

Fake News Detection Using Machine Learning

Vijaya Balpande, Kasturi Baswe, Kajol Somaiya, Achal Dhande, Prajwal Mire

Department of Computer Science and Engineering, Priyadarshini J. L. College of Engineering, Nagpur,
Maharashtra, India

ABSTRACT

Article Info

Volume 7, Issue 3

Page Number: 533-542

Publication Issue :

May-June-2021

Article History

Accepted : 01 June 2021

Published : 10 June 2021

A huge quantity of knowledge is generated on social media platforms with varied social media formats. Once an event take place many folks discuss it on the web through social networking sites. They arrange or retrieve and discuss the news event and build it as a routine of their existence. However, terribly messy volume of report contains caused the user to face the matter of knowledge overloading throughout looking out and retrieving. Under level sources of knowledge expose individual to an outsize quantity of Fox News, rumours, Hawks is, conspiracy theories and dishonest news. This pretends news comes back from the information, misunderstanding or unreliable contents with the creditability supply. This makes it tough to discover whether to believe or not if the news may be pretend or a true one once the news data is received. The aim of this paper is to try to tackle the growing problems with pretend news, which has been continuously been a retardant by the widespread use of social media. During this paper, we have a tendency to use two classification models : Naïve Bayes and TF-IDF Vectorizer.

Keywords: TF-IDF Vectorizer, Naive Bayes, fake news

I. INTRODUCTION

Fake news detection has recently become a rising analysis that's capturing attention. Pretend news is generated purposely to mislead readers to believe false data that makes it tough and non-trivial to discover supported content. Pretend news on social media has been occurring for many years, however, there's no united definition of the term 'fake news' For higher steering of the longer term directions of pretend news direction analysis, applicable classifications are necessary.

Fake news changes the manner folks interpret and answer real news, for example, some pretend news was simply created to trigger people's distrust and build them confused; preventative their skills to differentiate what is true from what is not. To help mitigate the negative effects caused by pretend news It's crucial that we tend to build up strategies to mechanically discover pretend news.

This project aims at learning the detection of pretend news victimization machine learning program in python. It uses linguistic communication process for sleuthing the pretend news. A model is constructed

supported the count vectorizer or a tf-idf matrix word tallies relative to however usually they're utilized in alternative articles within the dataset used will facilitate. Since this downside may be a quite text classification, implementing a Naive mathematician classifier and Support vector machine are best as this can be commonplace for text-based process.

By gathering instances of each real and pretend news and making ready a model, it ought to be conceivable to rearrange pretend news stories with a selected level of exactitude. the target of this project is to find the viability and impediments of language-based systems for sleuthing any form of pretend news that is detected victimization the machine learning algorithms, AI calculations as well as but not restricted to convolutional neural systems and perennial neural systems. The results of this project ought to be to make a decision what quantity may be accomplished during this task by dissecting styles contained within the text and bind to the surface knowledge concerning the planet. this sort of resolution is not expected to be AN end-to-end resolution for pretend news.

II. LITERATURE SURVEY

Authors: Monther Aldwairi, Ali Alwahedi, in [1] has implemented the Fake news and Click baits interfere with the ability of a user to discern useful information from the Internet vice especially when news become critical for decision making. Considering the changing land scape of the modern business world, the issue of fake news has become more than just a marketing problem as it warrant serious efforts from security researchers. It is imperative that any attempts to manipulate ort roll the Internet through fake news or Click baits are countered with absolute effectiveness. We proposed a simple but effective approach to allow users in-install simple tool into their personal browser and use it to

detect and filter out potential Click baits. The preliminary experimental results conducted to assess the method's ability to attain its intended objective, showed outstanding performance in identify possible sources of fake news. Since we started this work, few fake news data bases have been made available and we 'recurrently expanding our approach using to test its effectiveness against the new datasets.

Authors: Xinyi Zhou, Reza Zafarani, in [2] has researched about importance of multidisciplinary fake news research reviewing and organizing fake news detection studies from multiple way which are news content and the medium on which the news spreads, the rate of detection i.e., response time whether the news is fake or Real was measured to be very slow. They have detailed fact extraction, KB/KG construction and fact-checking. The two main components of automatic news fact-checking. There are some open issues and several Potential research tasks. First, when collecting facts to construct KB (KG), one concern is the sources from which facts are extracted. In addition to the traditional sources such as Wikipedia, some other sources, e.g., fact-checking websites that contain expert analysis and justifications for checked news content, might help provide high-quality domain knowledge. However, such sources have rarely been considered in current research. As fake news research is evolving, we accompany this survey with an online repository which will provide summaries and timely updates on the research developments on fake news, including tutorials, recent publications and methods, datasets, and other related resources.

Authors: Srishti Agrawal, Vaishali Arora, in [3] has implemented the key expressions of news affairs have been taken in a form that needs to be verified. The filtered data is stored in a database known as Mango DB. Data Pre-Processing unit is very reliable for setting up data for the additional processing that is

required. Classification is basically dependent on No. Of Tweets, No. Of hashtags, No. Of adherents, confirmed User Sentiment Score, No. Of Retweets, Methods of NLP. Due to multiple number of Stance Detection is used for examining the stance of the author there are not 2 but three results are expected. It is a psychological model that is used by the author. Stance Detection has many other applications. The stance of the author can be considered as: Agreed, Neutral or Disagreed. We can determine whether a news story is fake or genuine once we have considered all the classes. Also, the authenticity for a new story is given. After that we classify the outputs and use classification algorithms. Moreover, when the detection is measured = Neutral, which means neither its true, nor its false, the complete process is not so useful because the result is itself confusing, whether to trust or not. Which eventually failed the very purpose of building the program.

Authors: H.Parveen Sultanaa, Srijan Malhotraa, in [4] has researched about the results that are not satisfying with the variety of news. The results show that SVM and logistic regression classifier have the best performance on this dataset in the model, with SVM having a slightly better performance than logistic regression classifier. The same can be perceived from the f1 scores. Also, the training data is largely based on US politics and economics news so it has been observed in our test cases, that the news statements related to US politics have been correctly classified and fake news was detected. But the test cases which have news related to technology have been wrongly predicted. The biggest drawback that come packaged with this problem is that, the data is erratic and this means that any type of Prediction model can have anomalies and can make mistakes. For future improvements, concepts like POS tagging, word2vec and topic modelling can be utilized. These will give the model a lot more depth in terms of feature extraction and fine-tuned classification.

Authors: Rajendra Chatse, Pradeep kumar Kale, in [5] has executed the process of this project was tedious. It was not an easy experience of an expert as well. First System Login, then Registration, twitter Data Scrapping, Twitter data to csv conversion, Applying NLP, Algorithm and predict the Positive, Negative and Neutral, Fake News Detection. This paper describes a simple fake news detection method based on one of the machine learning algorithms – naive Bayes classifier. The goal of the research is to examine how naive Bayes works for this particular problem, given a manually labelled news dataset, and to support the idea of using artificial intelligence for fake news detection. Further, this technique cannot be applied to social platforms like Facebook and Twitter by adding recent news and enhancing the Fake News Detection System. The main drawback of this was the dataset stored had to be manually labelled, which is time consuming and not convenient for large number of datasets. The difference between this paper and other papers on the similar topics is that in this composition naive Bayes classifier was specifically used for fake news detection We have tested the difference in accuracy by taking different length of articles for detecting the fake news; also a concept of web scrapping was introduced which gave us an insight into how we can update our dataset on regular basis to check the truthfulness of the recently updated Facebook posts.

Authors: Shruthi S. Shetty, K. B. Shreejith, in [6] has researched about the Fake news detection on social media has recently become an emerging research that is capturing attention. Fake news is generated on purpose to mislead readers to believe false information, which makes it difficult and non-trivial to detect based on content. Fake news on social media has been occurring for several years; however, there is no agreed definition of the term “fake news”. For better guidance of the future directions of fake

news direction research, appropriate classifications are necessary. Social media has proved to be a powerful source for spreading fake news. It is important to utilize some of the emerging patterns for fake news detection on social media. The one and only drawback here is SVM algorithm, because it is not suitable for large data sets. SVM does not perform very well when the data set has more noise i.e. target classes are overlapping. In cases where the number of features for each data point exceeds the number of training data samples, the SVM will underperform.

Authors: Nerissa Pereira, Simran Dabreo, in [7] has presented a model for fake news detection using a variety of machine learning and deep learning algorithms. Furthermore, in the first level of implementation, we investigated the four different classifiers and compared their accuracies. The model that achieves the highest accuracy is LSTM and the highest accuracy score is 93%. Fake news detection is a quite popular and trending research area which has an extremely scarce number of datasets. The current model which we have generated is run against the existing dataset, indicating that the model performs well against it. In our next level we have analyzed the real time data from twitter. Here we have trained our model using logistic regression algorithm; due to the inability of the LSTM to perform well over real time tweets having considerably small length. The accuracy for the tweets classification using Logistic Regression was found to be around 87%. Also there is no Visual presentation in the result. Hence in the future work we need to verify not just the Language but also the images and audio embedded in the content. The method is only twitter oriented, hence any news which is not on twitter cannot be predicted or analyzed whether it's real or fake. Also, it will be a useless set of data.

Authors: Z Khanam, B N Alwasel, H Sirafi, in [8] has focused on detecting the fake news by reviewing it in

two stages: Characterization and disclosure. In the first stage, the basic concepts and principles of fake news are highlighted in social media. During the discovery stage, the current methods are reviewed for detection of fake news using different supervised learning algorithms. As for the displayed fake news detection approaches that is based on text analysis in the paper utilizes models based on speech characteristics and predictive models that do not fit with the other current models. From the utilized Naive Bayes classifier to detect fake news from different sources, with results of accuracy of 74%. Used combined ML algorithms, but they depend on unreliable probability threshold with 85-91% accuracy. Uses the Naive Bayes to detect fake news from different social media websites, but the results were not accurate for the untruthful sources.

Authors: Christian Janze, Marten Risius, in [9] has implemented the research given by them suggests that Fake news sites could falsely suggest probity by selecting name, profile pictures and logos similar to reliable sources. Thus, respective source-centric attributes should be considered in future. In the present study, we only considered the most apparent features of the news post, which are probably most influential due to their exposed position. However, characteristics of the actual fake news text should prospectively also be assessed to determine its status as being real or fake news. Beyond these considerations, it needs to be noted that we also excluded some seemingly relevant metrics like the percentage of post likes and the overall number of reactions due to multi co-linearity. However, other limiting aspects concern the generalizability of our findings. The news detection in the present work only revolves around political topics. While these are currently of the predominant public interest, fake news can also target other areas like science, sports or economics, which are not part of the study's sample. Nevertheless, as we do not consider any topic specific

features. We are confident in the generalizability of our results. Furthermore, we only considered messages from Facebook, which are structurally and functionally distinct from other social media platforms. While Facebook represents the social media platform where most news are consumed other platforms are also subject to fake news, which need individual means of detection. Next to this limitation, it is possible that future advances in the realm of natural language generation could potentially bypass our detection system by incorporating our findings to create fake news which are indistinguishable from non-fake news. Considering the alleged substantial effects of fake news on recent political events, the automatic detection of fake news has important practical consequences. For future research, the present study provides a starting point to identify other potentially relevant features in order to further improve the detection of fake news, which could also be expanded to other topics and tested using data from additional social media platforms. Current efforts of major platform operators to manually tag fake news is not an efficient process.

III. Methodology

We have implemented this project using different methodologies and the elaboration of the methodology are:

Web Scripting is an automatic method to obtain large amounts of data from websites. Most of this data is unstructured data in an HTML format which is then converted into structured data in a spreadsheet or a database so that it can be used in various applications. This large amounts of data from a website is used to train a algorithm.

Web scraping requires two parts namely the crawler and the scraper. The crawler is an artificial intelligence algorithm that browses the web to search the particular data required by following the links across the internet. The scraper, on the other hand, is

a specific tool created to extract the data from the website. The design of the scraper can vary greatly according to the complexity and scope of the project so that it can quickly and accurately extract the data.

When a web scraper needs to scrape a site, first it is provided the URLs of the required sites. Then it loads all the HTML code from those sites and a more advanced scraper might even extract all the CSS and JavaScript elements as well. Then the scraper obtains the required data from this HTML code and outputs this data in the format specified by the user. Mostly, this is in the form of an Excel spreadsheet or a CSV file but the data can also be saved in other formats such as a JSON file.

There are many different ways to perform web scraping to obtain data from websites. We are implementing the web scrapping in our project by using python library i.e., for accessing the particular website we are using Request Library and to we are using HTML5lib Parser library to parse or scrap the data. The detailed working of this libraries is given below:

Request Python library: Request's library is one of the integral parts of Python for making HTTP requests to a specified URL. Requests play a major role in dealing with REST APIs, and Web Scrapping. First, we need to send HTTP request to the URL of the webpage we want to access. The server responds to the request by returning the HTML content of the webpage, this will be done by using request library.

Once we have accessed the HTML content, we are left with the task of parsing the data. Parsing of data is a method where one string of data gets converted into a different type of data. So, let's say we receive our data in raw HTML, a parser will take the said HTML and transform it into a more readable data format that can be easily read and understood. Since most of the HTML data is nested, we cannot extract data simply through string processing. One needs a parser which can create a nested/tree structure of the

HTML data. There are many HTML parser libraries available but the most advanced one is html5 lib.

- To create an instance of article -> article_name = Article (url, language="language code according to newspaper")
- To download an article -> article_name.download()
- To parse an article -> article_name.parse()
- To apply nlp(natural language processing) on article -> article_name.nlp()
- To extract article's text -> article_name.text
- To extract article's title -> article_name.title
- To extract article's summary -> article_name.summary
- To extract article's keywords -> article_name.keywords

After parsing the data, it will be stored in structured format in spreadsheet.

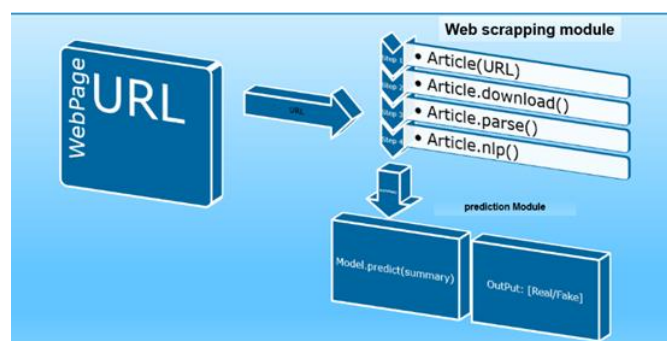


Fig 1 : Web scrapping Flow

Pre-Processing

The term Pre-processing the data is defined as the process of converting a data into an understandable format by cleaning it and preparing the text for classification. Texts from online contain usually lots of noise and uninformative parts such as scripts and advertisements. Pre-processing includes several steps such as online text cleaning, white space removal, expanding abbreviation. Stemming, stop words removal and feature selection. These will reduce the noise in the text which will help to boost up the performance of the classifier.

Machine Learning Algorithms

Machine learning is an application of artificial intelligence (AI) that provides systems the ability to automatically learn and improve from experience without being explicitly programmed. Machine learning focuses on the development of computer programs that can access data and use it to learn for themselves.

Machine learning data only works with numerical features so we have to convert text data into numerical columns. So, we have to pre-process the text and that is called natural language processing.

We are using two machine learning algorithms:

- 1. TF-IDF Vectorizer
- 2. Naïve Bayes Classifier
-

1. 1. TF-IDF Vectorizer (Term Frequency-Inverter Document Frequency):

TF-IDF which stands for Term Frequency – Inverse Document Frequency is a statistical method of evaluating the significance of word in given documents. This is very common algorithm to transform text into a meaningful representation of numbers which is used to fit machine algorithm for prediction. TF-IDF vectorizer is defined with parameter (stop_words='english') which eliminates all the common English words like 'me, him, I, will, on' which will improve the accuracy by keeping only unique words.

For Eg: d1= The sky is blue.

d2= The sun is bright.

Here, the term such as 'the' and 'is' will be eliminated keeping the unique keywords i.e., 'sky', 'blue', 'sun', 'bright'.

Now, we can convert the test document set into a vector space where each term of vector is indexed as our index vocabulary. Example first term of the vector represents "blue" term of our vocabulary. the second term represents "sun" and so on. Now we are going to use term — frequency which means more than a measure of how many times the terms present

in our vocabulary (E(t)). We can define the term-frequency as counting function:

$$tf(t, d) = \sum_{x \in d}^n fr(x, t)$$

(Above formula is referred from Karen Spärck Jones, paper in 1972)

Where the $fr(x,t)$ is a simple function defined as:

$$Fr(x,t) = \begin{cases} 1, & \text{if } x = t \\ 0, & \text{otherwise} \end{cases}$$

Referred from Karen Spärck Jones, paper in 1972. Where the $tf(t,d)$ returns is how many times is the term t present in document d .

The formula for the $tf-idf$ is then:

$$tf-idf(t) = tf(t,d) \times idf(t)$$

$TF(t,d)$ = Number of times 't' occur in document 'd' / Total word count of document 'd' IDF stands for Inverse Document Frequency: A word is not of much use if it is present in all the documents. IDF weighs down the importance of these terms and increase the importance of rare ones. The more the value of IDF, the more unique is the word.

$IDF(t) = \frac{\text{Total Numbers of documents}}{\text{Number of documents with term 't' in it}}$

$TF-IDF$ is applied on the body text, so the relative count of each word in the sentences is stored in the document matrix.

This formula has an importance consequence that a high weight of the $tf-idf$ calculation is reached when we have a high term frequency (tf) in the given document (local parameter) and a low document frequency of the term in the whole collection (global parameter).

Algorithms used for Classification:

This section deals with training the classifier. Different classifiers were investigated to predict the class of the text. We explored machine learning algorithm that is Multinomial Naïve Bayes.

2. Naïve Bayes Classifier:

Naïve Bayes Classifier is one of the simple and most effective Classification algorithms which helps in building the fast machine learning models that can make quick predictions. It is a probabilistic classifier, which means it predicts on the basis of the probability of an object.

It is called Bayes because it depends on the principle of Bayes theorem, which is used to determine the probability of a hypothesis with prior knowledge. It depends on the conditional probability. It is a classification technique based on Bayes' Theorem with an assumption of independence among predictors. In simple terms, a Naive Bayes classifier assumes that the presence of a particular feature in a class is unrelated to the presence of any other feature. For example, a fruit may be considered to be an apple if it is red, round, and about 3 inches in diameter. Even if these features depend on each other or upon the existence of the other features, all of these properties independently contribute to the probability that this fruit is an apple and that is why it is known as 'Naive'.

Naive Bayes model is easy to build and particularly useful for very large data sets. Along with simplicity, Naive Bayes is known to outperform even highly sophisticated classification methods.

Working of Naïve Bayes Classifier:

Naïve Bayes Classifier works on following steps:

Convert the given dataset into frequency tables.
 Generate Likelihood table by finding the probabilities of given features.

Now, use Bayes theorem to calculate the posterior probability.

Formula:

$$P(c|x) = P(x|c) P(c) / P(x)$$

Referred from Bayes's theorem, in probability theory, a means for revising predictions considering relevant evidence, also known as conditional probability or inverse probability. In which the,

$P(c|x)$ is the posterior probability according to the predictor (x) for the class(c).

$P(c)$ is the prior probability of the class.

$P(x)$ is the prior probability of the predictor.

$P(x|c)$ is the probability of the predictor for the particular class(c).

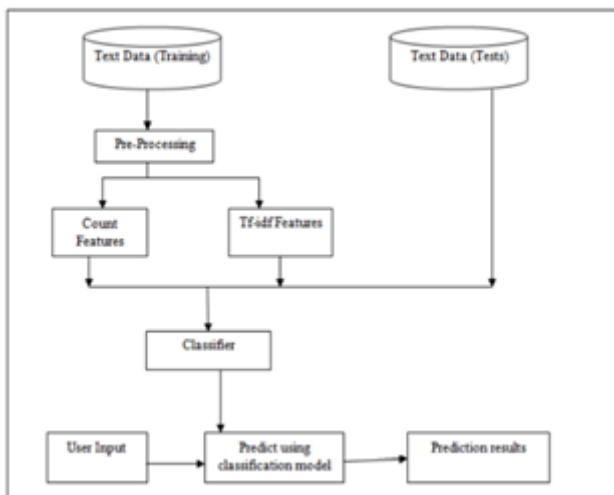


Fig 2. Data Flow Diagram

Experimental Analysis and Screenshots

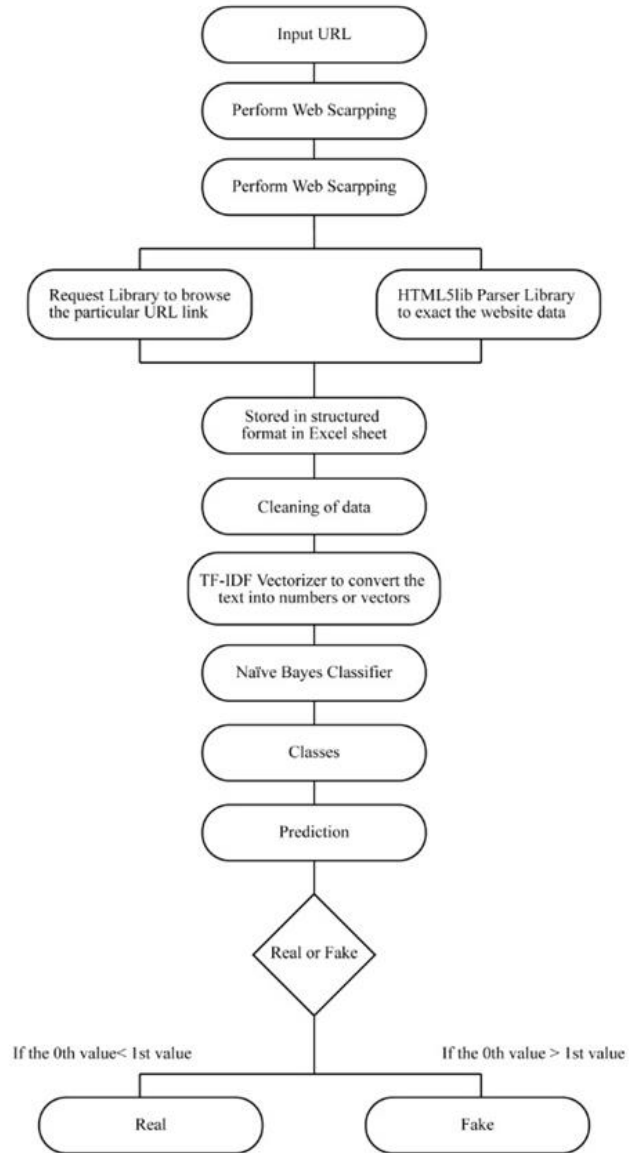


Fig 3. Data Flow Diagram

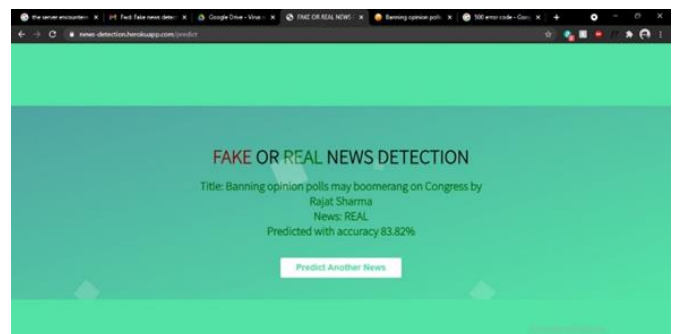


Fig 4. Home page of Fake News Detection

In above fig, web application for fake news detection where, the total backend is operated when the URL

link is inserted or searched. The URL is generally copied from the browsers. The URL links must be related to news article.



Fig 5. Inputted URL Link (Sample news article)

In above fig, the sample news article is shown from where the web scrapper will extract the html codes and convert it to readable text. This extracted data will be the input to the machine learning algorithms.

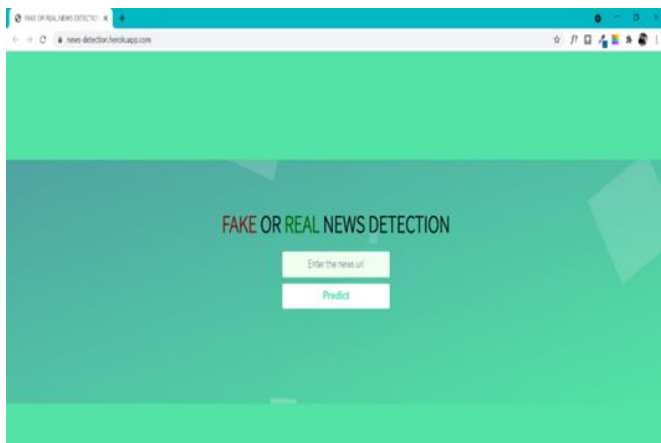


Fig 6. Output page of Fake News Detection

After applying the machine learning algorithms, the news will be predicted as real or fake. The prediction results will be shown after searching the URL link based on the backend classifiers.

id	title	text	label
1			
2	8476 You Can St Daniel		FAKE
3	10294 Watch The Google		FAKE
4	3608 Kerry to g.U.S.		REAL
5	10142 Bernie sup 3C"		FAKE
6	875 The Battle It's		REAL
7	6983 Taliban, US		FAKE
8	7341 Girl Horrifi Share		FAKE
9	95 3C"Britain A Czech st		REAL
10	4869 Fact checkHillary		REAL
11	2909 Iran repor Iranian		REAL
12	1357 With all th CEDAR		REAL
13	988 Donald Tr Donald		REAL
14	7041 Strong Sol Click		FAKE
15	7623 10 Ways AOctober		FAKE

Fig 7. Database Storage-Datasets (Excel Sheet)

Above spreadsheet is used as a database in our project, in which the various entities of the project like title, name, email, phone number etc can be also seen.

IV. Conclusion

With the increasing popularity of social media, more and more people consume news from social media instead of traditional news media. However, social media has also been used to spread fake news, which has strong negative impacts on individual users and broader society. This fake news is created by someone intentional to create wanted violence, anger in our society. Most of the times, the younger generations face the lot of effects mentally.

To avoid this situation, we have created this system called fake news detector. Fake news detection system will differentiate between fake and real news from the social media.

We have explored machine learning techniques to detect the news, real or fake. In our project we have characterized two parts i.e., parsing of data and classification. For parsing of data, we have explored many libraries, tools, but the simplest and easiest way was through using python libraries i.e., request library and HTML5lib parser library. By using them we were able to extract the data and store in structured form.

The classification phase was completely based on machine learning algorithms. Also, we have examined various algorithms such as linear regression, Logistic Regression, Support Vector Machine, K-

Nearest Neighbours, Neural Network Model and so many. But we have come to conclusion to use TF-IDF Vectorizer and naïve Bayes algorithm for predication of news int real or fake. Using these methods, the users get the correct information to rely on.

This system can predict the news up to 80 to 90% accurate. This will be helpful for millions of social media users.

The input is human dependable. Until and unless a URL is not given for the detection we cannot get the result. Hence making this system automate can be down in future. Therefore, the prediction of news being fake or real depends on the input.

In our project, there are some limitations such as, the data sets are stored in the format of spreadsheets, which are located in the local system. Due to this reason, any developer will not be able to access this accumulated data until and unless it is shared by any other means. Another limitation is, it is difficult to work on large amount of data. This limitation can be improved in future.

V. REFERENCES

- [1]. Jiawei Zhang, Bowen Dong, Philip S. Yu, "FAKE DETECTOR: Effective Fake News Detection with Deep Diffusive Neural Network" published in August 2019.
- [2]. Steni Mol T S and Shreeja P Sin, "Fake News Detection on Social Media-A Review" published in April 2020.
- [3]. Monther Aldwairi and Ali Alwahedin, "Detecting Fake News in Social Media Networks" published in 2018.
- [4]. Natali Ruchansky, Sungyong Seo and Yan Liu, "CSI: A Hybrid Deep Model for Fake News Detection".
- [5]. Ray Oshikawa, Jing Qian, William Yang Wang, "A Survey on Natural Language Processing for Fake News Detection" published in March 2020.

- [6]. Kai Shu, Suhang Wang, Jiliang Tang, and Huan Liu, "Fake News Detection on Social Media: A Data Mining Perspective".
- [7]. Junaed Yonus Khan, Md. Tawkat Islam Khondaker, Anindya Iqbal, Sadia Afroz, "A Benchmark Study on Machine Learning Methods for Fake News Detection" published in May, 2019.
- [8]. Xinyi Zhou, Reza Zafarani, Kai Shu, Huan Liu, "Fake News: Fundamental Theories, Detection Strategies and Challenges" published in January 2019.
- [9]. Nichlar Olivirea, Pedro Pisa, Martin Lopez, Diogo Mattos, "Identifying Fake News on Social Networks Based on Natural Language Processing: Trends and Challenges" published in December 2020.
- [10]. Srishti Agrawal, Vaishali Arora, Ruchika Arora, Pronika Chawla, Madhumita Kathuria. "FAKE NEWS DETECTION USING ML".

Cite this article as :

Vijaya Balpande, Kasturi Baswe, Kajol Somaiya, Achal Dhande, Prajwal Mire, "Fake News Detection Using Machine Learning", International Journal of Scientific Research in Computer Science, Engineering and Information Technology (IJSRCSEIT), ISSN : 2456-3307, Volume 7, Issue 3, pp.533-542, May-June-2021. Available at
doi: <https://doi.org/10.32628/CSEIT12173115>
Journal URL : <https://ijsrcseit.com/CSEIT12173115>