Project/Dissertation Review-2 Report on

FAKE NEWS DETECTION

Submitted in partial fulfillment of the requirement
for the award of the degree of

B. Tech CSE

GALGOTIAS UNIVERSITY

(Established under Galgotias University Uttar Pradesh Act No. 14 of 2011)

Under The Supervision of

Dr. Subash Harizan

Submitted By

Pranav Upadhyay(21SCSE1010695)
Abhay Shankar Singh(21SCSE1010925)
Chetan Raj Singh(21SCSE1010770)
Piyush Phughat(21SCSE1010723)

SCHOOL OF COMPUTING SCIENCE AND ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
GALGOTIAS UNIVERSITY,
GREATER NOIDA INDIA

Acknowledgement

We would like to express our gratitude to all those who encouraged us to complete this project. We want to thank the Department of Computer Science and Engineering for giving us permission to develop a project on this topic. The development of this project was only possible due to the support, encouragement and cooperation of our friends, teachers and seniors. We would also like to express heartfelt thanks for the people who are directly and indirectly part of this project.

We would cordially like to thank our classmates for their help and support, without which it was very difficult to develop this project. At last, we would like to thank our project guide Dr. Subash Harizan Sir who have helped us on every step and without whose support this project would not have been completed.

<u>Contents</u>

ABSTRACT

Recent political events have lead to an increase in the popularity and spread of fake news. As demonstrated by the widespread effects of the large onset of fake news, humans are inconsistent if not outright poor detectors of fake news. With this, efforts have been made to automate the process of fake news detection. The most popular of such attempts include "blacklists" of sources and authors that are unreliable. While these tools are useful, in order to create a more complete end to end solution, we need to account for more difficult cases where reliable sources and authors release fake news. As such, the goal of this project was to create a tool for detecting the language patterns that characterize fake and real news through the use of machine learning and natural language processing techniques. The results of this project demonstrate the ability for machine learning to be useful in this task. We have built a model that catches many intuitive indications of real and fake news as well as an application that aids in the visualization of the classification decision.

INTRODUCTION

In today's society, most of the news consumption by people is through different social media platforms, since it is the most easy and convenient way of sharing news to each other. But with this comes the risk of widespread dissemination of fake news. These fake news not just adversely affect an individual but it also affects the society as a whole. Recently our world is fighting against covid19. This pandemic not just destroyed the livelihood of many people but also destroyed many families. Amidst these problems, fake news just acts as a fuel to the fire. These misinformation conceal healthy behaviour and encourage erroneous activities which aid in the spread of virus and lead to poor mental and physical health outcomes in people. Thus, it is very important to stop the chain of fake news from the root itself. This can be done only if we have the proof whether the given news is real or fake and also the source of real news. This is where our project will be beneficial.

LITERATURE SURVEY

In this paper, Shuo yang et al [1] inspect the matter of Unsupervised discovery of fake news on social media by utilizing the users' reckless social media engagement details. They used current event truths and users' integrity as dormant random factors, and they used users' social media engagements to recognise their views on the validity of current events. They suggest a method for unsupervised learning. This system employs a probabilistic graphical paradigm to model current case truths and, as a result, the users' reputation. To solve the inference dilemma, an effective Gibbs sampling technique is proposed. Their experiment results show that their proposed algorithm outperforms the unsupervised standards.

Kai Shu et al [2] examines two facets of the issue of false news identification: - 20 a) Characterization- This aspect introduces the fundamental concepts of fake news in both traditional and social media. b) Detection- The current detection methods, including feature extraction and model construction, are examined from a data mining perspective. They described fake news and characterized it by evaluating various theories and properties in both traditional and social media. They continue to systematically describe the issue of detecting fake news and summarize the strategies of doing so. They discussed about the datasets and measurement criteria that are currently used in existing methods.

Yuta Yanagi et al [3] proposes a fake news detector that can create fake social contexts(comments), with the aim of detecting fake news early on in its spread when few social contexts are available It's been trained on a series of news articles and their social situations. They also trained a classify model using news posts, real-posted comments, and generated comments. They compared the quality of produced comments for articles with actual comments and those generated by the classifying model to determine the detector's effectiveness. Limitation- According to their study, the words "!", "?", "false," "breaking," and other similar phrases are essential signals of fake new

MTHODOLOGY

We suggest a model in this project that makes use of machine learning algorithms and various feature extraction methods to identify fake news by cross-referencing it with other reliable news sources, as well as producing and displaying real news from reliable sources in the form of a website. To achieve a perfect result, we strive to achieve maximum accuracy in fake news detection and real news generation in this project.

These are the steps followed:

• A model is proposed to check whether a given stance of information or news article is true or false.
• Basically, the title content and domain name are checked.
• The new model can be constructed from algorithms like Passive Aggressive Classifier, Naïve Bayes algorithm and keyword search algorithm.
• Once we know that a piece of information is not real, it will give genuine news from trusted sites so the dissemination of false information can be stopped.
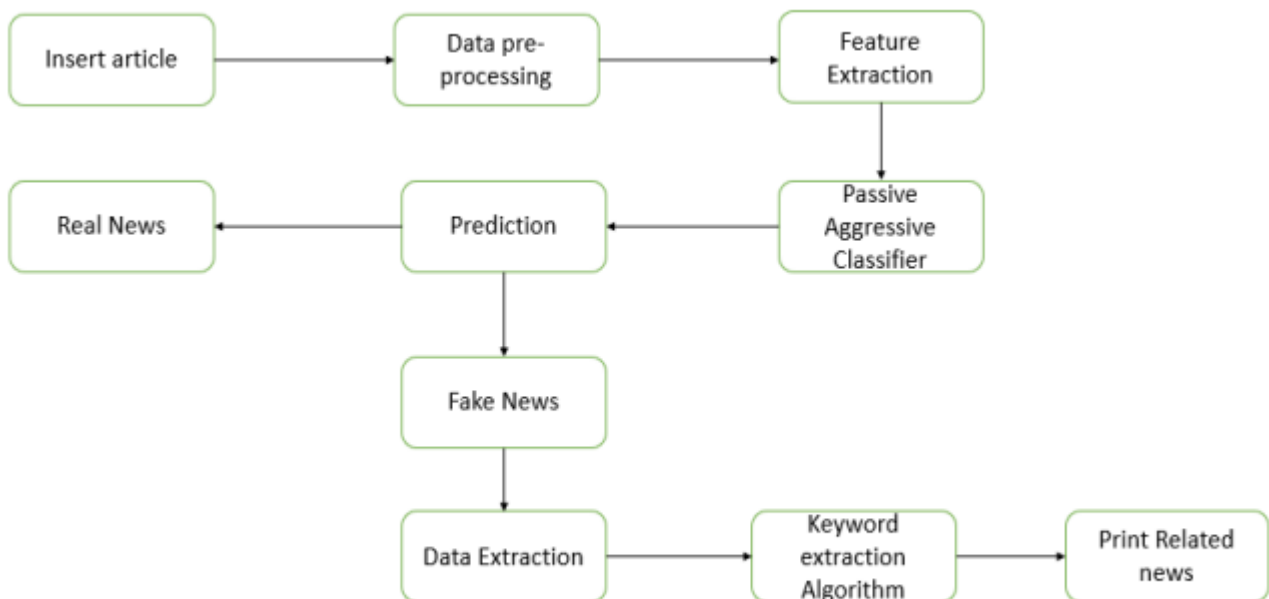

Fig-1 Architecture Diagram

FAKE NEWS DETECTION

1. DATA COLLECTION

In the proposed system, the data is collected keeping in mind the current covid situation. So, we have collected the dataset which were publicly available on Kaggle. We went through various datasets and at last came up with dataset with maximum number of records. 32

2. PRE-PROCESSING

In the pre-processing step, the data is cleaned such that the unwanted and unnecessary information can be removed and only the relevant details will be kept. In this project we have used Stemming and stopwords. There are different methods used in pre-processing. Some of the methods are mentioned below-

• Stemming: - The method of minimizing various words to their root or basic word is known as stemming. For example: If we have words like ‚retrieval', ‚retrieves', ‚retrieved' etc., these words will be reduced to its root form which is retrieve. Stemming is an important part of Natural language processing and is widely used. In a domain analysis, the stemming is used to evaluate the main vocabularies.

• Stopwords: - Stopwords are the common words present in a text such as ‚a', ‚an', ‚the' etc. In the pre-processing, these are the steps which will be filtered out and are not necessary. These are the words which add very little meaning to a sentence in any language. They can be easily overlooked without jeopardizing the sentence's purpose. When we remove the stopwords, the dataset size also decreases which helps in faster processing of data and it also enhances the performance.

• Tokenization: - Tokenization refers to splitting of text or words into small tokens. For example, in a paragraph, a line is a token. Similarly, in a line a word is a token. Tokenization is important because, by studying the words in a document, the meaning of the text can be easily deduced. There are different types of tokenization present such as word tokenization, line tokenization, regular expression tokenization etc.

3. FEATURE EXTRACTION

In Feature extraction, after identifying the key feature from the document, the data is reduced so that it can be cleaned and further be tested on various machine learning algorithms. There are various feature extraction methods. In this project, we have used the TFIDF vectorizer.

TFIDF vectorizer-

TFIDF vectorizer is an abbreviation for Term Frequency and Inverse Document Frequency. It checks that how significant a word is in the whole document.

The term frequency function determines how often a term appears in the text.

The inverse document frequency determines whether a word is uncommon or common across a document.

The TFIDF will thus check the authenticity. So, if a word occurs frequently in many documents like ‚what', ‚if' etc., they have the chances that they are fake, while the words that appear often in one text but not in all others have a good chance of being true.

MACHINE LEARNING ALGORITHMS

• Passive Aggressive Classifier: Passive Aggressive Classifiers are an online learning algorithm family that functions in the same way as a perceptron since they do not need a learning rate. Such a classifier remains passive when the classification outcome is correct, however it turns aggressive as soon as it comes across an incorrect outcome in the event of a miscalculation, after which it updates and modifies the unwanted outcome. In this project, such a classifier can help detect fake news and then fetch and generate relevant, genuine news to the user in the process from trusted news sources, thus fulfilling its purpose of making the much-needed modifications that corrects the loss. Due to its simplicity in terms of implementation as well as its quality to be used for incremental large-scale learning, it plays an imperative role in classifier 34 training stage after a dataset has been through a test-train split procedure to approximate and improve the efficiency of the machine learning model used in this project.

PREREQUISITE(S)

In this paper, a system is proposed that not only detects the news as real or fake using machine learning algorithms but it also fetches and presents real news to the user using keyword search algorithms.

1.FUNCTIONAL REQUIREMENTS

Functional Requirements consist of:

Web Application

In this project, a web application is created using languages such as HTML, CSS and JavaScript along with Heroku which is a cloud application platform to create an interface that enables a user to enter a news article that is needed to be validated as genuine news or fake news. When the user enters the news article in the text box, with the help of Flask framework which integrates the web application with the machine learning model that is the machinery behind the projects functionality, the news article is utilized as input for the model of machine learning to identify and classify news as genuine or false. In case of detection of real news, the application simply prompts the news as genuine, else the application detects fake news, prompts the user about the detection and then generates real news that may be relevant to the news article. To access this web application, web browsers such as Chrome, Mozilla etc can be used by the user.

2.NON-FUNCTIONAL REQUIREMENTS

Non-functional requirements include:

DATASET

Fig. 2 Dataset used In this study, we have utilized the dataset for both fake news and real news with over 8000 records. The datasets consist of features such as title of the news, text or news content, and label. The data once fetched from the datasets are then pre-processed with the help of processes such as stemming and stopwords which filters or cleans the unnecessary words and only keeps pieces of text or information that can be used as key words to simplify the search process. Then with feature extraction methods such as TFIDF vectorizer, the frequency of words or texts are identified in the collection of documents based on which the relevant topic of the data as well as its authenticity can be checked. The datasets are then exposed to test-train split, which divides the datasets into training and testing subsets to assess the efficiency of the machine learning models used in this analysis which are Naïve Bayes Classifier and Passive-Aggressive Classifier. While the train subset is implemented to fit the model, the test subset is utilized to make predictions and comparisons between the model's outcome which is generated once an input element of the dataset is provided and the expected result. Such a procedure is fitting especially for large datasets which is expected in such a study. 26 Upon implementing the two machine learning models on the dataset, the accuracy for both Passive aggressive classifier and Naïve Bayes algorithm is obtained. Table 3.1: Accuracy comparison Algorithm Accuracy Naïve Bayes 83% Passive Aggressive Classifier 93.55%

	Unnamed: 0	title	text	label
0	8476	You Can Smell Hillary's Fear	Daniel Greenfield, a Shillman Journalism Fello...	FAKE
1	10294	Watch The Exact Moment Paul Ryan Committed Pol...	Google Pinterest Digg Linkedin Reddit Stumbleu...	FAKE
2	3608	Kerry to go to Paris in gesture of sympathy	U.S. Secretary of State John F. Kerry said Mon...	REAL
3	10142	Bernie supporters on Twitter erupt in anger ag...	— Kaydee King (@KaydeeKing) November 9, 2016 T...	FAKE
4	875	The Battle of New York: Why This Primary Matters	It's primary day in New York and front-runners...	REAL

Fig.2 Dataset

3.**SOFTWARE REQUIREMENTS**

Software requirements consist of:

I.   PROGRAMMING LANGUAGE

In this project, Python version 3.5 has been implemented. Python programming language is an open-source programming language and since it is free, its use is extensive and has an active community development and support. Python programming language offers creation of solutions to machine learning problems with code that is readable and intuitive, its simplicity also enables developers to develop robust, reliable projects. Python is also platform independent which enables the developers to deploy and utilize the code or frameworks on different systems with little to no changes. Python is also supported by a variety of platforms, some of which includes Windows, macOS and Linux. 27 One of the major reasons for implementing Python programming language is its extensive collection of libraries and frameworks. In this project, Pandas, NumPy, Seaborn are a handful of examples of libraries that have enabled developers to create the system quickly and effectively.

II.   LIBRARIES

The libraries that have been implemented in this project are as follows:

• Sci kit-learn: It is a Python library and it plays an imperative role for implementing machine learning concepts using Python programming language. It contains functions and tools for machine learning as well as for statistical modelling which includes clustering, regression, classification and dimensionality reduction.

• NumPy: It is a Python library used to enable computational power to a python program. It contains N-dimensional arrays, matrix data structures and functions to work with arrays. It is a vital component to integrate variety of datasets into the project.

• Pandas: It is a package that provides developers with efficient, high-speed data analysis tools used to work with structured data which can be n-dimensional or tabular.

• Matplotlib: It is a Python library that consists of a set of functions that can be implemented to visualize and plot data.

• Seaborn: is a visualization library that is based on Matplotlib which is used to implement an interface to create interactive visualization and graphics.

• NLTK: Natural Language Toolkit is a python suite that contains functions and text processing packages such as stemming and tokenization in order to enable a python program to utilize natural language data. In this project, tokenizers such as RegexpTokenizer and 28 Wordpunct Tokenizer are implemented to extract tokens or key pieces of text by using regular expressions and by separating punctuation from string of words or sentences. Porter's stemmer algorithm has been implemented for the process of stemming used to reduce words into its root form to filter any unnecessary piece of text. This algorithm implements data mining and information retrieval techniques. When a news article entered by the user is detected and classified as fake, then RAKE which stands for Rapid Automatic Keyword Extraction is implemented which is a keyword search algorithm that determines key words or terms that occurs concurrently in different collection of documents based on which, relevant genuine news can be fetched and displayed to the user.

- Beautiful Soup: This is a Python library that is used to extract data from HTML and XML formats. In this project, such a library can help extract relevant news content from websites of trusted news sources once a news article input inserted by the user is classified as fake by the machine learning model.
- Pickle: It is a python module that is used to convert an object structure into bytestream so that it can be stored in a file and then it can be converted back into bytestream. In other words, it can serialize and deserialize an object structure.

III. PLATFORM (IDE)

In this project, PyCharm IDE which is developed by JetBrains has been implemented. PyCharm also supports various libraries and consists of an interactive console. PyCharm even supports Anaconda IDE. Google Colab which is a free IDE has also been implemented in this project. makes it easy for developers to share code through their google drive account, it also comes preinstalled with plenty of frequently used modules and has an user-friendly interface.

4.Hardware Requirement

One of the major advantages of this project is its minimal hardware requirement for the user as any electronic device such as mobile phone or laptop from where web browsers access is possible can be used

RESULT

In [59]: `print(f"Accuracy : {round(score*100,2)}%")`

Accuracy : 94.95%

Fig-3. Accuracy of model

News headline is -> REAL

→
Enter news headlines

Trump cherry-picked Clinton's words when he claimed Clinton said "vets are being treated, es:

Fig-4 Real news detected on website

News headline is -> FAKE

→

Enter news headlines

'Lion of Punjab. Son of Hindustan': Author Tarek

Fig-5 Fake news detected on website
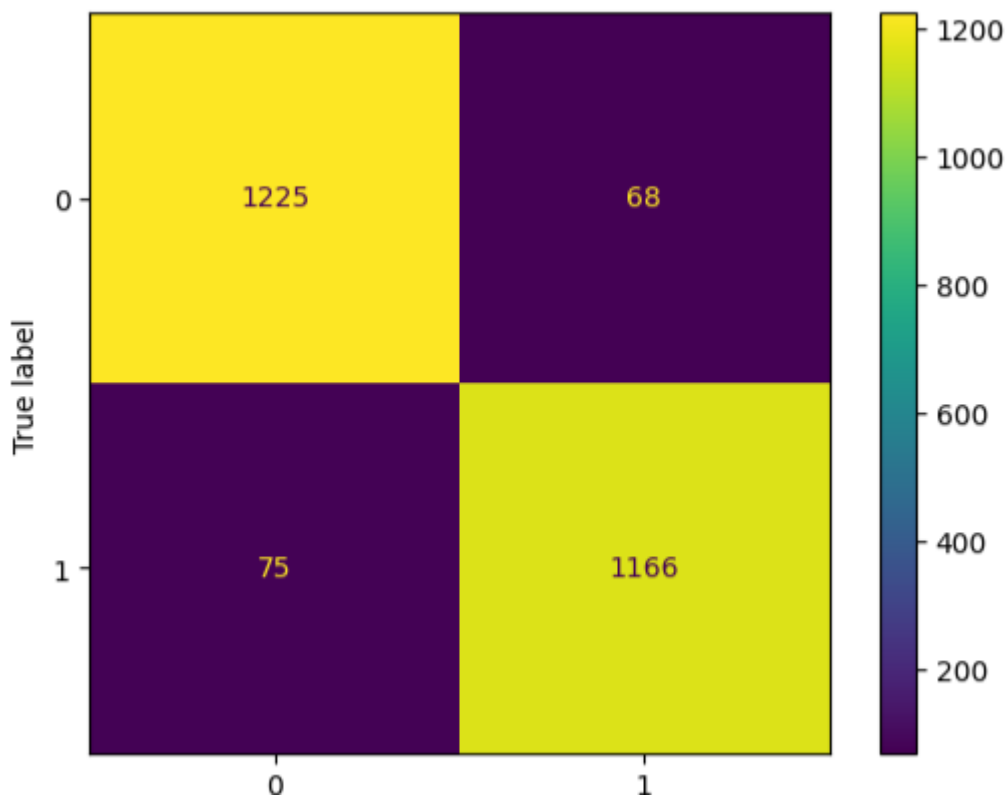

Fig- 6 Confusion matrix of Passive aggressive Classifier

```
In [503]: print(f"Classification Report : \n\n{classification_report(y_test,y_pred)}")

Classification Report :

                precision    recall  f1-score   support

        FAKE         0.94      0.95      0.94      1293
        REAL         0.95      0.93      0.94      1241

    accuracy                            0.94      2534
   macro avg         0.94      0.94      0.94      2534
weighted avg         0.94      0.94      0.94      2534
```

Fig-7 Classification report(Passive-aggressive)

CONCLUSION

With the increased use of social media for news consumption and in prevalence, the widespread distribution of false news has the potential to harm both individuals and society as a whole. Even in the midst of the current covid-19 pandemic, false information on platforms like WhatsApp, Twitter and Facebook can cause panic and have a shocking impact not just on an individual but to a society as a whole. The objective is to detect the fake news through latest technologies and algorithms likePassive aggressive classifier. We used fake news detection where the user will enter the text and this text will go through our various models and at last give a prediction whether it is true or false. Further, our real news generation will check and validate the news and give us some news from trusted sites. Our proposed model consists of two components, one where the detection takes place and the other where its correction takes place, if the news is found out to be false corresponding correct news is given as output. We determine the accuracy of these models and discuss about their limitations. In our project, the user can enter the text. Various machine learning algorithms are performed and we found out that Passive aggressive classifier gives a better accuracy as compared to Naïve Bayes. Further, the data is extracted and then real news generation is done using the keyword extraction algorithm. On the basis of our analysis, we can successfully remove the fake news if any.

FUTURE WORK

Because of its low cost, easy accessibility, and broad distribution, social media has improved the news consumption experience. However, it has rendered the average internet consumer susceptible to consuming news that has been skewed deliberately or inadvertently, which can have serious implications and put a person and society at risk. Thus, we focused on eliminating the problem of fake news from the root itself and also providing people with a consequent genuine news which will help them to gain knowledge and be aware of the facts. Based on our obtained results the following are the future directions for continuing the research:

a) We could test, optimize and cross validate various machine learning models so that we get good results across different types of news as well as news related to covid-19.
b) We could compare various other machine learning algorithms.
c) Testing the proposed method in this paper on a larger dataset to check for accuracy and problems associated.
d) Can improve the webpage by using animations and wallpapers and making it more attractive.
e) Aft er the successful implementation and removing all problems, can try for making this in the form of mobile app

REFERENCES

[1] Yang, S., Shu, K., Wang, S., Gu, R., Wu, F. and Liu, H., 2019, July. Unsupervised fake news detection on social media: A generative approach. In Proceedings of the AAAI conference on artificial intelligence (Vol. 33, No. 01, pp. 5644-5651). (Accessed at – 10/03/2023)

[2] Kai Shu , Amy Sliva , Suhang Wang , Jiliang Tang , and Huan Liu,2017 september. Fake News Detection on Social Media: A Data Mining Perspective (Accessed at –11/03/2023)

[3] Yanagi, Y., Orihara, R., Sei, Y., Tahara, Y. and Ohsuga, A., 2020, July. Fake News Detection with Generated Comments for News Articles. In 2020 IEEE 24th International Conference on Intelligent Engineering Systems (INES) (pp. 85-90). IEEE. (Accessed at – 12/03/2023)

[4] N. Grinberg, K. Joseph, L. Friedland, B. Swire-Thompson, and D. Lazer. Fake news on twitter during the 2016 us presidential election. Science, 363(6425):374–378, 2019. (Accessed at – 12/03/2023)

[5] Magdy, A., and Wanas, N. 2010. Web-based statistical fact checking of textual documents. In Proceedings of the 2nd international workshop on Search and mining user-generated contents, 103–110. ACM. (Accessed at – 13/03/2023)

[6] Ajao, O., Bhowmik, D. and Zargari, S., 2018, July. Fake news identification on twitter with hybrid cnn and rnn models. In Proceedings of the 9th international conference on social (Accessed at – 13/03/2023)