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Crime Awareness and Registration System

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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.

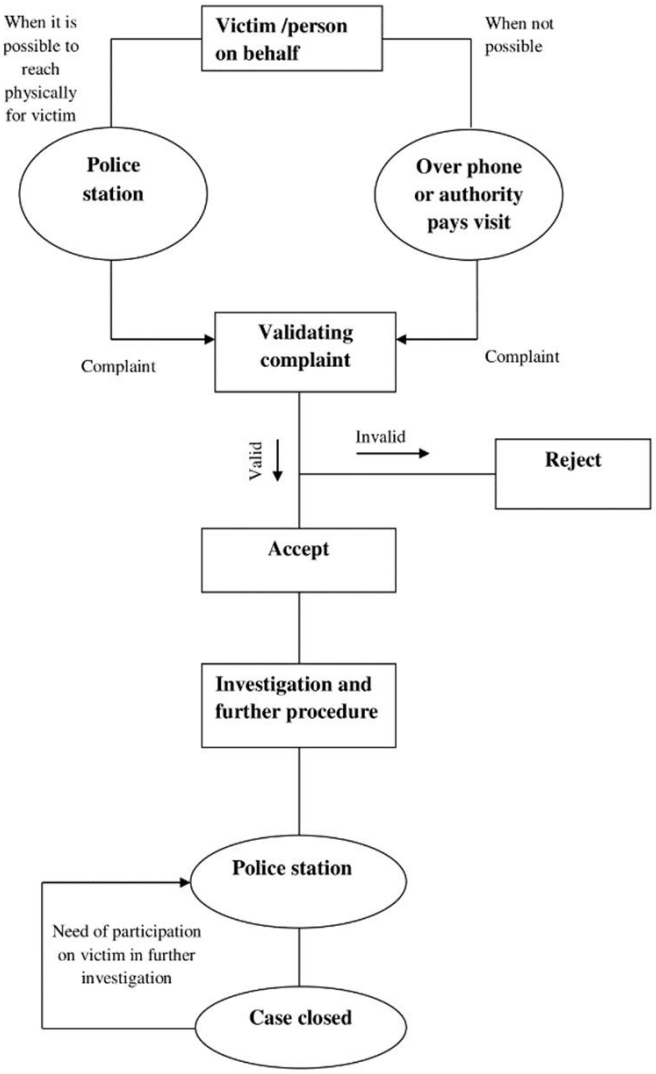


Fig: Traditional/Existing System

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.

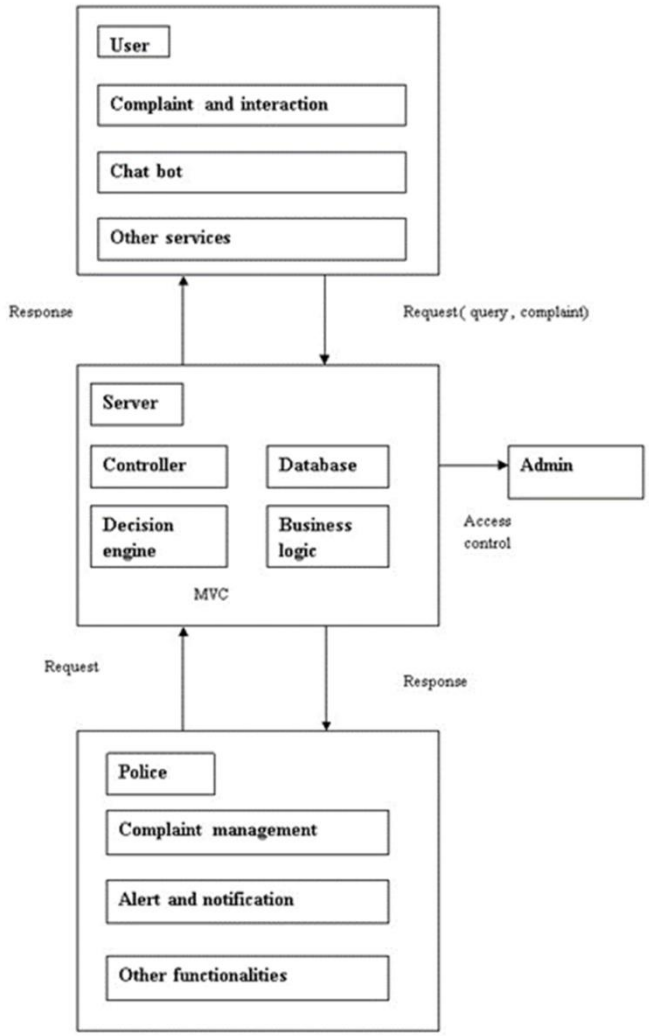
We are using the same logic to complete our business purpose which is provide information about crime laws and related information about it.

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:

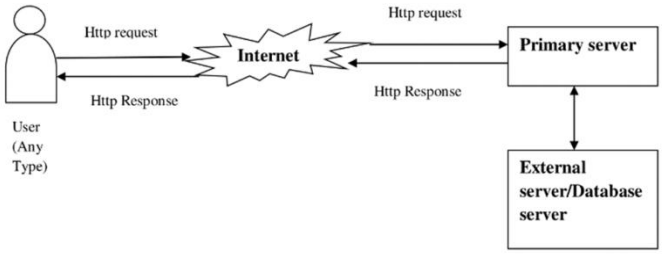


Fig. Physical Architecture

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

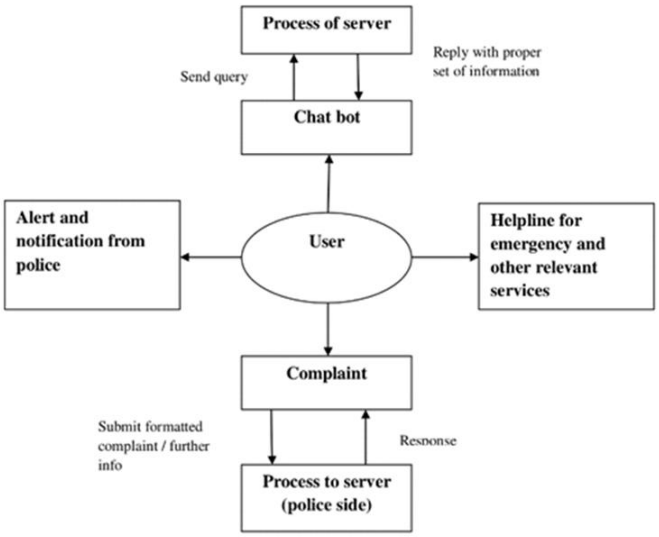


Fig. User end

- 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.

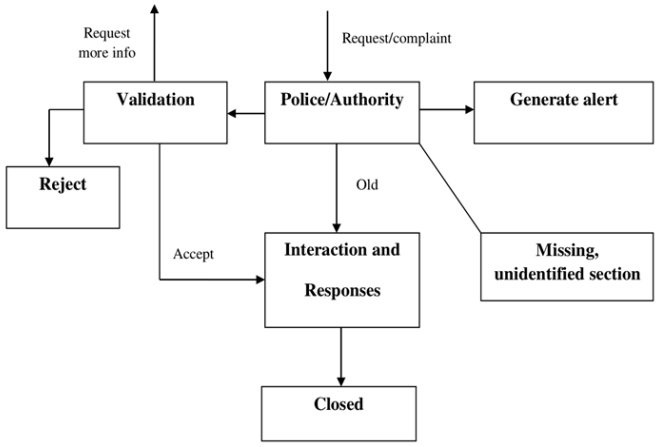


Fig. Police end

- 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.

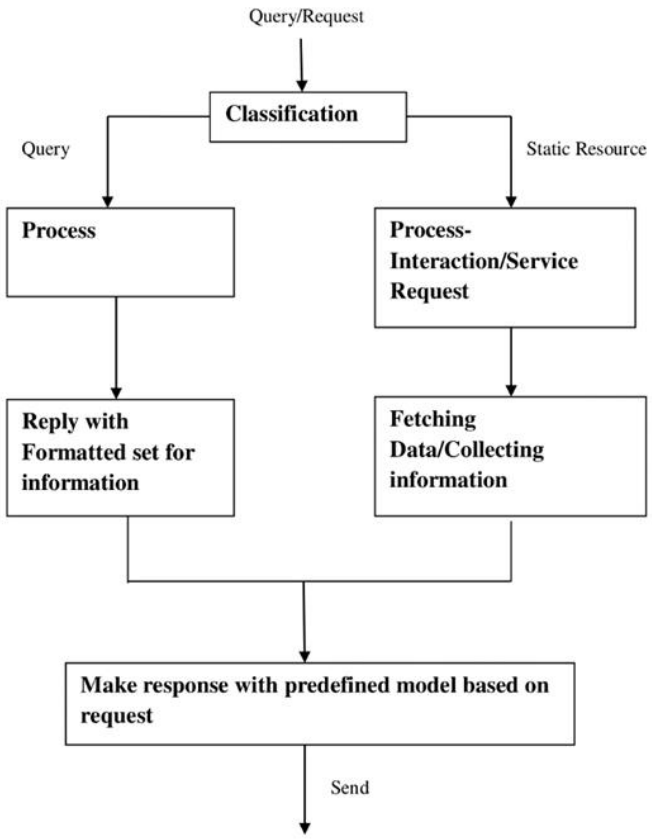


Fig. Server side

- 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

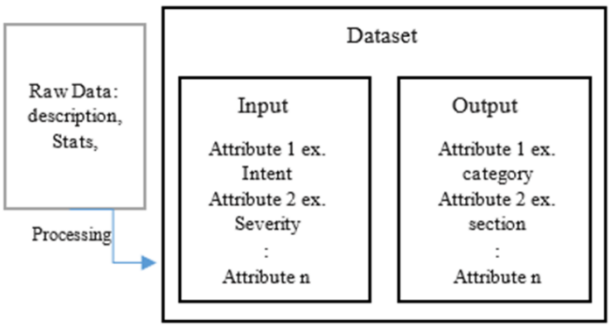


Fig. Dataset

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).

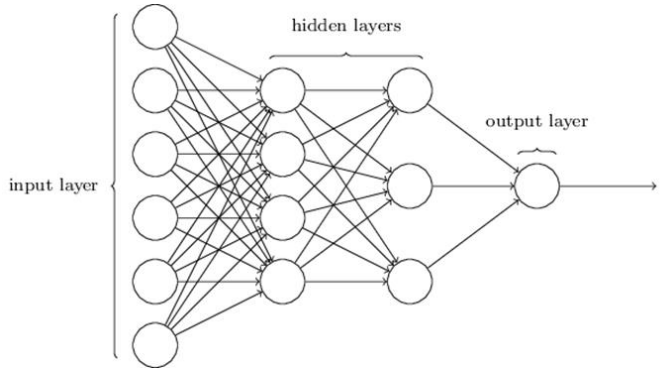


Fig. Neural Network

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

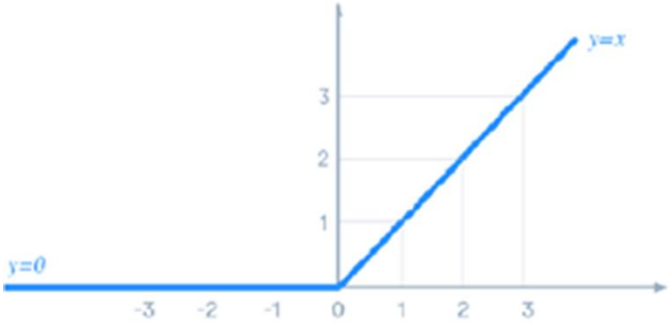


Fig. ReLU activation function

   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.

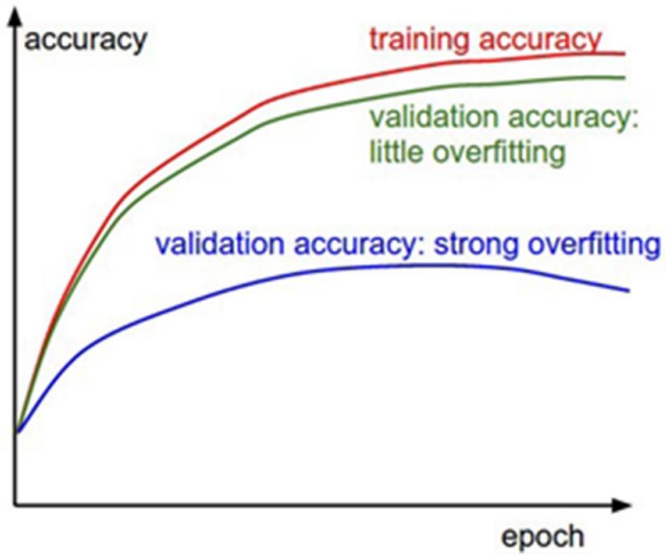


Fig. Model Accuracy

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.

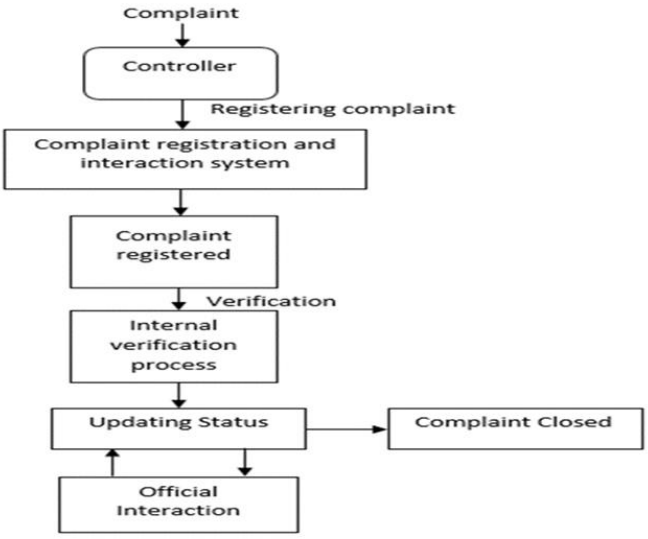


Fig. Complaint process

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.

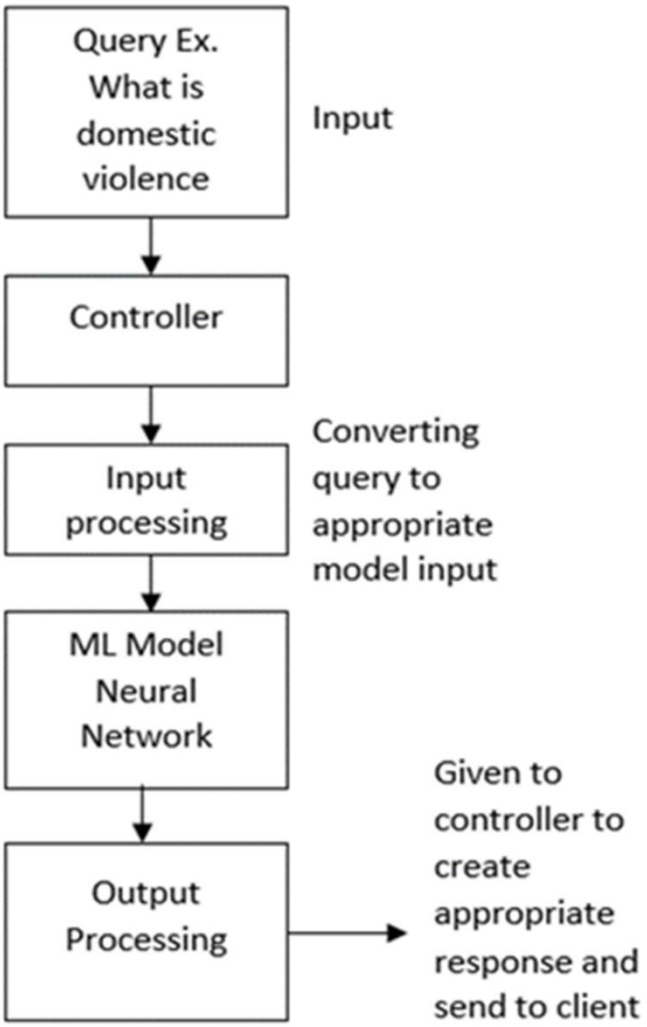
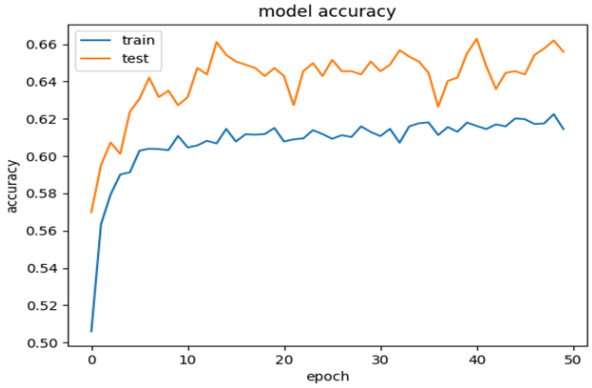


Fig. Chat-bot

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.

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