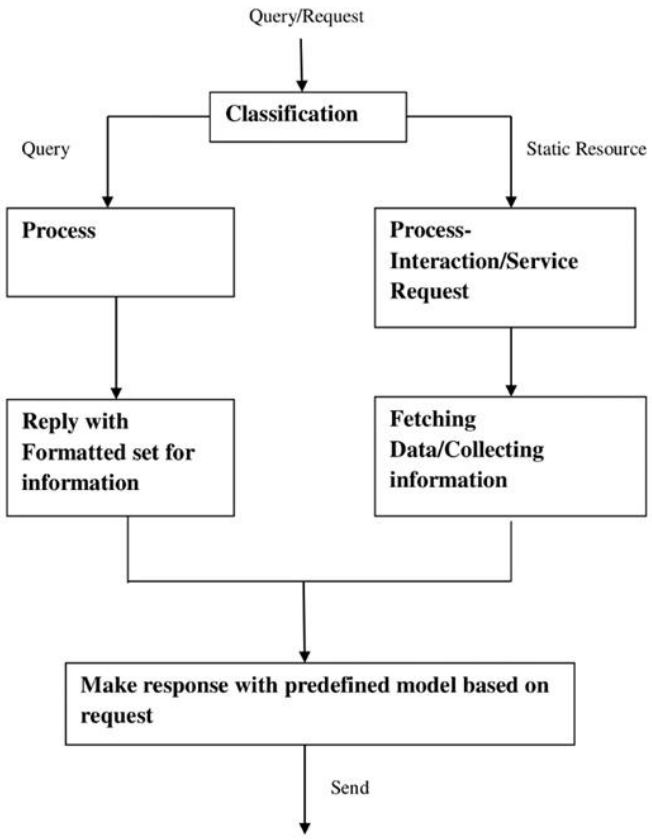



Fig. Server side

- But in query section there are several stages. Query
- may go through different machine learning models to understand the natural language using different algorithms and natural language tool kits. These query then understood by machine. Which machine learning algorithms this process is done we have the numerical output processed in different stages. With the business logic this output is converted to output which is expected by user.
- These two process sends the data to response section where formatting of response is done. This response is then send to the all type of user.

### E. Chatbot system

Chatbot will work as the machine/bot which chats user in natural language or as we refer the language in which human talks. To make this basic requirement fulfil first machine needs to understand the natural language because machine only understands the language of 0's and 1's other than a programming languages with set of rules. The machine cannot understand the human language. Natural language processing is the process of understanding the language with set of rules grammar. With set of mathematical rules and computations.

We implemented an algorithm for Chatbot which takes the input string and give appropriate response. We are using supervised learning model where we know the right answer and we want the model to set the rules to find right answer. This model is saved and used each time. We have to train the model for this work. For that we will use neural network. Neural networks works great in supervised learning.in neural network there is an input layer, output layer, and layers in between also called as hidden layers. While training we will decide input and output and network will make rules according to that. Our input goes through such several models, to extract category of crime, urgency and other. All have the similar training and prediction process. To make Chatbot more dynamic we have to apply more sophisticated ML algorithms which has ability to not only display the stored information but to state the same information in different forms of sentences without changing its meaning.

## F. Dataset

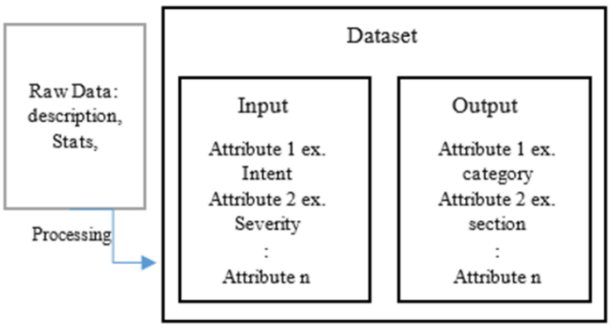



Fig. Dataset

Dataset is different than Database of the company or platform. Database contains the user information or company information. A static and mostly growing set of information. Which is used on daily basis.

On the other hand Dataset is set of information collected for training and testing the machine learning model. Machine learning model has to be trained to give expected output significant amount of times. To achieve that model has to be fed by appropriate data. We are using neural networks a deep leaning model to get our output. Input provided will be conversion of query in numerical format (neural networks only works with numbers). And output will be the array of output points in which selected neuron will hold 1 or any other number which suggest which output is chosen by model. This neural network will be using the dataset.

In this case dataset contains the dissimilar possible inputs in the form queries which can be asked by user and the appropriate responses for those queries. This data comes from the raw data which is not necessarily in the format used by model. For that reason we have to convert the data into tables and nested objects. The data goes through number of processes to make it more usable after that it converted to multiple parameters ex. Inputs, outputs, etc. These inputs and outputs holds different parameters which also used to differentiate from one another. We can build the dataset with any flexible technology or a database which holds great flexibility of easily accessing and manipulating data. In many cases this is done by using formats like JSON, XML, xlsx, CSV or to store the data sets DB's are also used such as MongoDB, MySQL. Dataset will be divided into training and testing sets. The proportion is important. We can divide dataset in standard proportions into 80% for training and 20% for testing.

In algorithm for training and testing this dataset will be used with appropriate data structure and programming logic for conversion and feeding to model.

## G. Training algorithm

1. Data  dataset {input, output}: Data is imported from the dataset where input and output is known.
2. For each input in data input:
   a. Tokenize the input sentence into word sequence.
      Convert sentence into array of words
   b. Remove non-alpha chars. From words
      Remove all non-alphabetical characters (? ,' . :)
   c. Get base word of each word.
      Convert the words into dictionary words (doing à do)
   d. Create dictionary of words from the total words in all inputs. Assign numbers to them the dictionary should contain only distinct words with distinct number values.
   e. Convert all words in input to numbers in dictionary.
      Neural network only works with numbers.
3. Create an output array for neural network: For all the outputs create the array of total outputs which contains only selected output as 1 and others as 0 (required for neural network).

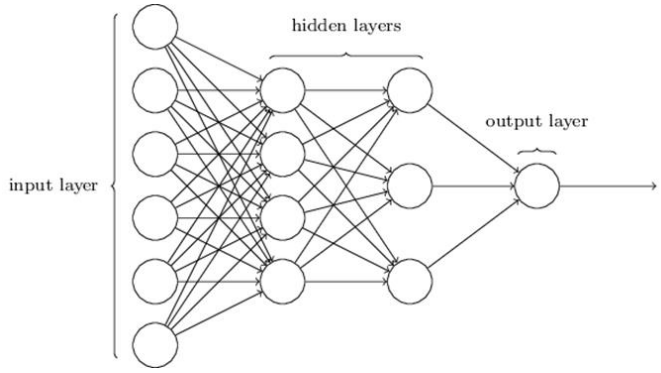



Fig. Neural Network

4. Create and define a user defined model or import form library:
   a. Define number of layers.
   b. Define number of neurons for each layer. For input it is same as size of max input size. And output as number of outputs. Define number of neurons in all middle layers.
   c. An activation function for neurons : ReLU

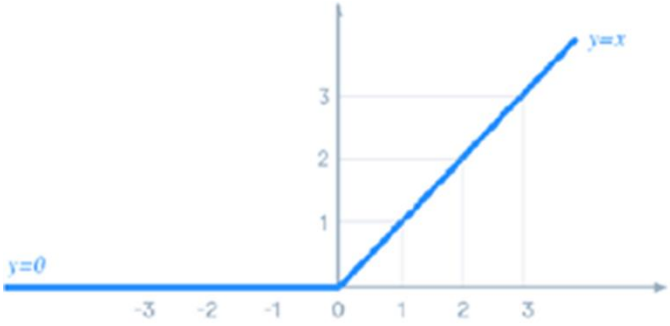



Fig. ReLU activation function

   d. Choose loss function: mean squared error chosen.
   e. Use any suitable optimizer: Adam chosen.
5. Give data to model.
6. Select epoch (number of times model has to train)
7. Start training
8. Test the model with testing set.

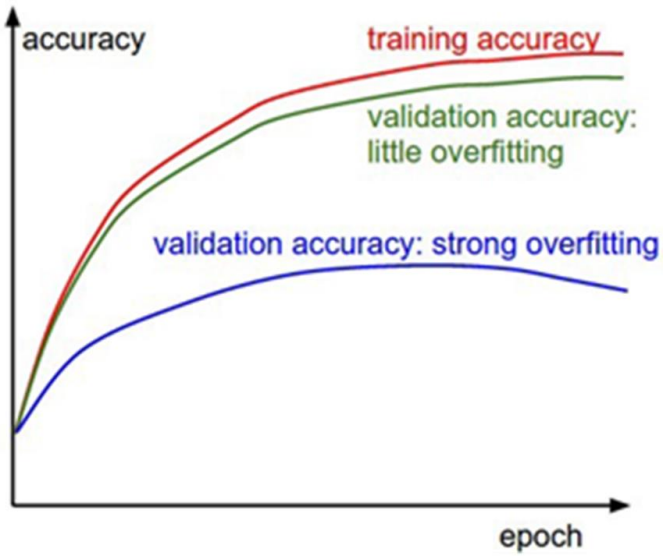



Fig. Model Accuracy

9. Deploy if accuracy meets decided threshold.

## H. Prediction algorithm

1. Tokenize the all words in the input. Convert array of words.
2. Convert words into dictionary equivalent numbers.
3. Give input to model.
4. Get the output (selected output neuron).

All the models in in this process works with same number of steps for different feature extractions.

## I. Cross platform

System is built with cross-platform technology where we have to put less efforts and time to develop efficient system. Which can work on multiple platforms easily native apps is one option for that where we can Cross-platform our application with flexible layout. Native apps can easily access device resources.

### J. Drawbacks

- Depends on external database for user verification: As our database holds only the information collected in portal itself it depends on the government database for Aadhar, PAN or any other verification.
- Needed to train models when government make amendments in law:
  In current situation of country in past 6 years government made or rather had to make amendments in the law and enforcements. With that frequency it has been observed that government will continue to do so in that case we have to retrain our model with new data.
- To use these services and get information of register complaints we need a device with working internet. In many rural areas there is an absence of such devices and inaccessibility of technology, system cannot help these citizens.
- System will require additional layers of security and extra care while controlling access: The Police or any authority type of user will have to use the system with extra care as it contains very sensitive data which attracts attention of many offenders and attackers. For that we need to train the staff for using the system.
- There is no supervisor in the system to keep eye on activities of police and other authority. We need to add more levels of user.

Chatbot accuracy directly depend on the training model and the dataset. This idea of providing information about the crime law and related topics is not yet implemented much to draw anyone's attention hence there is lack of data and knowledge in the field.

## III. EXPERIMENTAL RESULTS

The end product of this project we able to register our complaint and the complaint can be managed by using Complaint interaction and management system. User can ask questions to chatbot about criminal laws and ask for help.

**Complaint Process:**

When user files complaint it is assigned to authority of that respective area where crime has happened which is determined by the pin code entered by the user. After going to respective authority the internal verification will take place which can be done over the phone or any other method decided by authority. Once verification is done then complaint is opened. If Authority wants to send any notification to user then they can send through interaction management system. Where user will receive the message and user will also able to respond to the message all of this conversation is recorded. We make this communication easy and secured. After proceedings complaint can be closed by authority. All authority recorded conversations as well as the information of which phases did complaint have gone through is stored in the database and using access control it can be viewed by authorized users.

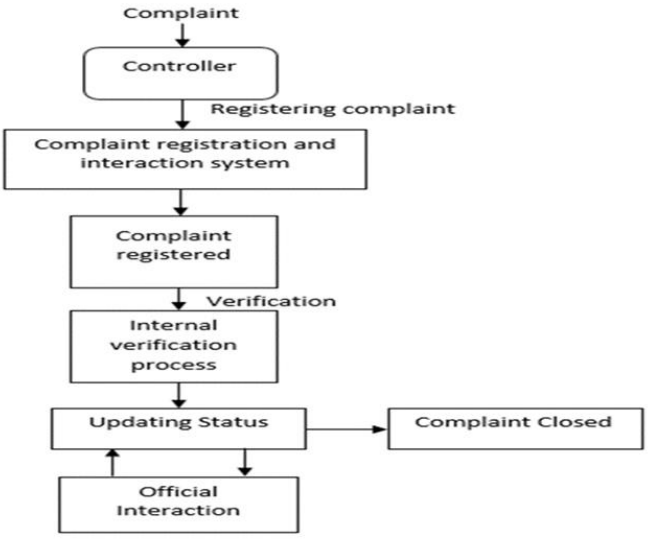



Fig. Complaint process

**Chatbot and Querying:**

Chatbot will help user to register complaint and make user comfortable to use the system other than that chatbot will also provide some emergency services.

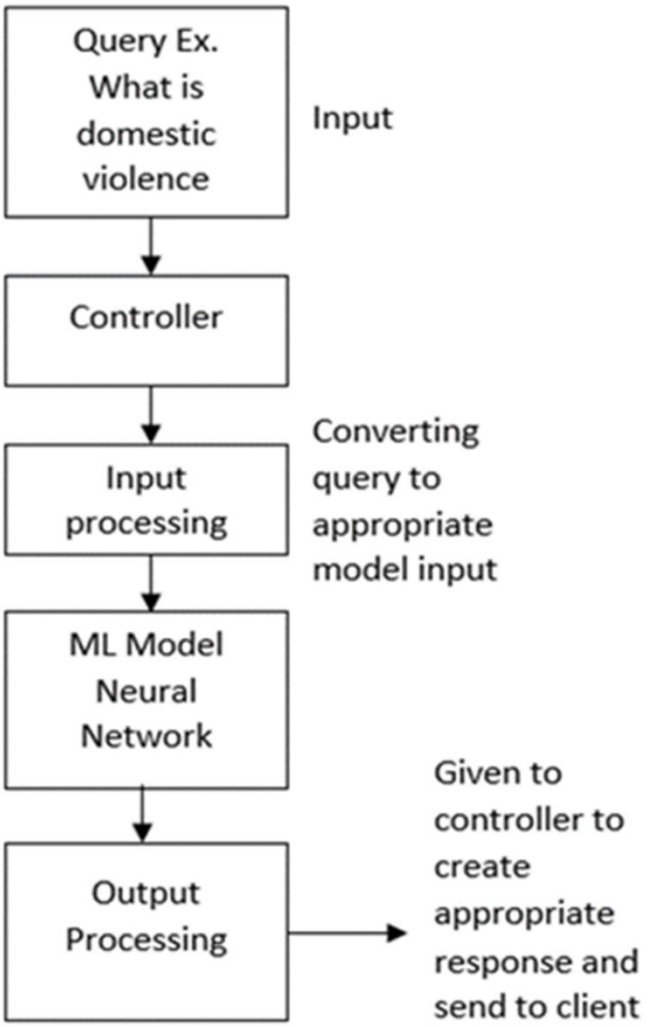
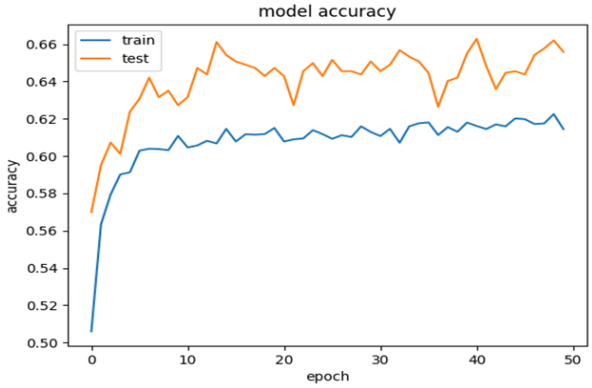



Fig. Chat-bot

Primary work of Chatbot is help user to know about the particular crime, law, and procedures. After creating the dataset and training the model with the dataset we saved the model deployed to server and model is now model is ready to give response. We can enter our query in chatbot the query will go through some stages. Query is give response. We can enter our query in chatbot the query will go through some stages. Query is first passed to controller where controller identifies that this query will go to machine learning model. Before predicting with the input first in input is processed and gone through some steps to convert the query into series of numbers because our machine learning model works only with numbers. After converting to numbers then input is given to model. Model predicts the output and select specific neuron which represents the category of our query now this selected neuron is processed and converted to response which is wrapped by controller and send to the client machine.




Our prediction model is artificial neural network which can be created in various way to predict the output neuron. Number of layers and neurons in layers can be varied based on how much large our dataset is.

## IV. CONCLUSION

In this paper an attempt has been made to present a new idea with current technology to solve important issues of society. With the help of natural language understanding and other machine learning algorithms we can built a system with minimum requirements and necessary services. First we discussed the traditional methods have been practiced till now. Then we discussed how we can change it with technology we have. After that we saw how system can be implemented. Taking basic needs of citizens this paper highlights on unfocussed areas of reachability of citizens towards the crime and law departments.

## V. REFERENCES


[1]. Ravichandran, K., & Arulchelvan, S. (2017). "Structural Equation Model Analyzed on Cyber Crime and Media Awareness in India". 2017 Second International Conference on Recent Trends and Challenges in Computational Models (ICRTCCM).

[2]. Zayid, E. I. M., & Farah, N. A. A. (2017). "A study on cybercrime awareness test in Saudi Arabia - Alnamas region". 2017 2nd International Conference on Anti-Cyber Crimes (ICACC)

[3]. Ki, Y. P., & Hee, Y. Y. (2011). "Crime Prevention System Based on Context-Awareness". 2011 3rd International Workshop on Intelligent Systems and Applications.

[4]. Datta, P., Panda, S. N., Tanwar, S., & Kaushal, R. K. (2020). "A Technical Review Report on Cyber Crimes in India". 2020 International Conference on Emerging Smart Computing and Informatics (ESCI).

[5]. Azeez, J., & Aravindhar, D. J. (2015). "Hybrid approach to crime prediction using deep learning". 2015 International Conference on Advances in Computing, Communications and Informatics (ICACCI).

[6]. Mkhwanazi, K., Owolawi, P. A., Mapayi, T., & Aiyetoro, G. (2020). "An automatic crime reporting and immediate response system". 2020 International Conference on Artificial Intelligence, Big Data, Computing and Data Communication Systems (icABCD).

[7]. Gambino O. Augello A. Caronia A. Pilato G. Pirrone R. Gaglio S., "Virtual conversation with a real talking head. Proceedings of the Conference on" Human System Interactions, 25-27 May 2008, Kraow, Poland, pp. 263-268.

[8]. R. S. Russell, "Language Use, Personality and True Conversational Interfaces", Project Report of AI and CSUniversity of Edinburgh, Edinburgh, pp.1-80, 2002.

[9]. Y. Zhou, X. Ziyu, A. W. Black, A. I. Rudnicky, "Chatbot Evaluation and Database Expansion via Crowdsourcing", Proc. of the Chatbot Workshop of LREC, US, pp. 16-19, 2016.

[10]. C. R. Anik, C. Jacob, A. Mohanan, "A Survey on Web Based Conversational Bot Design", JETIR, Vol.3, Issue.10, pp. 96-99, 2016.

[11]. Ramos, S., Perez-Lopez, J. A., & Abreu, R. (2020). "An Analysis of the Importance of the Artificial Intelligence on the Information System of Police Forces". 2020 15th Iberian Conference on Information Systems and Technologies (CISTI).

[12]. Mary Shermila, A., Bellarmine, A. B., & Santiago, N. (2018). "Crime Data Analysis and Prediction of Perpetrator Identity Using Machine Learning Approach". 2018 2nd International Conference on Trends in Electronics and Informatics (ICOEI).

[13]. Gonda, D. E., Luo, J., Wong, Y.-L., & Lei, C.-U. (2018). "Evaluation of Developing Educational Chatbots Based on the Seven Principles for Good Teaching". 2018 IEEE International Conference on Teaching, Assessment, and Learning for Engineering (TALE).

[14]. Murcia Trivino, J., Moreno Rodriguez, S., Diaz Lopez, D. O., & Gomez Marmol, F. (2019). "C3-Sex: a Chatbot to Chase Cyber Perverts. 2019 IEEE Intl Conf on Dependable, Autonomic and Secure Computing", Intl Conf on Pervasive Intelligence and Computing,IntlConf on Cloud and Big Data Computing, Intl Conf on Cyber Science and Technology Congress (DASC/PiCom/CBDCom/CyberSciTech).

[15]. Zolfi, H., Ghorbani, H., & Ahmadzadegan, M. H. (2019). "Investigation and classification of cyber-crimes through IDS and SVM algorithm". 2019 Third International Conference on I-SMAC (IoT in Social, Mobile, Analytics and Cloud) (I-SMAC)

[16]. Rajapakshe, C., Balasooriya, S., Dayarathna, H., Ranaweera, N., Walgampaya, N., & Pemadasa, N. (2019). "Using CNNs RNNs and Machine

Learning Algorithms for Real-time Crime Prediction". 2019 International Conference on Advancements in Computing (ICAC).

[17]. Kumar, M., Hanumanthappa, M., & Kumar, T. V. S. (2017). "Use of AADHAAR biometrie database for crime investigation — Opportunity and challenges". 2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS).

[18]. G. Krishna Vamsi; Akhtar Rasool; Gaurav Hajela, "Chatbot: A Deep Neural Network Based Human to Machine Conversation Model", 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT).

[19]. A. M. Rahman, Abdullah Al Mamun; Alma Islam, "Programming challenges of chatbot: Current and future prospective", 2017 IEEE Region 10 Humanitarian Technology Conference (R10-HTC).

[20]. Mounika Karna; D. Sujitha Juliet; R.Catherine Joy, "Deep learning based Text Emotion Recognition for Chatbot applications", 2020 4th International Conference on Trends in Electronics and Informatics (ICOEI)(48184).

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information TechnologyISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Emotion Recognition Based Personal Entertainment Robot Using ML & IP

**Shivani Chougule[1], Shubham Bhosale[1], Vrushali Borle[1], Vaishnavi Chaugule[1], Prof. Yogesh Mali[1]**
[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

This project presents a method to automatically detect emotional duality and mixed emotional experience using Linux based system. Co-ordinates, distance, and movement of tracked points were used to create features from visual input that captured facial expressions, head, face gestures, and face movement. Spectral features, prosodic features were extracted using the camera. Espeak and Pyttsx and Face API were used for calculations of features. A combined feature vector was created by feature level fusion and a cascade classifier was used for emotion detection. Live participants and actions are to be used for recording simultaneous mixed emotional experiences. As per the calculated result system will play songs and display the books list.

**Keywords** : Smart Emotion, Espeak and Pyttsx, and Face API

## I. INTRODUCTION

Emotion recognition has important applications in the field of medicine, education, marketing, security, and surveillance. Machines can enhance human-computer interaction by accurately recognizing human emotions and responding to those emotions. Existing research has mainly examined the automatic detection of a single emotion. But psychology and behavioral science studies have shown that humans can concurrently experience and express mixed emotions. For instance, a person can feel happy and sad at the same time. In this research combinations of six basic emotions (happiness, sadness, surprise, anger, fear, disgust, and neutral state) were used. This study aims to develop features that capture data from facial expressions to identify multiple emotions. In the case of a single-label classification problem each annotated feature-vector instance is only associated with a single class label. However, multiple concurrent emotion recognition is a multi-label classification problem. In a multi-label problem, each feature vector instance is associated with multiple labels such as the presence or absence of one of each six basic emotions. The multi-label classification is receiving increased attention and is being applied to many domains such as text, music, images, and video-based systems, security, and bioinformatics. This paper examined the recognition of concurrent emotional ambivalence and mixed emotions. Additionally, the study examined two concurrent emotions (emotion duality) to limit the scope of the research based on the availability of scenarios. This was done so that the experimental design was realistic. The subjects could express dual emotions with ease and observers could annotate the data without ambiguity. This study implemented a multimodal emotion recognition system with multiple

check box inputs to facilitate the annotation of concurrent emotions in the user interface software.

## II. PROBLEM STATEMENT

In recent years, a Variety of emotional expression processes shows that there are many ways to describe global and local speech properties, and one of the most effective is emotions. The main motivation of the system is to automatically identify the user's mood and according to that related books list, video list and music will play through Linux based system.

## III. LITERATURE SURVEY

[1]. S. Patwardhan, "Augmenting Supervised Emotion Recognition with Rule-Based Decision Model", arXiv, 2016.
Description: In this paper, we investigate the effect of the transfer of emotion-rich features between source and target networks on classification accuracy and training time in a multimodal setting for vision-based emotion recognition.

[2]. M. Liu, R. Wang, S. Li, S. Shan, Z. Huang, and X. Chen. Combining multiple kernel methods on Riemannian manifold for emotion recognition in the wild. ICMI, 2014.
Description: Emotional expressions of virtual agents are widely believed to enhance the interaction with the user by utilizing more natural means of communication. However, as a result of the current technology virtual agents are often only able to produce facial expressions to convey emotional meaning.

[3]. A. S. Patwardhan, "Augmenting Supervised Emotion Recognition with Rule-Based Decision Model", arXiv, 2016.
Description: This paper presents a method to automatically detect emotional duality and mixed emotional experience using multimodal audio-visual continuous data. Co-ordinates, distance, and movement of tracked points were used to create features from visual input that captured facial expressions, head, hand gestures, and body movement. Spectral features, prosodic features were extracted from the audio channel.

[4]. SE. Kahou, C. Pal, X. Bouthillier, P. Froumenty, C. Glehre,R. Memisevic, P. Vincent, A. Courville, Y. Bengio, RC. Ferrari and M. Mirza. Combining modality-specific deep neural networks for emotion recognition in video. Proceedings of the 15th ACM on International conference on multimodal interaction, 2013.
Description: This paper presents the initial implementation of a system of multimodal recognition of emotions using mobile devices and the creation of an effective database through a mobile application. The recognizer works into a mobile educational application to identify user's emotions as they interact with the device.

[5]. A. S. Patwardhan and G. M. Knapp, "Multimodal Affect Analysis for Product Feedback Assessment," IIE Annual Conference. Proceedings. Institute of Industrial Engineers-Publisher, 2013.
Description: In this paper, we investigate the effect of the transfer of emotion-rich features between source and target networks on classification accuracy and training time in a multimodal setting for vision-based emotion recognition.

## IV. PROPOSED SYSTEM

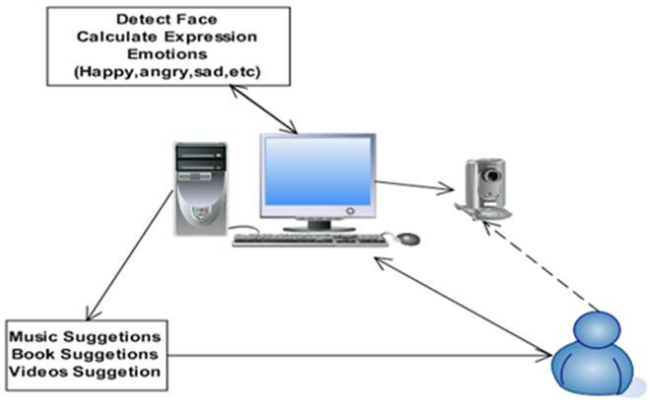



Fig 1. System architecture

### A. Module Description:

User: Use this system.

Server: Connection between User and database.

Database: Storage of information related to Facial characteristics, songs, and books uploaded.

Our system has mainly three modules, a user module, a mood detection module, and a video suggestion module. Various processes involved in these two modules are:

User Module:

Users can use the system and store songs and books library in the system.

Mood detection Module:

As per the facial expression, it will recognize the mood of the user it will show a songs list or books library and it will also give video suggestions.

Video suggestion Module:

According to the user's mood, it will give suggestions of videos.

### B. Mathematical Model:

Input-Output:

U= {I, O, f, S, F}

Where,

I= {I1, I2,I3}

- I1= {l1,l2…... ln} where n size of image and n>0
- I2= i.e. image capturing using camera
- I3= i.e. face images

O= {O1,O2,O3,O4}

- O1= Image Preprocess
- O2= Image Color Segmentation
- O3 = Image Segmentation (gray scale)
- O4 = emotion face detect

f= {f1,f2,f3,f4,f5}

- f1= preprocess (image,I1, I2, I3)
- f2 = color_segmentation (Image,O2)
- f3 = image_segmentation(Image,O3)
- f4 = face_detection(Image, f2)

## V. RESULT AND DISCUSSION


Fig 2. Emotion detected and song play

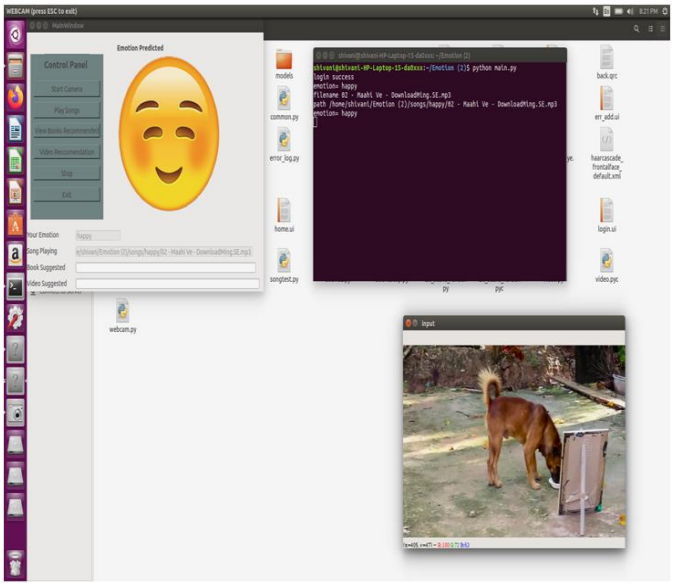


Fig 3. Emotion detected and video play

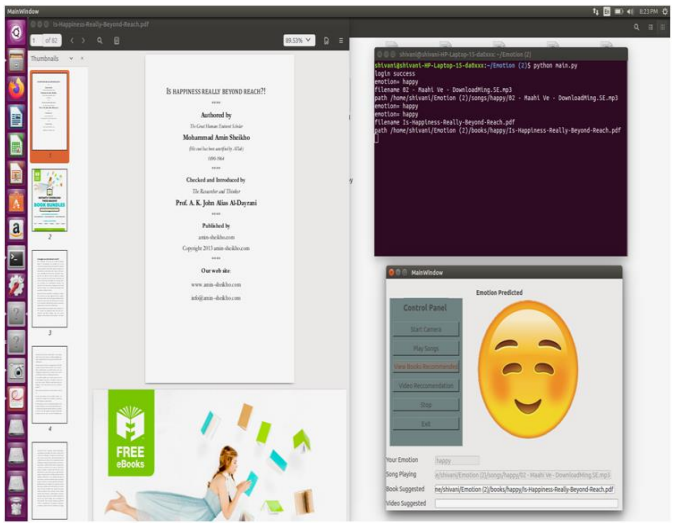



Fig 4. Emotion detected and Book opened

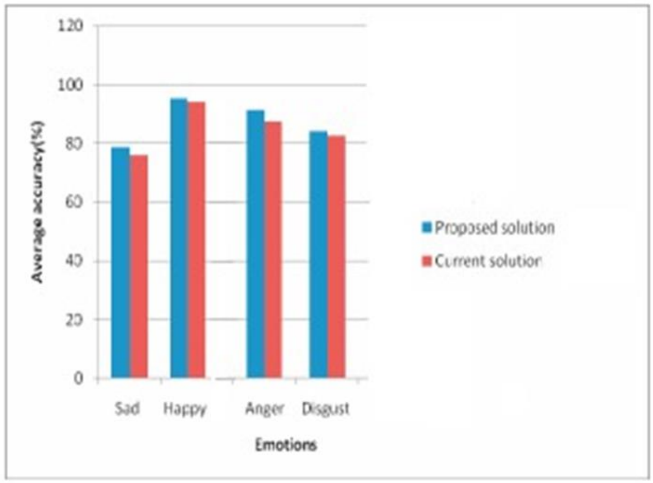



Fig 5. Average accuracy(%) of emotions in a bar graph

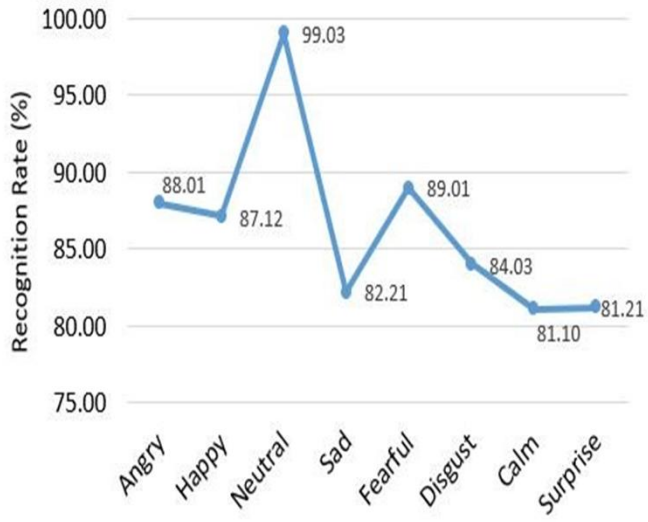



Fig 6. The recognition rate of each Emotion in a line graph

| No. | Type of Gesture | No. of Input Images | Recognized | Result (%) |
|---|---|---|---|---|
| 1 | Happy | 13 | 12 | 92.3 |
| 2 | Disgust | 11 | 10 | 90.9 |
| 3 | Anger | 10 | 9 | 90 |

Table 1. Average accuracy(%) of some emotions

## VI.CONCLUSION

To conclude, music is an important means of regulating mood in various everyday situations. The proposed system is readily available to everyone and can be listened to almost anywhere. The system is directly dependent upon the Facial Expressions of the user, so it is very effective.

## VII. REFERENCES

[1]. A. S. Patwardhan, "Augmenting Supervised Emotion Recognition with Rule-Based Decision Model", arXiv, 2016.

[2]. A. S. Patwardhan and G. M. Knapp, "Affect Intensity Estimation Using Multiple Modalities," Florida Artificial Intelligence Research Society Conference, May. 2014.

[3]. A. S. Patwardhan and G. M. Knapp, "Multimodal Affect Analysis for Product Feedback Assessment," IIE Annual Conference. Proceedings. Institute of Industrial Engineers-Publisher, 2013.

[4]. SE. Kahou, C. Pal, X. Bouthillier, P. Froumenty, C. Glehre,R. Memisevic, P. Vincent, A. Courville, Y. Bengio, RC. Ferrari and M. Mirza. Combining modality-specific deep neural networks for emotion recognition in video. Proceedings of the 15th ACM on International conference on multimodal interaction, 2013.

[5]. F. D. Schönbrodt and J. B. Asendorpf, " The Challenge of Constructing Psychologically

Believable Agents," J. Media Psychology, vol. 23, pp. 100-107, Apr. 2011.

[6]. N. C. Krämer, I. A. Gurgel, and G. Bente, " Emotion and motivation in embodied conversational agents," presented at the AISB'05 Conv., Symp. on Agents that Want and Like: Motivational and Emotional Roots of Cognition and Action, Hatfield, UK, 2005.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information TechnologyISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Automatic Whitelist Generation for SQL Queries Using Desktop Application Tests

**Venkati Mane[1], Jayesh Trivedi[1], Manalikamble[1], Shital Janjal[1], Prof. Vandana Chavan[2]**

[1]Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

In this survey paper the planned system has been developed to change secure access of information to a voice-based programme (UI) by sanctionative voice-based authentication Associate in Nursingd integration with an existing linguistic communication process (NLP) system. during this survey work on the voice-based SQL question generation. we have a tendency to study the question of a way to improve the attractive the results from question results in addition as applying the question to the info. ancient predefined question forms don't seem to be ready to satisfy varied ad-hoc queries from users on those databases. Here, we have a tendency to propose Machine learning based mostly technique to come up with the SQL question supported user voice, a unique info question kind interface that is in a position to dynamically generate question forms.

**Keywords :** NLP, Languages and compilers, Optimization, Verification, Voice Recognition, Machine-independent microcode generation.

## I. INTRODUCTION

In different words, human language technology may be a technique, which might create the pc perceive the languages naturally utilized by humans. during this project, we have a tendency to square measure translating English question into a SQL question victimisation linguistics synchronic linguistics. The system has been settle for users question in language as associate input. The program has been check whether or not the question is valid or not.

Then we have a tendency to has been generate tokens by acting the division of the question clause. every token represents one word within the users question. The tokens from the question clause square measure compared with clauses already keep within the wordbook. The wordbook has to be perpetually updated. Then the algorithmic program scans the tokens and tries to seek out attributes gift within the question. Then we discover all the tables within the information that contain the attributes by examination syntax and linguistics. Then we have a tendency to build the ultimate SQL question and

execute it on the information and come back the result dataset to the user.

Natural Language process (NLP) is a district of application and analysis that explores however computers may be accustomed perceive and manipulate language speech or text to try and do helpful things. the muse of human language technology consist variety of disciplines, namely, laptop and data sciences, linguistics, arithmetic, electrical and electronic engineering, AI artificial intelligence, and scientific discipline. human language technology researchers aim to assemble data on however hu- man beings use and manipulate languages to perform desired tasks in order that applicable tools and techniques may be developed. Applications of human language technology embody variety of fields of study like polyglot and cross-language info retrieval (CLIR), machine dealing, natural language, text process and report, user interfaces, speech recognition, AI and professional systems.

While language is also the simplest system for individuals to be told and use, it's tried to be the toughest for a laptop to know. The goal of human language technology is to change communication between individuals and computers while not resorting to acquisition of advanced commands and procedures.

## II. PROPOSED SYSTEM

### A. Description:

This system has been developed to change secure access of knowledge to a voice-based programme (UI) by sanctionative voice-based authentication Associate in Nursingd integration with an existing language process (NLP) system.

We address the question of the way to improve the attractive the results from question results.

Here, we tend to propose Machine learning based mostly technique to get the SQL question supported user voice, a completely unique information question kind interface, that is ready to dynamically generate question forms.

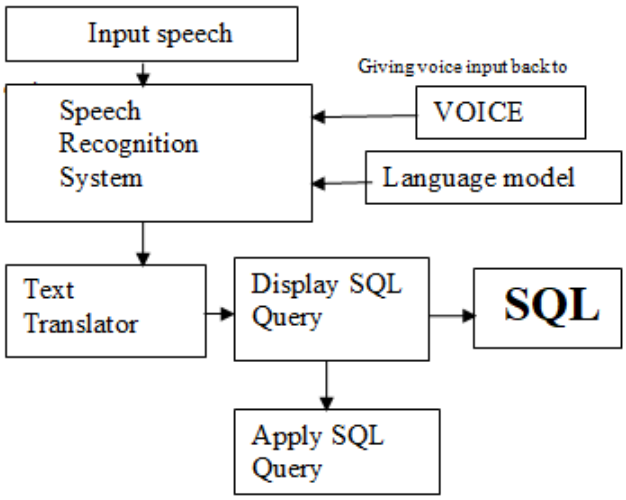



**Fig 1. System architecture**

### B. Mathematical Model:

Input-Output: Mathematical ModelU= {I, O, f, S, F}
Where,I= {I1, I2}

- I1= {l1,l2…... ln} where n sql query
- I2= i.e. sql query voice based
- O= {O1,O2,O3, O4, O5}
- O1= Voice process
- O2= Sql Query Generate
- O3 = Apply SQL query
- O4 = SQL query detection
- O5 =Voice Generationf= {f1,f2}
- f1= preprocess (voice, sql query)
- f2 = analysis (sql query)S: Success:
- SQL query successfully apply

F: Failure:

- Algorithm not working properly
- Voice command failure

## III. RESULTS AND DISCUSSION

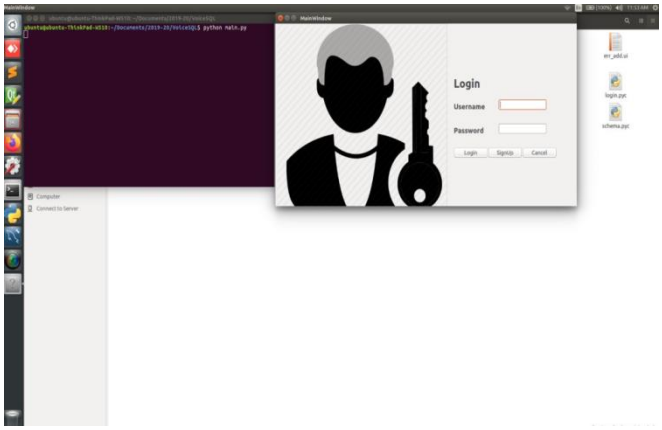



Fig 2. Login Page

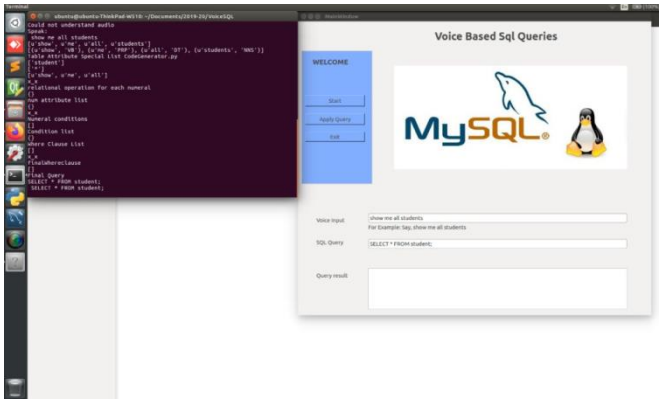



Fig 3. Voice Input Query

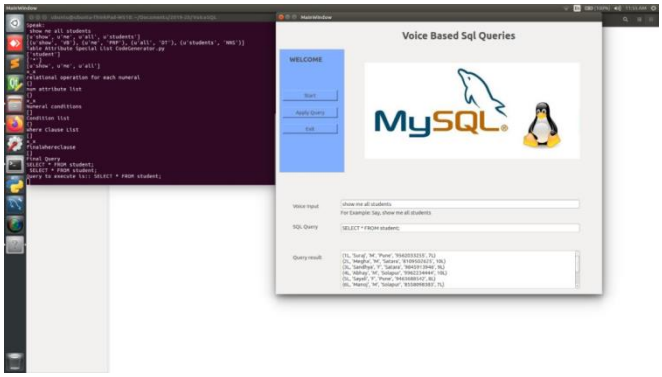



Fig 4. Query Result

## IV.CONCLUSION

The implementation of the planned system aims to translate SQL question into speech (voice). The scope of the project is to boost the popularity capability for varied SQL question and achieving a lot of accuracy to get the info. We address the question of a way to improve the attractive the results from question results. ancient predefined question forms don't seem to be ready to satisfy varied ad-hoc queries from users on those databases. Here, we have a tendency to propose Machine learning primarily based technique to get the SQL question supported user voice, a unique info question kind interface, that is ready to dynamically generate question forms.

## V. REFERENCES

[1]. F.Siasar djahantighi, M.Norouzifard, S.H.Davarpanah, M.H.Shenassa, "USING NATURAL LANGUAGE PROCESSING IN ORDER TO CREATE SQL QUERIES", in Proceedings of the International Conference on Computer and Communication Engineering, Kuala Lumpur, May 2008, pp. 600-604

[2]. NATURAL LANGUAGE PROCESSING USING PYTHON International Journal of Scientific Engineering Research Volume 8, Issue 5, May-2017 19 ISSN 2229-5518[IEEE]

[3]. Natural Language Processing Techniques Applied in Information Retrieval-Analysis and Implementation in Python, TulikaNarang, International Journal of Innovations Advance- ment in Computer Science IJIACS ISSN 2347 – 8616 Volume 5, Issue 4 April 2016

[4]. Anuradha Mohite, Varunakshi Bhojane, "Natural Language Interface to Database Using Modified Co-occurrence Matrix Technique 2015 International Conference on Pervasive Computing (ICPC)

[5]. Levin E., Pieraccini R., Eckert W. "Learning dialogue strategies within the Markov decision process framework", Automatic Speech Recognition and Understanding IEEE Proceedings, pp. 72-79, 1997.[IEEE]

[6]. Liddy, E. D. In Encyclopedia of Library and Information Science, 2nd Ed. Marcel Decker, Inc.

[7]. J. Allan. Perspectives on information retrieval and speech. In Information Retrieval Techniques for Speech Applications: LNCS 2273, pages 1–10, 2002.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information TechnologyISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Text to Image Synthesis

**Chaitanya Ghadling[1], Firosh Vasudevan[1], Ruchin Dhama[1], Shreya Lad[1], Sunil Rathod[2]**
[1]Student, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

One of the most difficult things for current Artificial Intelligence and Machine Learning systems to replicate is human creativity and imagination. Humans have the ability to create mental images of objects by just visualizing and having a general look at the description of that particular object. In recent years with the evolution of GANs (Generative Adversarial Network) and its gaining popularity for being able to somewhat replicate human creativity and imagination, research on generating high quality images from text description is boosted tremendously.

Through this research paper, we are trying to explore a newly developed GAN architecture known as Attentional Generative Adversarial Network (AttnGAN) that generates plausible images of birds from detailed text descriptions with visual realism and semantic accuracy.

**Keywords :** GAN, AI, ML, Deep Learning, AttnGAN

## I. INTRODUCTION

**GAN (Generative Adversarial network):**

GANs consists of two components- Generator and Discriminator which are constantly in touch with each other working in tandem. The generator generates images and the discriminator then assesses those images and provides feedback to generator about the correctness of the generated image in comparison with real images of the same object. The two neural networks constantly compete with each other to become more accurate in their predictions. The generator creates new images based on the feedback provided by the discriminator and the discriminator is trained by providing real images. The generator improves to fool the discriminator and the discriminator trains itself not to get fooled by the generator. The basic structure of GAN is shown in Fig-1.

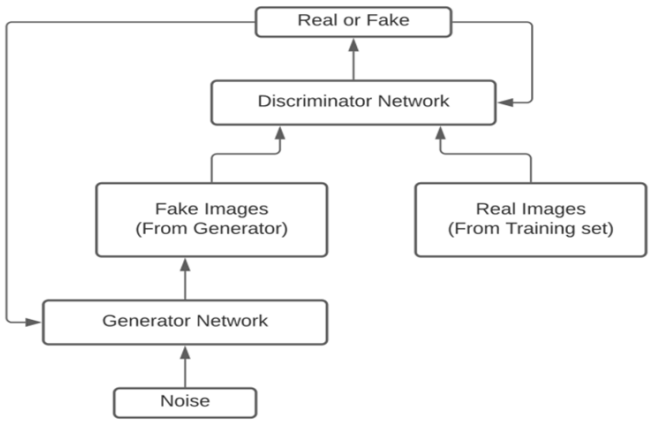



Fig-1. Basic Structure of GAN

## II. LITERATURE SURVEY

In 2014, Ian Goodfellow and his colleagues designed Generative Adversarial Network with the idea of broadening scope of neural networks from just prediction and classification to allowing them to generate their own images.

Though originally proposed as a form of generative model for unsupervised learning, GANs have also proven useful for semi-supervised learning, fully supervised learning and reinforcement learning. After various architectures developed to generate images by providing text description the quality of images along with semantic accuracy can be discussed from the Table-1.

Table-1 : Literature Survey

| Sr. No. | Paper Name | Advantages | Limitations |
|---|---|---|---|
| 1. | Generative Adversarial Text to Image synthesis | 1st major model for text to image synthesis | Lacks image quality.Does not work properly with different variety of datasets |
| 2. | StackGAN++: Realistic Image synthesis with Stacked Generative Adversarial Networks | Improves the quality of image substantially | Difficult to train.Highly unstable and sensitive to hyper parameters. |
| 3. | MirrorGAN: Learning Text to Image Generation by Redescription | Semantic consistency of image is highly improved. | Modules are not jointly optimized with complete end-to-end training. |
| 4. | Learn, Imagine and Create: Text to Image Generation from prior knowledge. | Both visual realism and semantic accuracy is highly improved over baseline models. | Modules are not jointly optimized with complete end-to-end training. |

## III. TAXONOMY CHART

The two main attributes that the performance of text to image converting GANs are

i. Image Quality- How real the image drawn looks.

ii. Semantic Accuracy- How accurate the image is with respect to the given text description.

To have a quantitative evaluating metric to measure the performance, we have used Inception Score for two datasets namely COCO and CUB.

Table 2 contains the comparison on how different GAN architecture performed on given parameters.

Inception Scores of all the models is taken from their respective papers.[2],[3], [4], [5],[6].

Table-2: Taxonomy Chart

| Attributes Model | Image Quality | Semantic Accuracy | Inception Score (COCO dataset) | Inception Score (CUB dataset) |
|---|---|---|---|---|
| DC GAN | LOW | LOW | 8.20 | 3.6 |
| STACK GAN | MEDIUM | LOW | 8.45 | 3.7 |
| STACK GAN++ | HIGH | MEDIUM | 8.30 | 3.82 |
| MIRROR GAN | MEDIUM | HIGH | 26.47 | 4.56 |
| LEICA GAN | MEDIUM | MEDIUM | 20.42 | 4.62 |

## IV. PROPOSED METHODOLOGY

The GAN model used in the proposed system is called as Attentional Generative Adversarial Network(AttnGAN). The architecture of the model is shown in Figure- 2. This model has two major components:

i. Attentional Generative Network.

ii. Deep Attentional Multimodal Similarity Model.

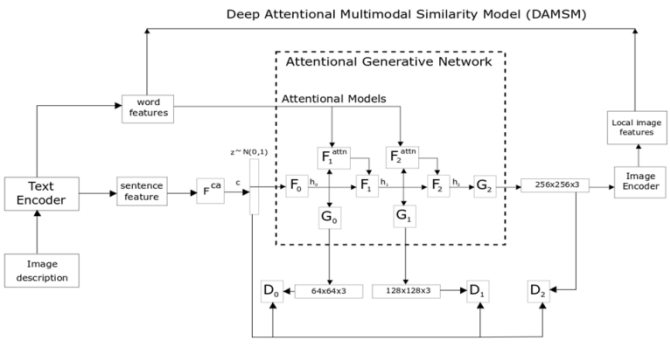



Figure -2. Proposed System Architecture

### i. Attentional Generative Network.

Earlier Models for Text to Image Synthesis, typically encoded the entire text description into a single vector as condition for image creation. This enables us to generate various sub-regions of image conditioned on text that are relevant to those sub-regions. The proposed attentional generative network has m generators G0, G1….,Gm-1which take the hidden states h0, h1….,hm-1as input and generate images of small-to-large scales x0, x1….,xm-1.

Specifically,

$$h_0 = F_0(z, F^{ca}(\bar{e}));$$
$$h_i = F_i(h_{i-1}, F_i^{attn}(e, h_{i-1})) \text{ for } i = 1, 2, ..., m-1;$$
$$\hat{x}_i = G_i(h_i).$$

(Equation 1)

Here, z is a noise vector usually sampled from a standard normal distribution. ‘ē’ is a global sentence vector, and ‘e’ is the matrix of word vectors. Fca represents the Conditioning Augmentation that converts the sentence vector e to the conditioning vector. Fi attn is the proposed attention model at the I th stage of the AttnGAN. Fca, Fi attn, Fi, and Gi are modeled as neural networks. The attention model Fattn(e,h) has two inputs: the word features e ϵ RDxTand the image features from the previous hidden layer h ϵ RDxT. The word features are first converted into the common semantic space of the image features by adding a new perceptron layer, i.e., e′= Ue, where U ϵ RDxD. Then, a word-context vector is computed for each sub-region of the image based on its hidden features h (query). Each column of h is a feature vector of a sub-region of the image. For the jth sub-region, its word context vector is a dynamic representation of word vectors relevant to hj , which is calculated by vector is a dynamic representation of word vectors relevant to hj , which is calculated by

$$c_j = \sum_{i=0}^{T-1} \beta_{j,i} e'_i, \quad \text{where } \beta_{j,i} = \frac{\exp(s'_{j,i})}{\sum_{k=0}^{T-1} \exp(s'_{j,k})},$$

(Equation 2)

S'I,j = hTje'I and $\beta_{j,i}$ indicates the weight the model attendsto the ith word when generating the jth sub-region of theimage. We then donate the word-context matrix for imagefeature set h by
$F^{attn}(e,h) = (c_0, c_1, ..., c_{N-1}) \in \mathbb{R}^{\hat{D}\times N}$.

**Attentional Model:**

To generate realistic images with multiple levels (i.e., sentence level and word level) of conditions, the final objective function of the attentional generative network is defined as

$$\mathcal{L} = \mathcal{L}_G + \lambda \mathcal{L}_{DAMSM}, \text{ where } \mathcal{L}_G = \sum_{i=0}^{m-1} \mathcal{L}_{G_i}.$$

(Equation 3)

Here, λ is a hyperparameter to balance the two terms of the above equation. The first term is the GAN loss that jointly approximates conditional and unconditional distributions.

**Generator Model:**

At the i th stage of the AttnGAN, the generator Gi has a corresponding discriminator Di . The adversarial loss for Gi is defined as

$$\mathcal{L}_{G_i} = \underbrace{-\frac{1}{2}\mathbb{E}_{\hat{x}_i\sim p_{G_i}}[\log(D_i(\hat{x}_i)]}_{\text{unconditional loss}} \underbrace{-\frac{1}{2}\mathbb{E}_{\hat{x}_i\sim p_{G_i}}[\log(D_i(\hat{x}_i,\bar{e})]}_{\text{conditional loss}},$$

(Equation 4)

where the unconditional loss determines whether the image is real or fake while the conditional loss determines whether the image and the sentence match or not.

**Discriminator Model:**

Alternately to the training of Gi, each discriminator Di is trained to classify the input into the class of real or fake by minimizing the cross-entropy loss defined by

$$\mathcal{L}_{D_i} = \underbrace{-\frac{1}{2}\mathbb{E}_{x_i\sim p_{data_i}}[\log D_i(x_i)] - \frac{1}{2}\mathbb{E}_{\hat{x}_i\sim p_{G_i}}[\log(1-D_i(\hat{x}_i)]}_{\text{unconditional loss}} + \underbrace{-\frac{1}{2}\mathbb{E}_{x_i\sim p_{data_i}}[\log D_i(x_i,\bar{e})] - \frac{1}{2}\mathbb{E}_{\hat{x}_i\sim p_{G_i}}[\log(1-D_i(\hat{x}_i,\bar{e})]}_{\text{conditional loss}},$$

(Equation 5)

where xi is from the true image distribution pdatai at the i th scale, and xˆi is from the model distribution pGi at the same scale. Discriminators of the AttnGAN are structurally disjoint, so they can be trained in parallel and each of them focuses on a single image scale.

**ii. Deep Attentional multimodal similarity model**

The attention-driven image-text matching score is designed to measure the matching of an image-sentence pair based on an attention model between the image and the text. We first calculate the similarity matrix for all possible pairs of words in the sentence and sub-regions in the image by:

$$s = e^T v,$$

where s 2 RT_289 and si;j is the dot-product similarity between the ith word of the sentence and the jth sub-region of the image. We find that it is beneficial to normalize the similarity matrix as follows

$$\bar{s}_{i,j} = \frac{\exp(s_{i,j})}{\sum_{k=0}^{T-1}\exp(s_{k,j})}.$$

(Equation 6)

Then, we build an attention model to compute a region context vector for each word (query). The region-context vector ci is a dynamic representation of the image's sub-regions related to the ith word of the sentence. It is computed as the weighted sum over all regional visual vectors, i.e.

$$c_i = \sum_{j=0}^{288}\alpha_j v_j, \text{ where } \alpha_j = \frac{\exp(\gamma_1\bar{s}_{i,j})}{\sum_{k=0}^{288}\exp(\gamma_1\bar{s}_{i,k})}.$$

(Equation 7)

Here, γ1 is a factor that determines how much attention is paid to features of its relevant sub-regions when computing the region-context vector for a word. Finally, we define the relevance between the ith word and the image using the cosine similarity between ci and ei,

$$i.e., R(c_i, e_i) = (c_i^T e_i)/(||c_i||||e_i||).$$

Inspired by the minimum classification error formulation in speech recognition the attention-driven image-text matching score between the entire image (Q) and the whole text description (D) is defined as

$$R(Q, D) = \log\Big(\sum_{i=1}^{T-1} \exp(\gamma_2 R(c_i, e_i))\Big)^{\frac{1}{\gamma_2}},$$

(Equation 8)

where γ2 is a factor that determines how much to magnify the importance of the most relevant word-to-region context pair. When $\gamma_2 \to \infty$, $R(Q, D)$ approximates to $\max_{i=1}^{T-1} R(c_i, e_i)$.

The DAMSM loss is designed to learn the attention model in a semi-supervised manner, in which the only supervision is the matching between entire images and whole sentences (a sequence of words). For a batch of image-sentence pairs $\{(Q_i, D_i)\}_{i=1}^{M}$, the posterior probability of sentence Di being matching with image Qi is computed as

$$P(D_i|Q_i) = \frac{\exp(\gamma_3 R(Q_i, D_i))}{\sum_{j=1}^{M} \exp(\gamma_3 R(Q_i, D_j))},$$

(Equation 9)

## V. RESULT AND DISCUSSION

Following the Zhang et al. [6], we have used Inception Score [7] as the quantitative evaluation measure. Also we have used R-precision, a common evaluation metric as a complementary evaluation measure for the text to image synthesis. The main feature that distinguishes our model from the pre-existing models is the presence of DAMSM which improves the performance of the model.

To test the proposed ŁDAMSM

We adjust the value of λ (See equation 3). From Table we can see as the value of λ increases both inception score and R-precision increases substantially.

| Method (AttnGAN) | Inception Score | R-Precision (%) |
|---|---|---|
| No DAMSM | 3.92 + 0.03 | 11.26 + 6.20 |
| λ= 0.1 | 4.21 + 0.05 | 18.62 + 4.05 |
| λ= 1 | 4.28 + 0.04 | 30.28 + 3.28 |
| λ= 5 | 4.36 + 0.04 | 55.76 + 5.69 |
| λ= 10 | 4.30 + 0.05 | 60.81 +3.44 |

Figure 3 and 4 shows us immediate results of the CUB dataset as images of 64 x 64 generated by G0, 128 x 128 generated by G1, 256 x 256 generated by G2 of the AttnGAN.

Figure 3: Text: A yellow bird with long beak

Figure 4: Text: A red bird with long beak

To elaborate the results the first stage of AttnGAN (G0) generates the skeleton of the object in low resolution. Since only single vector input is utilized here, word level detail is generally missing. These mistakes are later rectified during next stages of high resolution image generation by G1 and G2. As seen in Figure 3 and Figure 4, words like the, this, bird are generally handled by the Fattn model for locating the object. The initial image of 64 x 64 resolution does not

give attention to colour or shape of the bird's attributes. However in 128 x 128 image we can see that the image starts to give more attention to words like 'short beak', 'black crown', 'red wings' and'blue wings' along with better quality of image. In the end the image generated contains all the word level features we described in the text with a resolution of 256 x 256.

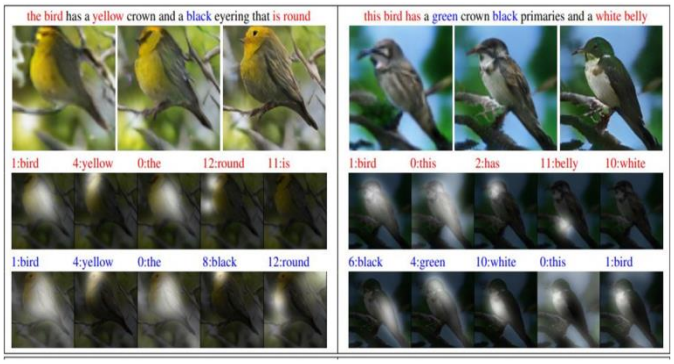



Figure 5. Intermediate results of our AttnGAN on CUB test sets. In each block, the first row gives 64×64 images by G0, 128×128 images by G1 and 256×256 images by G2 of the AttnGAN; the second and third row shows the top-5 most attended words by F attn 1 and F attn 2 of the AttnGAN, respectively.

## VI.CONCLUSION

The performance of Attentional Generative Attentional Model is greatly improved over the existing models that deal with generation of image from text description. The quality of image can be improved even more by adding more feature generator. But due to the limitation on memory and computing capabilities we limit the resolution quality to 256 x 256. But in future if the hardware performance improves we can go ahead for even better resolution. Increase in inception. score by over 12% from other models on the CUB dataset shows the effectiveness of the model. Exhaustive experimentation can greatly demonstrate the ability of the proposed model in handling complex scenes having various word level detail that needs to be drawn on the image.

VII.

ACKNOWLEDGEMENT

It gives us a great pleasure in presenting the paper on "TEXT TO IMAGE SYNTHESIS". We are really grateful to Dr Sunil Rathod for giving an opportunity to work with R&D cell of our department and providing us with necessary guidance with our project. We would like to take this opportunity to thank Dr. Pankaj Agarkar, Head of Computer Engineering Department, DYPSOE, Pune for providing us with an opportunity to present this paper. Our special thanks to Dr. Ashok Kasnale, Principal DYPSOE who motivated us and created a healthy environment for us to learn in the best possible way. We also thank all the staff members of our college for their support and guidance.

## VII. REFERENCES

[1]. AttnGAN: Fine - grained Text to Image Generation with Attentional Generative Adversarial Networks.

[2]. StackGAN++: Realistic Image Synthesis with Stacked Generative Adversarial Networks.

[3]. Generative Adversarial Text to Image Synthesis.

[4]. MirrorGAN: Learning Text to Image Generation by Redescription.

[5]. Learn, Imagine, and Create: Text to Image Generation from Prior Knowledge.

[6]. H. Zhang, T. Xu, H. Li, S. Zhang, X. Wang, X. Huang, and D. Metaxas. Stackgan: Text to photo-realistic image synthesis with stacked generative adversarial networks. In ICCV, 2017. 1, 2, 3, 5, 7

[7]. A. Agrawal, J. Lu, S. Antol, M. Mitchell, C. L. Zitnick, D. Parikh, and D. Batra. VQA: visual question answering. IJCV, 123(1):4–31, 2017.

[8]. D. Bahdanau, K. Cho, and Y. Bengio. Neural machine translation by jointly learning to align and translate. arXiv:1409.0473, 2014.

[9]. E. L. Denton, S. Chintala, A. Szlam, and R. Fergus. Deep generative image models using a laplacian pyramid of adversarial networks. In NIPS, 2015.

[10]. T. Salimans, I. J. Goodfellow, W. Zaremba, V. Cheung, A. Radford, and X. Chen. Improved techniques for training gans. In NIPS, 2016. 2, 5.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information TechnologyISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# A Smart Digital Health Care Record with Prediction of Health Condition

**Gopal Mule*[1], Vishakha Tapkir[1], Aishwarya Tingre[1], Saurabh Nangare[1], Sunil Rathod[2]**
[1]Student, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India
[2]Assistant Professor, Department Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT
Humans are known to be the most intelligent species on the earth and are inherently more health conscious. Since Centuries mankind has discovered various healthcare systems. To automate the process and predict diseases accurately machine learning methods are attending popularity in research community. We are implementing machine learning methodologies to identify the best-predicted values related to the patients in their respected health condition and also need to analyze the previous health records. The accuracy in prediction is achieved bymaintaining a repository or the warehouse wherein the digital data related to the patients and their treatment is maintained.

**Keywords :** Healthcare, Health Card, QR Code, Prediction, Methodology, Algorithms.

## I. INTRODUCTION

keep In this paper,we are proposing the health care system that stores the overall health information of the patient in a Digital card. This card will consist of all the medication details, reports etc. of the patient.The implementation of the project has done using Machine learning in python.

### Machine Learning

Machine learning is the main background of this prediction process and the data we acquired from the medical application. The information we gathered can be used for the machine learning models for better prediction of what is going to happen for the patient in future and what are the main constrains the patients have to follow if there are any problems withtheir health condition.[9][10]

## II. LITERATURE SURVEY

The table given below shows various existing system or models used so for in the context of fruit classifications.

Table i: Literature Survey Table

| Sr. No. | Paper Name | Advantages | Limitations |
|---|---|---|---|
| 1. | A Smart Card Based Healthcare System | -Access accurate health data quickly. -Encryption | -Internet supported system ,Network issue. |

| | | | |
|---|---|---|---|
| | | Keys and Digital signature. -Software Resuability. | -Technical problem risks are high. |
| 2. | A Case Study For Bangladesh for Healthcare System | -Secure and Authenticated and Data Communication. -Speed ,Portability -Efficent to use and easy interface. | -Less Cost-efficent. -User needs to put correct data or else it behaves abnormally. |
| 3. | Electronic Healthcare Model Based on Smart Card For Saudi Medical Centers. | -Pharmacists provide the prescription only when insurance company allows. - Synchronization system synchronizes data every time patient uses card. by this data loss probability is less | - Redundancy of data is seen. -No unique ID is provided to the card. -Some security issues are observed. |

## III. TAXONOMY CHART

The following table shows comparison between the existing system and our system. And gives the overview about what are the features are included in it.

Table ii: Taxonomy Chart

| parameter → / Systems ↓ | QR CODE ON CARD | DOWNADOF HEALTH INFORMATION | TRACKING of DATA USING UNIQUE ID | HEALTH PREDICTION | EASE of ACCESS |
|---|---|---|---|---|---|
| A Smart Card Based Healthcare System | ✗ | ✗ | ✗ | ✗ | ✓ |
| A Case StudyFor Bangladesh for Healthcare System | ✗ | ✗ | ✓ | ✗ | ✓ |
| Electronic Healthcare Model Based on SmartCard For Saudi Medical Centers | ✓ | ✗ | ✗ | ✓ | ✗ |
| PROPOSED SYSTEM | ✓ | ✓ | ✓ | ✓ | ✓ |

## IV. SYSTEM ARCHITECTURE

In system architecture how system works the collecting, flow and distribution of the data we get know in diagrammatic format in Fig.1.

Also the how the prediction algorithm system works also determined in Fig.2.

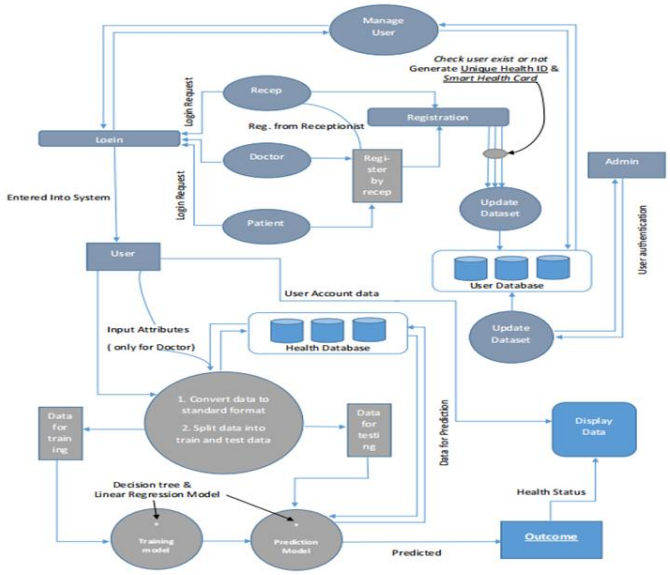



FIG-1: SYSTEM ARCHITECTURE

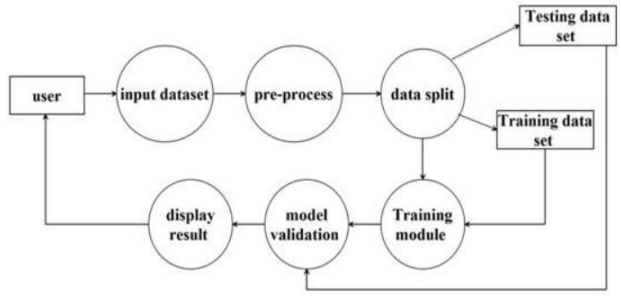



FIG-2: PREDICTION ALGO. SYSTEM

## V. ALGORITHM

We have used two algorithms in our system like Decision Tree and Linear Regression. The decision tree is mainly used for the prediction of the disease and linear regression used for the health status accuracy in the numeric state. Implementation and explanation is determined below,

### A. Decision Tree Algorithm

A Decision Tree has influenced a wide area of machine learning, covering both classification and regression. In decision analysis, a decision tree can be used to visually and explicitly represent decisions and decision making. As the name goes, it uses a tree-like model of decisions. Though a commonly used tool in data mining for deriving a strategy to reach a particular goal, it's also widely used in machine learning.[11]as shown in the fig-.example.

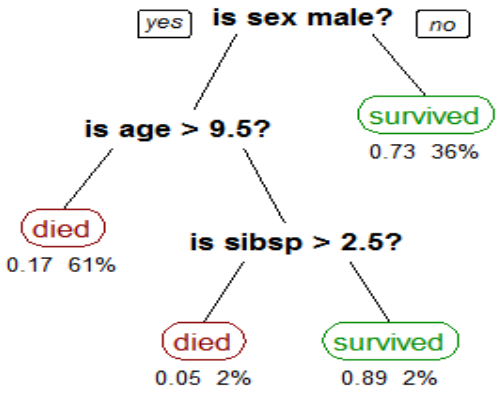



Fig-3: Decision Tree Algorithm

**Steps**:

1.Import all the basic libraries required for the data,like

-import pandas as pd

- import numpy as np

2.Now we will import the csv files which contains the data of patients undergoing treatment to diagnose whether they have particular disease or not. The dataset is small so we will not discretize the numeric values present in the data. It contains the symptoms of the disease.

Let us read the data.

- df = pd.read_csv('disease_name.csv')

3.The dataset is normal in nature and further preprocessing of the attributes is not required. So, we will directly jump into splitting the data for training and testing.

-from sklearn.model_selection import train_test_split

- X = df.drop('disease_outcome',axis=1)

- y = df['disease_outcome']

- X_train, X_test, y_train, y_test = train_test_split (X,y, test_size=0.30)

Here, we have split the data into 70% and 30% for training and testing. You can define your own ratio for splitting and see if it makes any difference in accuracy.

4.Now we will import the Decision Tree Classifier for building the model. For that scikit learn is used in Python.

- from sklearn.tree import DecisionTreeClassifier
- dtree = DecisionTreeClassifier()
- dtree.fit(X_train,y_train)

5. Now that we have fitted the training data to a Decision Tree Classifier, it is time to predict the output of the test data.

- y_pred = classifier.predict([disease_name])

There are also two steps next to it in the algorithm like confusion matrix and model building and data visualization, but in our model there no need for that.

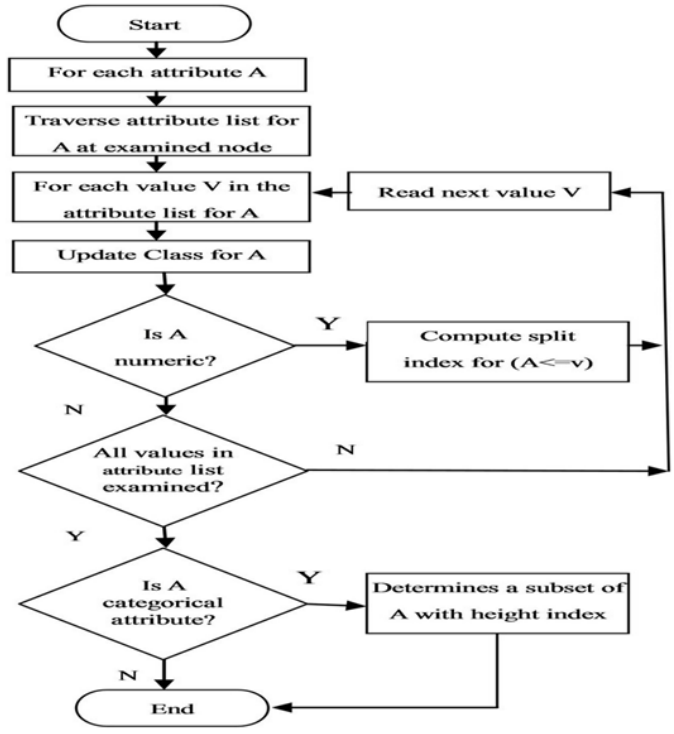



Fig-4: Flowchart for Decision Tree

## B. Linear Regression Algorithm

Linear regression is the simplest and most extensively used statistical technique for predictive modelling analysis. It is a way to explain the relationship between a dependent variable (target) and one or more explanatory variables(predictors) using a straight line.

Linear regression performs the task to predict a dependent variable value (y) based on a given independent variable (x).

**Steps**:

1.Import the libraries that are necessary for the algorithm.

- import numpy as np
- import pandas as pd

2. Import the dataset. Here we in the dataset we have taken the data items(symptoms) from the disease datasets.

- dataset = pd.read_csv('health_status_data.csv')

3.Seperate X and y variables form the dataset.

- X = df_getdummy.drop('sum',axis=1)
- y = df_getdummy[sum]

4.Split the dataset into the Training set and Test set.

- from sklearn.model_selection import train_test_split
- X_train, X_test, y_train, y_test = train_test_split(X, y, test_size = 0.25, random_state = 0)

5.Feature scaling.

- from sklearn.preprocessing import StandardScaler
- sc = StandardScaler()
- X_train = sc.fit_transform(X_train)
- X_test = sc.transform(X_test)

6.Fit Logistic Regression to the training set.

- from sklearn.linear_model import LogisticRegression

-classifier = LogisticRegression(random_state = 0)

- classifier.fit(X_train, y_train)

7. predict the Test set results and accuracy of the result.

- y_pred = classifier.predict(X_test)

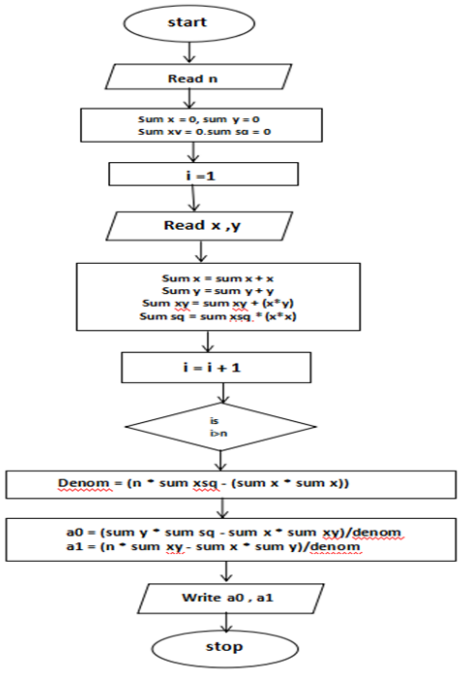



Fig-5: Flowchart for Linear regression

## VI. RESULT

We are going to see pages of the system(project) and also the disease prediction and health status of patientsalso the 3health card page.


Fig-6: Login page of our syste


Fig-7: Patient portal dashboard


Fig-8: Receptionist portal dashboard

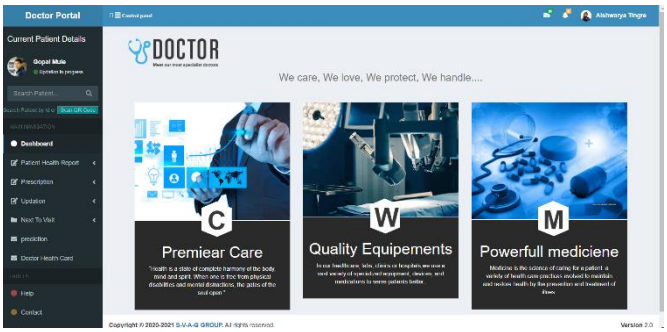



Fig-9: Doctor portal dashboard

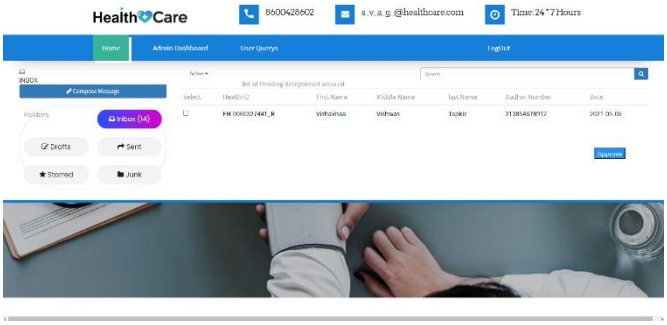



Fig-10: Admin Receptionist Approve portal dashboard

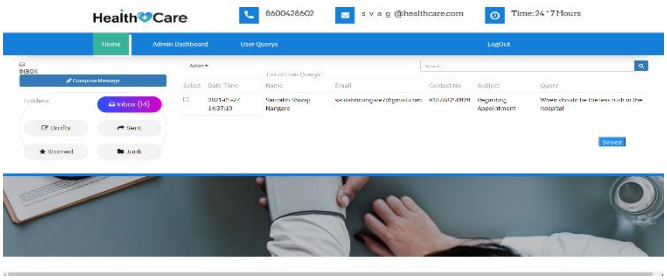



Fig-11: Admin User Query portal dashboard

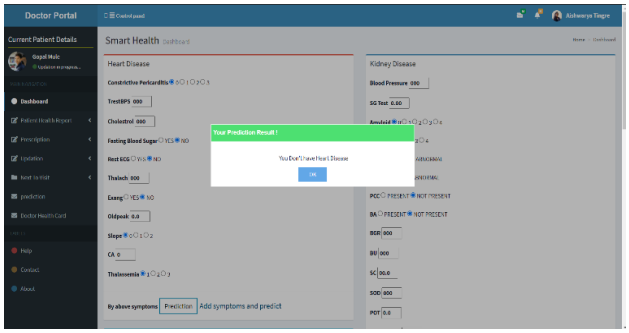



Fig-12: prediction ofdisease(1)

The above fig.12 shows the recommendation box layout in green which shows that patient doesn't have the disease.

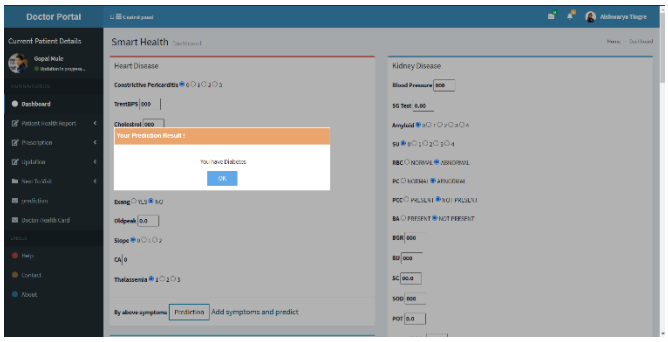



Fig-13: prediction of disease(2)

The above fig.13 shows the recommendation box layout in red which shows that patient have the disease.


Fig-14: Health status in numeric manner

The above fig.14 shows the health status of the patient we have calculated by the linear regression algorithm in numeric format.


Fig-15: Virtual E-Health Card.

The above fig.15is the health card of our users like patient, receptionist and doctor.

## VII. ADVANTAGES

1. Accurate results of the diseases and the health status.
2. Easy to use interface of the system.
3. The health card is easy to carry anywhere and is citizencentric.
4. The data losing percentage by our system is less.

## VIII. LIMITATIONS

1. Sometimes if user does not fill the proper data, it does not give accurate prediction.
2. User needs to have internet connection for accessing the system.

## IX. FUTURE WORK

1. To gives more interactive interface for our system.
2. Using health dataset predict the future health condition of the patient in data visualization format.
3. To give more accurate results in health status.

## X. CONCLUSION

The main purpose of this paper is to determine work on medical database with the help of digital card to store information and analyse.This research paper focuses on storing the patients' health information in the digital card,analysing and designing a system where patients real-time information can be processed and evaluated based on previous symptoms and on current symptoms for different diseases. By this paper we have concluded that Decision tree and Linear regression is the best algorithms with higher accuracy rate than others for predicting and analysis. This paper also outlines the technique to deploy this method to android and web platform to analyse and predict using real time data of users by collaborating with doctors and various medical organization.[5]

## XI.ACKNOWLEDGEMENT

It gives us a great pleasure in presenting the paper on "A SURVEY ONSMART DIGITAL HEALTH CARE RECORD WITH PREDICTION OF HEALTH CONDITION". We would like to take this opportunity to thank **Dr. PankajAgarkar**, Head of Computer Engineering Department, DYPSOE, Pune for giving us all the help and support we need during course of the Paper writing work. We are really grateful to &**Dr. Sunil Rathod** for giving an opportunity to work with R&D cell of our department. Our special thanks to **Dr. Ashok Kasnale, Principal DYPSOE** who motivated us and created a healthy environment for us to learn in the best possible way. We also thank all the staff members of our college for their support and guidance.

## XII.REFERENCES

[1]. M.A.NisharaBe.anu, B.Gomathy, "Disease Predicting System Using Data Mining Techniques", International Journal of Technical Research and Applications e-ISSN: 2320-8163,www.ijtra.com Volume 1, Issue 5 (NovDec 2017), PP. 41-45.

[2]. M.A.NisharaBanu, B.Gomathy, "Disease Predicting System Using Data Mining Techniques", International Journal of Technical Research and Applications e-ISSN: 2320-8163,www.ijtra.com Volume 1, Issue 5 (NovDec 2017), PP. 41-45.

[3]. "Inpatient clinical information system", Kathrin M. Cresswell, 2017, Science Direct.

[4]. https://www.researchgate.net/publication/332188767

[5]. A. Danny, S. Li, P. Houle, M. Wilcox, R. Phillips, P. Mohseni, S. Zeiger, H. Bergsten, M. Ferris, J. Diamond, M. Bogovich, M. Fleury, K. Vedati, A. Halberstadt and A. Patzer, Professional Java Server Programming: with Servlets, Java Server Pages (JSP), XML, Enterprise Java Beans (EJB), JNDI, CORBA, Jini and Java spaces (Wrox Press Inc., USA,1999).

[6]. D Kumar, R Singh, A Kumar, N Sharma An adaptive method of PCA for minimization of classification error using Naïve Bayes classifier Procedia Computer Science, 2015. Elsevier, pp.9-15.

[7]. Kumar, A., & SAIRAM, T. (2018). Machine Learning Approach for User Accounts Identification with Unwanted Information and data. International Journal of Machine Learning and Networked Collaborative Engineering, 2(03), 119-127.

[8]. Rawat K., Kumar A., Gautam A.K. (2014) Lower Bound on Naïve Bayes Classifier Accuracy in Case of Noisy Data. In: Babu B. et al. (eds) Proceedings of the Second International Conference on Soft Computing for Problem Solving (SocProS 2012), December 28-30, 2012. Advances in Intelligent Systems and Computing, vol 236. Springer, New Delhi DOI: https://10.1007/978-81-322-1602-5_68.

[9]. https://towardsdatascience.com/decision-trees-in-machine-learning-641b9c4e8052 https://towardsdatascience.com/linear-regression-in-machine-learning-641b9c4e8052

[10]. I. J. Goodfellow, D.Warde-Farley, M. Mirza, A. Courville, and Y. Bengio. Maxout networks. In Proceedings of the 30th International Conference on Machine Learning, pages 1319-1327. ACM, 2013.

[11]. G. Hinton and R. Salakhutdinov. Reducing the dimensionality of data with neural networks. Science, 313(5786):504-507.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# A Random Forest Regression Approach to Predict Flight Fare

**Komal Kalane[1], Shivam Ghorpade[1], Omkar Jawale[1], Abhishek Jaiswal[1], Snehal More[1], Prof. Monika Dangore[2]**
[1]Student, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Pune, Maharashtra, India
[2]Assistant professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Pune, Maharashtra, India

## ABSTRACT

This paper deals with the problem of flight prices prediction. The aviation industry keeps changing the flight prices. Prices on last minute airfare can be highly volatile so customer try to book ticket in advance. To estimate the minimum flight price, data for a specific air route has been collected including the features like departure date, arrival date, source, destination and airways. Features are extracted from the gathered data to apply Machine Learning (ML) Models. Machine Learning regression methods are used to predict the price at the given time. The training set is used to train the algorithm for accurate prediction and this will help to decide a specific airline as per budget.

**Keywords :** Machine Learning Algorithm, Prediction Model, Flight Price, Regression.

## I. INTRODUCTION

The aviation industry is using complex strategies and methodologies to assign flight prices these days, in a dynamic fashion. These strategies are taking into account several commercial, financial and marketing factors closely connected with the final flight prices.

The high complexity of the pricing models applied by the airlines is the major difficulty faced by customers while purchasing the ticket, it is very difficult for customer to purchase an air ticket in the lowest price, since the price changes rapidly.

Machine Learning is one of the most powerful research topics in computer science and engineering, which is applicable in many directions. It provides a collection of algorithms, methods and tools able to incorporate some kind of intelligence to machines.

The potential of machine learning is the provided modelling tools, which are able to be trained, via a learning policy, with a set of data describing a certain problem and to counter to similar unrevealed data with a common way.

For anticipating the flight ticket prices, numerous algorithms are introduced in machine learning. The algorithms are: Support Vector Machine (SVM), Linear regression, K-Nearest neighbours, Decision tree, Multilayer Perceptron, Gradient Boosting and Random Forest Algorithm. Using python library scikit learn these models have been accomplished. The

parameters like R-square, MAE and MSE are appraised to demonstrate the performance of these models.

## II. METHODS AND MODEL

### A. Methods

#### a. Collection of Data-

Python script is used on remote server for data collection, which provide output as excel record. The document contains data with features and its details. Output accumulated from the site contains number of parameters for each flight. The gathered data is two years old.

| Airline | Date_of_Journey | Source | Destination | Route | Dep_Time | Arrival_Time | Duration | Total_Stops | itional_I | Price |
|---|---|---|---|---|---|---|---|---|---|---|
| IndiGo | 24/03/2019 | Banglore | New Delhi | BLR → DEL | 22:20 | 01:10 22 Mar | 2h 50m | non-stop | No info | 3897 |
| Air India | 1/05/2019 | Kolkata | Banglore | CCU → IXR → BBI → BLR | 05:50 | 13:15 | 7h 25m | 2 stops | No info | 7662 |
| Jet Airway | 9/06/2019 | Delhi | Cochin | DEL → LKO → BOM → COK | 09:25 | 04:25 10 Jun | 19h | 2 stops | No info | 13882 |
| IndiGo | 12/05/2019 | Kolkata | Banglore | CCU → NAG → BLR | 18:05 | 23:30 | 5h 25m | 1 stop | No info | 6218 |
| IndiGo | 01/03/2019 | Banglore | New Delhi | BLR → NAG → DEL | 16:50 | 21:35 | 4h 45m | 1 stop | No info | 13302 |
| SpiceJet | 24/06/2019 | Kolkata | Banglore | CCU → BLR | 09:00 | 11:25 | 2h 25m | non-stop | No info | 3873 |
| Jet Airway | 12/03/2019 | Banglore | New Delhi | BLR → BOM → DEL | 18:55 | 10:25 13 Mar | 15h 30m | 1 stop | In-flight | 11087 |
| Jet Airway | 01/03/2019 | Banglore | New Delhi | BLR → BOM → DEL | 08:00 | 05:05 02 Mar | 21h 5m | 1 stop | No info | 22270 |
| Jet Airway | 12/03/2019 | Banglore | New Delhi | BLR → BOM → DEL | 08:55 | 10:25 13 Mar | 25h 30m | 1 stop | In-flight | 11087 |
| Multiple c | 27/05/2019 | Delhi | Cochin | DEL → BOM → COK | 11:25 | 19:15 | 7h 50m | 1 stop | No info | 8625 |
| Air India | 1/06/2019 | Delhi | Cochin | DEL → BLR → COK | 09:45 | 23:00 | 13h 15m | 1 stop | No info | 8907 |
| IndiGo | 18/04/2019 | Kolkata | Banglore | CCU → BLR | 20:20 | 22:55 | 2h 35m | non-stop | No info | 4174 |
| Air India | 24/06/2019 | Chennai | Kolkata | MAA → CCU | 11:40 | 13:55 | 2h 15m | non-stop | No info | 4667 |
| Jet Airway | 9/05/2019 | Kolkata | Banglore | CCU → BOM → BLR | 21:10 | 09:20 10 May | 12h 10m | 1 stop | In-flight | 9663 |
| IndiGo | 24/04/2019 | Kolkata | Banglore | CCU → BLR | 17:15 | 19:50 | 2h 35m | non-stop | No info | 4804 |
| Air India | 3/03/2019 | Delhi | Cochin | DEL → AMD → BOM → COK | 16:40 | 19:15 04 Mar | 26h 35m | 2 stops | No info | 14011 |
| SpiceJet | 15/04/2019 | Delhi | Cochin | DEL → PNQ → COK | 08:45 | 13:15 | 4h 30m | 1 stop | No info | 5830 |
| Jet Airway | 12/06/2019 | Delhi | Cochin | DEL → BOM → COK | 14:00 | 12:35 13 Jun | 22h 35m | 1 stop | In-flight | 10262 |
| Air India | 12/06/2019 | Delhi | Cochin | DEL → CCU → BOM → COK | 20:15 | 19:15 13 Jun | 23h | 2 stops | No info | 13381 |

Fig 1: Collected Data

#### b. Cleaning data-

The collected data needs to be clean, it is important to clean the data according to the model requirements. All the unnecessary data need to remove to achieve desire output. There are various techniques used for cleaning and pre-processing the data.

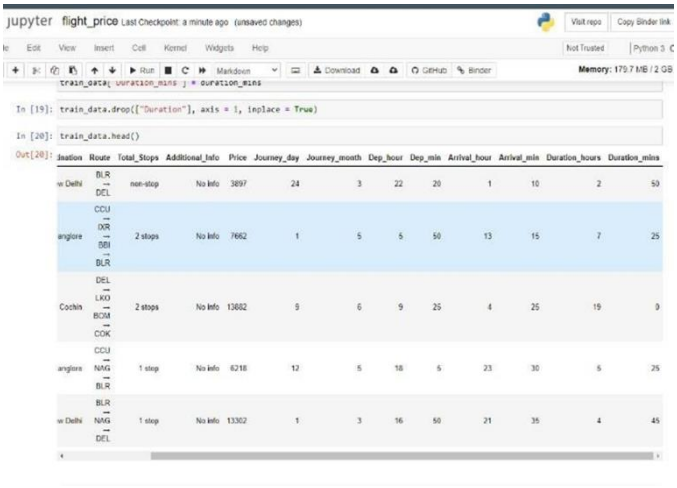



Fig 2: Data cleaning and processing

#### c. Analyzing Data-

The inspecting of data is the most key aspect of this project. Data preparation is followed by analyzing the data, unwrapping the invisible trends and then applying various machine learning models.

#### d. Machine Learning Algorithms-

To develop the model for the flight price prediction, many standard machine learning algorithms are evaluated. Those algorithms are as follows: K- Nearest neighbors, Multilayer Perceptron, Support Vector Machine (SVM), Linear regression, Decision tree, Gradient Boosting and Random Forest Algorithm. All these models are implemented in the scikit learn to evaluate the performance of this model, certain parameters are considered, the parameters are as follows: Mean Absolute Error (MAE), Mean Squared Error (MSE) and R-squared value.

### B. Models

Different models which we have tried:

| | |
|---|---|
| *LinearRegression- | 2779.0455708889144 |
| *ElasticNet- | 3379.6819876610443 |
| *Lasso- | 2759.449381312224 |
| *Ridge- | 2710.8476127741037 |
| *KNeighborsRegressor- | 3249.005561971264 |
| *DecisionTreeRegressor- | 2017.530360334335 |
| *RandomForestRegressor- | 1662.7359733973055 |
| *SVR- | 4246.460099935076 |
| *AdaBoostRegressor- | 3135.985374101527 |
| *GradientBoostingRegressor- | 1904.7364927923986 |
| *ExtraTreeRegressor- | 2432.1393735590073 |
| *HuberRegressor- | 3108.870789540331 |
| *XGBRegressor- | 1603.7426369307445 |
| *BayesianRidge- | 2773.275561516677 |

XGBRegressor, RandomForestRegressor and GradientBoostingRegressor gave the lowest RMSE so we have chosen these model and

| Model | Savings (In Lakhs) | Loss (In Lakhs) | Profit per Transaction (In Rs.) | Accuracy |
|---|---|---|---|---|
| Decision Trees | 4.7 | 1.3 | 140 | 73.0% |
| Gradient Boosting | 5.5 | 2.2 | 145 | 73.0% |
| Logistic regression | 6 | 1.8 | 177 | 76.0% |
| Random Forest | 5.8 | 1.8 | 180 | 77.8% |
| Trend Based Model | 7 | 2.2 | 210 | 81.8% |

Fig 3: Comparison between models

## III. RESULTS AND DISCUSSION

As discussed in Section II, we used 10 thousand samples to train the data and test the classifiers with the suggested 80-20 split. For the decision tree algorithm, we parameterized the depth of the tree for better accuracy. In order to analyze the impact of the used features to the prediction accuracy of the models, the same experiment is repeated several times by leaving out some features, one at a time. Several techniques used to clean and pre-processing the data to achieve desire output.

The correlation between independent and dependent attribute as shown in figure below: -

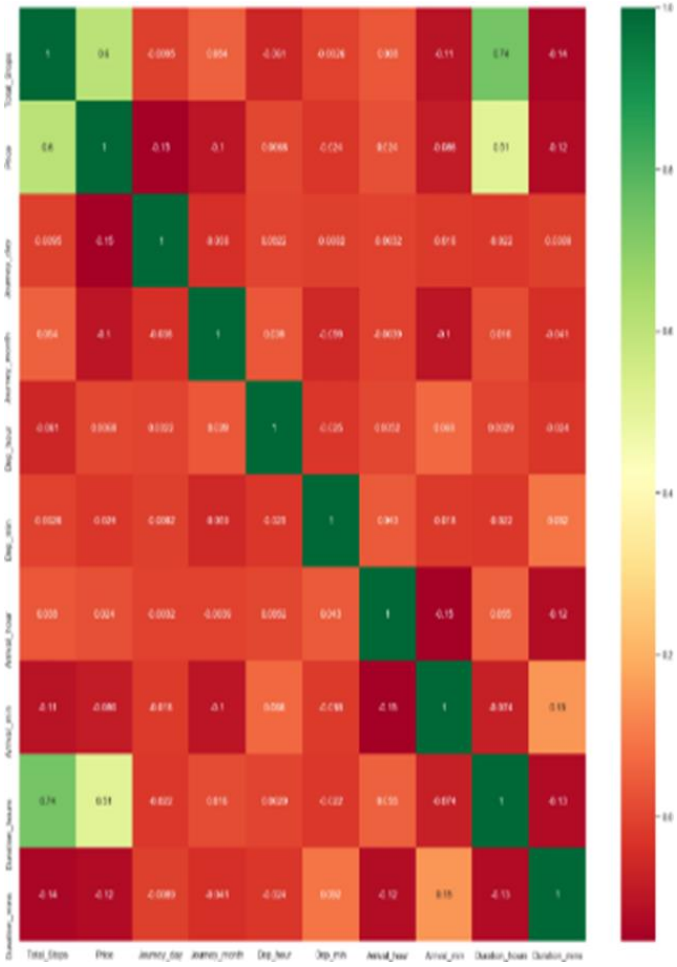


fig 4: Co-relation between independent and dependent attribute

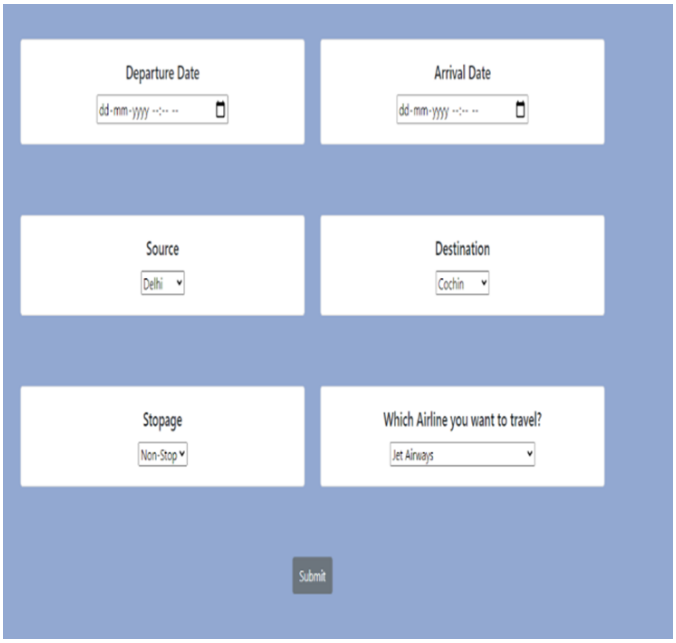



Fig 5: UI

The above figure shows the user interface, user need to fill the data according to user requirements to get the approximate flight price for the trip.

## IV. CONCLUSION

The information gathered remote server by using python script and showed that it is feasible to predict prices for flights based on previous air fare data. The experimental results show that machine learning models are a satisfactory tool for predicting flight prices. Other important factors in flight prices prediction are the data collection and feature selection from which we drew some useful conclusions. From the experiments we wind up which features influence the flight price prediction at most.

In the future, this work could be extended to predict the flight prices for the entire aviation industry. Additional experiments on larger airfare data sets are essential, but this initial work highlights the potential of Machine Learning models to guide consumers to make an airfare purchase in the best market period.

## V. REFERENCES


[1]. K. Tziridis, K.I. Diamantaras,"Airfare Prices Prediction Using machine Learning Technique",European signal processing conference 2017

[2]. M. Papadakis, "Predicting Airfare Prices," 2014.

[3]. A. Mottini and R. Acuna-Agost, "Deep choice model using pointer networks for airline itinerary prediction," in the 23rd ACM SIGKDD international conference on knowledge dis-covery and data mining, 2017

[4]. T. Liu, J. Cao, Y. Tan, and Q. Xiao, "ACER: An adaptive context-aware ensemble regression model for airfare price prediction," in the international conference on progress in informatics and computing, 2017 Analysis. In: 2013 IEEE 13th International Conference on Data Mining Workshops, Dallas, TX, 2013, pp. 440–444.

[5]. Chieh-Hua Wen, Po-Hung ChenPassenger booking timing for low-cost airlines: a continuous logit approach J. Air Transport Manage., 64 (2017), pp. 91-99

[6]. Estimating dynamic demand for airlines Econ. Lett., 124 (1) (2014), pp. 26-29

[7]. F. Pedregosa, G. Varoquaux, A. Gramfort, V. Michel, B. Thirion, O. Grisel, M. Blondel, P. Prettenhofer, R. Weiss, V. Dubourg et al., "Scikit-learn: Machine learning in python," Journal of Machine Learning Research, vol. 12, no. Oct, pp. 2825–2830, 2011

[8]. A. Ng, "Cs229: Machine learning lecture notes," Standford University Lecture, 2011.

[9]. L. Breiman, J. Friedman, R. Olshen and C. Stone, Classification and Regression Trees. Boca Raton, FL: CRC Press, 1984

[10]. Dominguez-Menchero, J.Santo, Reviera, "optimal purchase timing in airline markets" ,2014

[11]. Abhilash, Ranjana,shilpa and Zubeda'"Survey on Air Price Prediction using Machine Learning Algorithm", IJIREEICE 2019

[12]. L. Breiman, —Random forests, ‖ Machine Learning, vol. 45, pp. 532, 2001

[13]. S.B. Kotsiantis, "Decision trees: a recent overview," Artificial Intelligence Review, vol. 39, no. 4, pp. 261-283, 2013.

International Conference - Innovation-2021-Innovation-2021
International Journal of Scientific Research in Computer Science, Engineering and Information Technology ISSN : 2456-3307 (www.ijsrcseit.com)
Volume 8, Issue 3, May-June-2021

# Generation of 3D Model from Images

**Akash Chaudhari[1], Aditya Deo[1], Mahesh Badhe[1], Ritesh Patidar[1], Sunil Rathod[2]**
[1]Student, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Savitribai Phule Pune University, Pune, Maharashtra, India
[2]Professor, Department of Computer Engineering, Dr. D. Y. Patil School of Engineering, Lohegaon, Savitribai Phule Pune University, Pune, Maharashtra, India

## ABSTRACT

3D models are used in various fields such as video games, films, architecture, illustration, engineering and commercial advertising. We have seen significant progress in 3D model generation and reconstruction in recent years. In this paper, we discussed how to convert a 2D image into a 3D model. Creating a 3D Model takes lots of effort starting from scratch in software like Maya or Blender. We are proposing a tool that allows you to generate a 3D Model from a single 2D image. The tool uses a pre-trained machine learning model in the background to generate a 3D Model. The pre-trained model is based on Hierarchical Surface Prediction (HSP). HSP uses Convolutional Neural Network (CNN) which is good at processing visual data like images, 3D Models with low computational power.

**Keywords :** HSP, CNN, 3D Model, DIB-R

## I. INTRODUCTION

The 3D modelling is a computer graphics technique that makes it possible to produce a 3D digital representation of any object or surface. The 3D model is a collection of points/vertex, edges, and faces. The 3D models are used in various media, including video games, movies, architecture, illustration, engineering and commercial advertising. This is what engineers and architects use to plan and design their work. Animators and game developers use 3D modelling to turn their ideas into reality. Due to their value, a vast market for 3D models is available online.

The 3D modelling is an accurate workflow that often involves the careful placement of individual vertices to obtain the correct contours of the desired object. There are several tools available to accelerate the modelling process. Most programs include a mirror technique that allows the artist to build an asymmetric model by working on only half or even a quarter of the object.

So to solve the problem of manual work like changing vertex position, or adding a new vertex, and many more things the 3D modelling is required as a technique to do it using algorithm. we have developed an application that allows generating 3D models automatically. The system takes an input image that holds an object for which the user wishes to generate the 3D model. Next, it processes the image and makes it appropriate for a subsequent process. After

completion of the process, the generated 3D model is automatically saved on the local disk in .obj format.

A Hierarchical Surface Prediction (HSP) algorithm is used for the generation of models. It uses Convolutional Neural Network (CNN) to detect important characteristics of the input image and generate a 3D model matching the object displayed in the image. Hierarchical surface prediction predicts the surface of a 3D model, rather than the entire volume, or whatever is within the surface of the desired 3D model.

Our application provides an interactive User Interface (UI) to end-users which allows them to generate a model of isometric images, view the previously generated images and search for the queries in the FAQ and well-written user manual.

Our goal is to automate the process of creating 3D models and increase productivity by reducing the time it takes to manually generate models.

## II. RELATED WORK

Most of the 3D Generation is done using Generative Adversarial Networks. There are various approaches proposed for 3D Model generation in the field of GANs also. Some of them are "Learning a Probabilistic Latent Space of Object Shapes via 3D Generative-Adversarial Modeling (3D GAN)" [1], "Learning to Predict 3D Objects with an Interpolation-based Differentiable Renderer (DIB-R)" [2]. GAN needs a lot of computation power.

DIBR predicts and renders a whole 3D Model. It makes rendering pipeline differential which allows it to use Machine Learning in the process. DIB-R also predicts the texture and light details of a 3D Model. It needs a lot of computation power.

Recently Hierarchical Surface Prediction (HSP)[3] has shown that it is possible to predict 3D Models using Convolutional Neural Network (CNN) [4]. The HSP focuses on the surface of an object, which is what we only need to render a 3D Model. The surface of a 3D Model predicted by HSP is high resolution and smooth, although it doesn't predict texture, and lighting (shadows, reflections, etc.) like DIBR.

HSP seems efficient than others because it predicts a high-resolution 3D Model with low relative computation power. Our tool uses its pre-trained model for the generation of 3D Models.

## III. SYSTEM ARCHITECTURE

The FLASK Light-weighted web app for the complete user interface for the end-user. The web application includes different features like generating a 3D model, history, FAQ, and user manual to manage the web application in a particular way.

Our system takes a single 2D image, and upstream server (Colab Server) URL as inputs. Upstream server is responsible for generation of model. The Upstream server accepts this image via the flask server and saves the received file in the Google Drive folder. The saved file is passed as an argument with the training data set already available on the drive for 3D model generation. The algorithm generates a 3D model and stores it in the output folder using the .obj extension. The colab flask server sends the 3D model by the algorithm in response to a received 2D image.

WebGL (Web Graphics Library) is a JavaScript API for rendering high-performance interactive 3D, 2D graphics received 3D models over the web app.

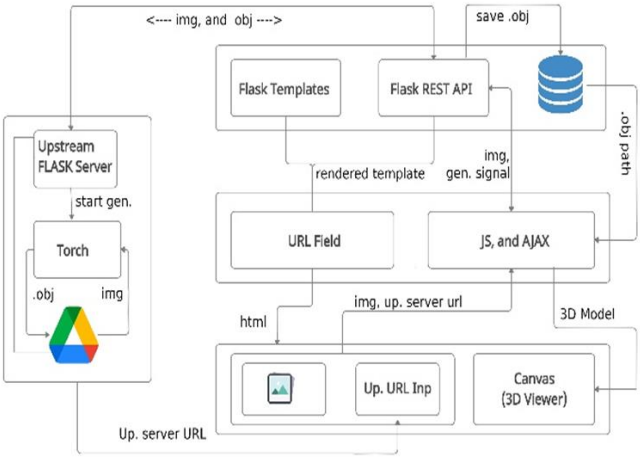



Figure-1: System Architecture

In this system architecture, we have the following modules

1. Flask (Lite version of Django )
   Flask Server is used to view the complete user interface and manage file transfer from the local machine to the server (Colab)
2. WebGL (Web Graphics Library)
   WebGL (Web Graphics Library) is a JavaScript API for rendering high-performance interactive 3D and 2D graphics in any compatible web browser with no plug-ins. It is for previewing the 3D template on canvas from the colab server.
3. JavaScript and AJAX
   JS Function get3DModel uses AJAX to send 2-D images and receives the 3D model generated by the colab server in the background. It validates the URL field input by the user.
4. Upstream Flask Server
   Colab server makes the upstream server live on the Internet to temporarily using ngrok python library. It receives the 2D image sent by the local flask server and sends the generated 3D object file as a reply.
5. Colab
   3D Model Generation Algorithm (CNN) is running behind whenever the 2D image came from the server it passes as an argument for algorithm along with training dataset
6. Google Drive
   Bundle of training data, 2D images, and 3D-Model stored on Google Drive.

## IV. ALGORITHM

1. Define input image size, and give it to the input layer of CNN.
2. Define n Convolution layers(Conv + Pooling).
   - define weight, and give number of filter, kernels, and other hyperparameters
   - connect each with previous layer, if first then connect with input layer
3. Define fully connected layer.
   - output of fully connected layer will be 3D model data(vertices, edges, faces).
   - connect fully connected layer to the last convolutional layer.
4. Train the model using Backprop, and gradient descent hy providing input images.
5. Test the ML model by feeding test images.
6. If output of ML model gives 90% accuracy, then save the trained model as t7, or h5 file for future use.
7. If output accuracy is low, then train the model again with desired changes

## V. RESULTS

Figure-1 is a home screen. Using the deployment server, the application is launched, which may be obvious from the address in the address bar. It contains the following four features: Generate a 3d model, History/Records, FAQ and User Manual.

Figure-2 is Generate 3D Model. The user selects the image to upload by choosing the file option, then adds the upstream server URL to the text field and click Continue. In the rendered view of the 3D model, the generated model is shown.

Figure-3 is History/Records. All the models previously generated can be viewed in the history function. Clicking on the images from the list on the left allows the user to view their respective models.

Figure-4 is FAQ. The questions are based on different categories and by clicking on any category, the user will be able to see the questions below.

Figure-5 is User Manual. A well-defined process server as a guide simplifies the use of the application for the new user.

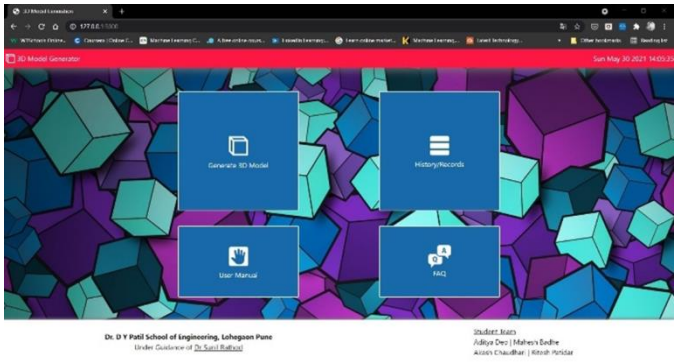



Figure-1: Home Screen

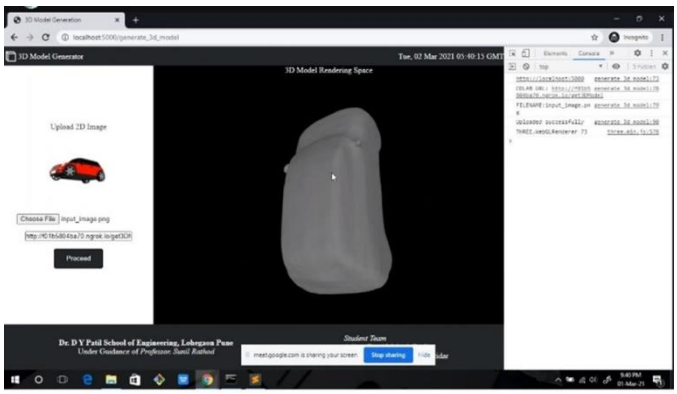



Figure-2: Generate 3D Model

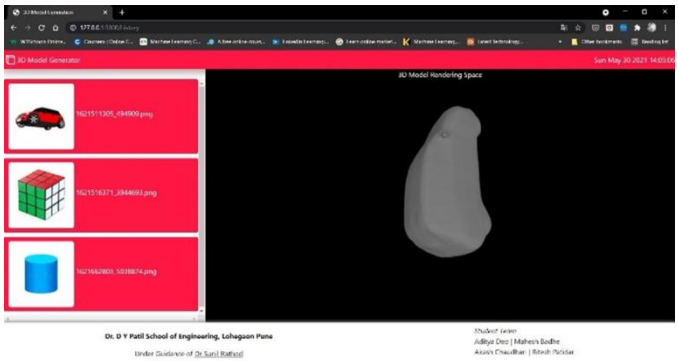



Figure-3: History/Records

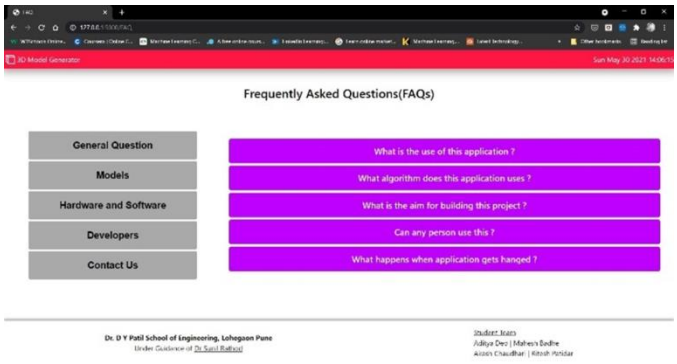



Figure-4: FAQ

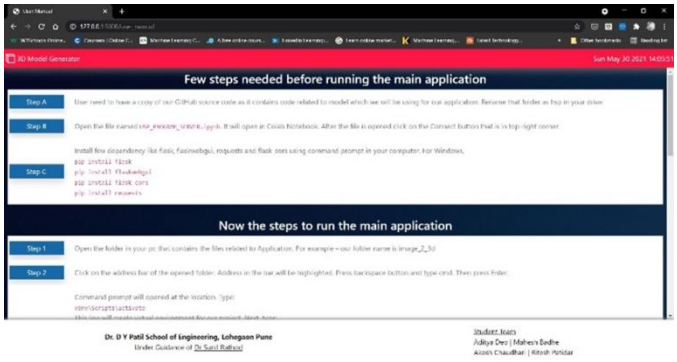



Figure-5: User Manual

## VI. CONCLUSION

In this paper, a tool with a user interface is proposed which allows user to generate a 3D Model using a single 2D image. The tool also allows user to see previously generated 3D Models, and data related to them. It uses a pre-trained Machine Learning model to generate a 3D Model. The ML algorithm/approach used here is called Hierarchical Surface Prediction (HSP), which uses CNN. Although 3D Models generated in this tool are not as perfect as manually created 3D Models by artists, combining them with human efforts can allow users to create 3D Models faster. Also, this area of auto 3D model generation is getting the attention of researchers. So, in future, we may see better 3D Models generated with the new algorithms. Our tools are scalable; therefore new algorithms can be embedded in it also.

## VII. REFERENCES

[1]. Jiajun Wu*, Chengkai Zhang*, Tianfan Xue*, William T. Freeman*, Joshua B. Tenenbaum*, Learning a Probabilistic Latent Space of Object Shapes via 3D Generative-Adversarial Modelling, NIPS 2016

[2]. Wenzheng Chen, Jun Gao,, Huan Ling, Edward J. Smith, Jaakko Lehtinen, Alec Jacobson, Sanja Fidler, Learning to Predict 3D Objects with an

Interpolation-based Differentiable Renderer, NeurIPS 2019

[3]. Christian Hane, Shubham Tulsiani, Jitendra Malik, Hierarchical Surface Prediction for 3D Object Reconstruction, Nov 2017

[4]. Deepu R, Murali S, 3D Reconstruction from Single 2D Image, January 2016 ISSN: 2454-5031

TECHNO SCIENCE ACADEMY
The International Open Access Publisher


Dr D Y Patil School of
Engineering, Lohegaon, Pune

IJSRCSEIT

# An International Conference Innovation-2021

## Organised by

Computer Engineering Department,
Dr. D. Y. Patil School of Engineering,
Lohegaon, Pune, Maharashtra, India

**Publisher**

Technoscience Academy

Website : www.technoscienceacademy.com
Email: info@technoscienceacademy.com

Email : editor@ijsrcseit.com, ijsrcseit@gmail.com