AN AI SYSTEM FOR FAKE NEWS DETECTION ON SOCIAL MEDIA

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Keywords: *Artificial Intelligence, Fuzzy Logic, Fuzzy Inference, Machine Learning, Naive Based Classifier, News, Prediction, Recommendation, Support Vector Machine(SVM).*

Abstract**:** Recent political events have led to an increase in the popularity and spread of fakenews. As the far-reaching impact of the spread of fake news has shown, people are inconsistent, if not poor, at detecting fake news. Therefore, efforts have been made to automate the process of detecting fake news. Among the most widespread attempts of this kind are "blacklists" of sources and authors who cannot be trusted. While these tools are useful for creating a more comprehensive end-to-end solution, we must consider the more difficult cases where credible sources and authors publish fake news. The aim of this project was therefore to create a tool to use machine learning to detect linguistic patterns that characterize false and real information. The results of this project show that machine learning can be useful in this task. We have developed a model that captures many intuitive clues about true and false news, as well as an application that visualizes the classification decision.

I. INTRODUCTION

Nowadays anyone can publish content on theInternet. Unfortunately, fake news receives a lot of attention on the Internet, especially in network media. Individuals are misled and do not hesitate to allow such misleading material to reach the very end of the business. Recent political events have led to the growing popularity and spread of fake news. As the far- reaching impact of the spread of fake news has shown, people are inconsistent, if not poor, at detecting fake news. For this reason, efforts have been made to automate the process of detecting fake news. There are many websites offering fake numbers. They deliberately try to spread advertising, fraud and lies under the pretense that it is real news. Their main role is data control, which can lead to openly trusting them. There are countless similar websites around the world. So, fake news affects the individual's brain. As the study shows, scientists admit that many calculations about the power of the human brain can help detect fake news.

Fake News Detection aims to stop the spread of rumors on various platforms, be it social media or messaging platforms. It's about stopping the spread of fake news that leads to actions like mass lynchings. This is a very good reason that motivates us to work on this project. We continue to receive conflicting reports of mob lynchings that end with the person being murdered; Fake news detection aims to detect these fake news and stop this type of activity to protect you and also defend society from these unwanted acts of violence.

The main goal is to detect fake news, a classic text classification problem with a simple statement. Among the most widespread attempts of this kind are "blacklists" of sources and authors who cannot be trusted. While these tools are useful in creating a more complete and comprehensive solution, we must address the more difficult cases where credible sources and authors expose fake news. Therefore, the goal of this project was to use machine learning to develop a tool to detect speech patterns that characterize false and real information.

The widespread dissemination of fabricated information, commonly referred to as fake news, has become a pervasive and urgent concern in the modern digital age. In a time where information flows rapidly through various online platforms, the ability to distinguish between

accurate and misleading news has become increasingly critical. Fake news, which involves the intentional spread of deceptive or inaccurate content, can wield considerable influence over public opinion, erode trust in media sources, anddisrupt political and social dynamics.

II. RELATED WORK

2.1 Overview

Several initiatives been taken over the years to achieve fake news detection:

- In 2019, Anjali Jain, Assistant Professor in Department of Information Technology at KIET Group of Institutions, Lucknow, Harsh Khatter, Assistant Professor and Avinash Shakya, a final year student in Department of Computer Science and Engineering at ABES Engineering College, Lucknow published a research paper aimed at developing a smart system to detect fake news using Machine Learning. They used a News Aggregator and a News Authenticator in accordance with Naïve Baye's Classifier and SVM methodology.
- Facebook and WhatsApp are actively engagedin the development of fake news detection systems, as stated in an official article. Theircollaborative efforts in this area have spanned nearly one year, with the project presently in its alpha testing phase.
- Dr. M. J. Lazer and Dr. Mathew Baum (Harvard University) studied the propagation and nature of fake news and published their study under the title "The science of fake news" in March of 2018. They concluded that in order to address the issue of fake news, it required a multidisciplinary effort.
- NK Conroy, VL Rubin and Y Chen surveyed the current state-of-the-art technologies that are instrumental in adoption and development of fake news detection in their paper, "Automatic Deception Detection: Methods for Finding Fake News". An innovative hybrid approach between linguistic cue and network analysis is promising.

In response to the recent surge in widespread fake news, various strategies have been employed to identify and combat this issue. Fake news contributors can be categorized into three distinct groups: social bots, trolls, and cyborg users. Social bots are characterized by the automated control of a social media account through computer algorithms, enabling them to automatically generate content. Trolls, on the other hand, are real individuals who intentionally seek to disrupt online communities with the aim of provoking emotional responses from social media users. Cyborg users represent a combination of automated actions and human intervention, where humans create accounts and employ programs to engage in activities on social media platforms.

For this purpose, two approaches are commonly used: Linguistic Cue and Network Analysis. These approaches make use of techniques such as the Naïve Bayes Classifier and SVM.

2.2 Facebook Works to Stop Misinformationand False News

According to a statement from Facebook, their efforts are primarily focused on two crucial aspects. First, disrupting economic incentives that drive propagation of false news, as a significant portion of such content is financially motivated. The second aspect is development of novel products aimed at restraining the spread offalse information.

- **Ranking Improvements:** Ranking News Feed content serves to diminish prevalence of false news.

- **Easier Reporting:** Assessing content for its accuracy is essential. If stories are identified as false, their visibility on user feed is lower.

2.3 WhatsApp's Contribution

In order to combat the dissemination of false information, WhatsApp has introduced various security measures, including a fake news detection system that is currently in its alphatesting phase and has not yet been extended to beta users. WhatsApp is also testing a "Suspicious Link Detection" feature, which will notify users by displaying a red label on links known to direct to counterfeit or unverified websites or news sources. Furthermore, messages forwarded from a device more than 25 times may potentially be subject to blocking.

2.4 Outcome

As it is cited above, all top most giants are trying to hide their selves from the rumors and factual news from authentic articles should be focused upon. More or less, the procedures examine withinside the extraction are based totally mostly on tool learning and Natural language processing. Classifiers,and analytical algorithms are required to paint hand in hand forthe authentication of information articles.

SVM can be used withinside the paper via way of means as an current great appropriate technique with Naïve Bayes. SVM is best suited for binary classification. There are numerous information web sites and information blogs which lets in to paintings with RSS feeds and import the references of the information articles.

III. PROPOSED MODEL

In the proposed model there are three main modules, called

3.1Aggregator

News aggregation websites provide users with a convenient means of accessing news and updatesfrom a multitude of sources all in one place.
These platforms collect information, categorize itinto tags or classes, and present it in an organizedmanner for easy consumption. Popular websites like Google News, Feedly, and News360 providesemi-structured news data, with the assistance of RSS aggregator plugins to simplify the process. Essentially, the aggregator enhances the quality and accuracy of news by gathering data, makingdata collection its primary objective. A fundamental approach involves continuously monitoring RSS feeds, extracting articles from different news sites, and assembling the data.
Keyword-based methods are often employed to identify related articles. Once all these processesare complete, they display relevant and current news on their pages.

3.2 News Authenticator

The new authenticator takes several steps to verify whether the message is real or fake. Compare the news provided on our website with other websitesand various news sources. If such news is found on a news site, it is evidence that the new data is true, otherwise it is evidence that there has been no such news in recent years. days. This can help us fight fake news. Nowadays, fake news spreads very quickly thanks to social networks and the Internet.

3.3 News Recommendation System

News recommendations provide recent news and recommend news articles that are related to the user's provided news for authentication.

If the news is fake, then this news suggestion givesthe related news on that topic.

IV. METHODOLOGY

4.1 Approach

Due to the multidimensionality of fake news, it is not so easy to identify the news category. It is clear that a practical technique must integrate multiple perspectives to accurately grasp the problem. For this reason, the proposed strategy is a combination of naive Bayesian classifier,support vector machines and semantic search. The proposed strategy is based entirely on artificial intelligence, which forms the basis fora precise classification between original and counterfeit, instead of relying on calculations that cannot represent subjective possibilities. The three-part strategy is a combination of machine learning calculations divided into managed learning techniques and separate language preparation techniques.

4.1.1 Naive Bayes

This underlying assumption plays a pivotal role in streamlining computational processes as it narrows the focus down to simply tallying the class distribution of data. The Naive Bayes algorithm is a well-established and frequently employed method for evaluating the veracity of news, aiming to discern whether it is true orfalse.

$$P((X|Ci) = \prod_{k=1}^{n} P(xk|Ci)$$
$$= (x1|Ci) \times (x2|Ci) \times \dots \times P(xn|Ci)$$

It utilizes the Naive Bayes theorem, which is a probabilistic approach, to make these determinations. Numerous other algorithms, based on similar underlying principles, are designed for training classifiers to distinguish between authentic and fake news. To assess whether a message is genuine or counterfeit, the Bayes theorem can be effectively leveraged as one of the viable and widely recognized techniques. This approach involves evaluating the probability of a message being true or false based on its characteristics and the historical data used for training the classifier, ultimately aiding in the identification of accurate news reporting.

4.1.2 Support Vector Machine (SVM)

The Support Vector Machine (SVM) proves to be a valuable algorithm for extracting binary classifications based on the provided dataset. In the proposed model, the task involves categorizing articles into one of two groups, specifically as either true or false.

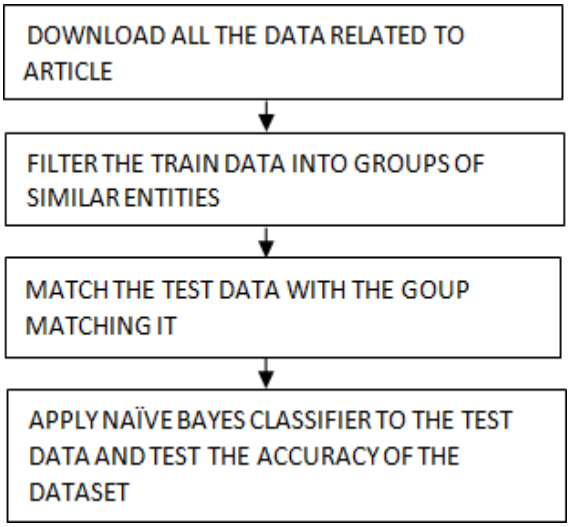


Fig 4.1 Use of Naïve Bayes Classifier

SVM, which stands for Support Vector Machine, is a supervised machine learning algorithm with versatile applications in both regression and classification tasks. Its fundamental principle revolves around identifying the optimal hyper-plane that effectively separates the dataset into two distinct classes

point is done using a hyper-planes can be seen in figure 4.2 depicted below:[11][12]

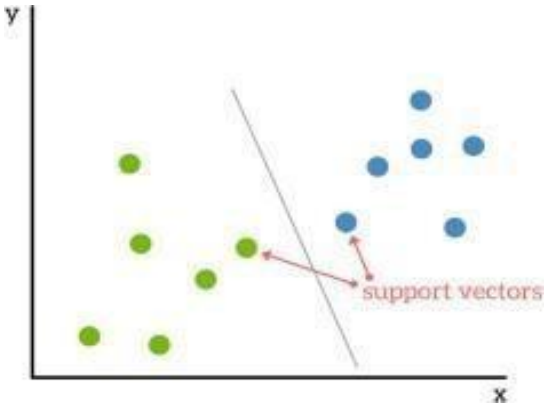


Figure 4.2Depiction of hyper-plane dividingthe dataset into two classes

Moreover, the advantages of employing the SVM approach include its tendency to be exceptionally precise and performs incredibly well on datasets that are semi-structures structured. Moreover, this method is truly adaptable since it tends to be utilized to arrange or even decide numbers. Likewise, support vector machines have the capacity to deal with high dimensional spaces and will in general be memory proficient.

4.2 System Architecture

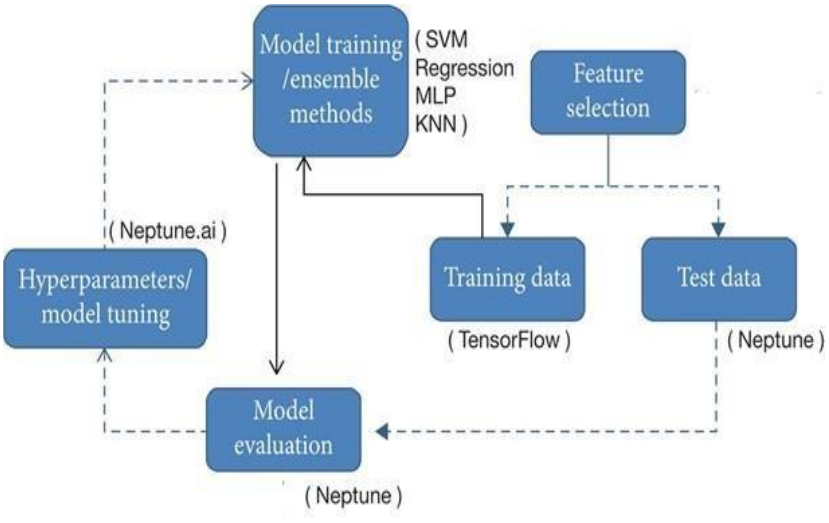


Figure 4.3 Flow chart – Classifier Training

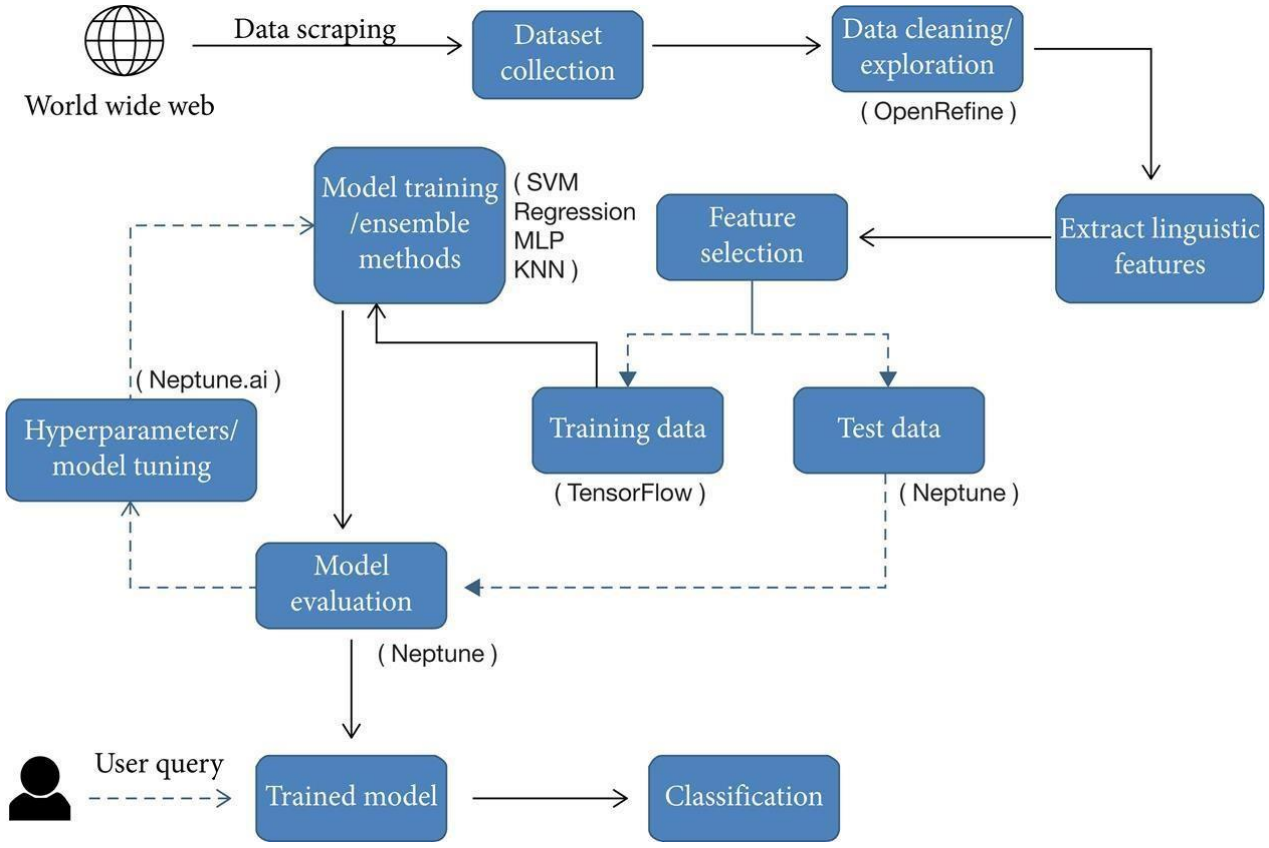


Figure 4.4 Flow chart – Proposed Model

V. IMPLEMENTATION AND RESULTS

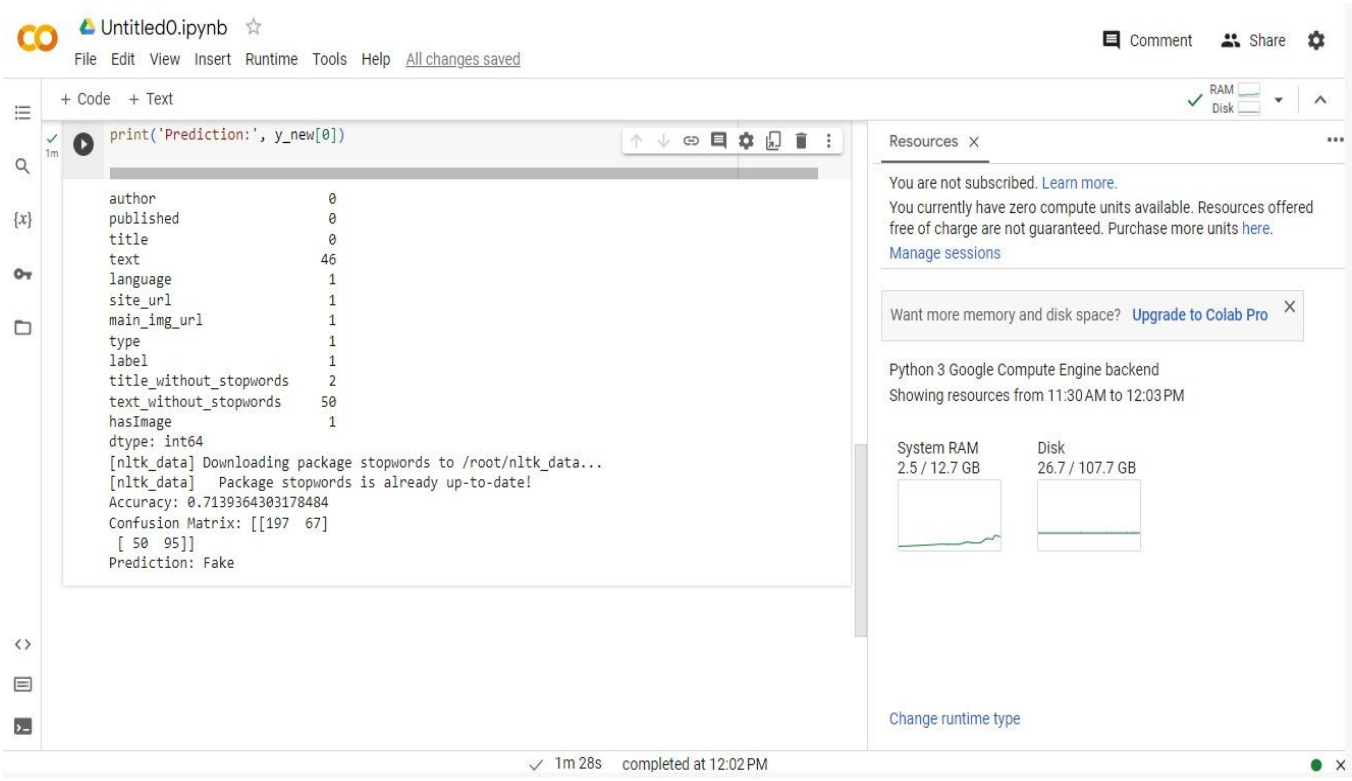
The source code for the implementation is provided below. The demonstration is done using python programming on R studio and some machine learning algorithm.

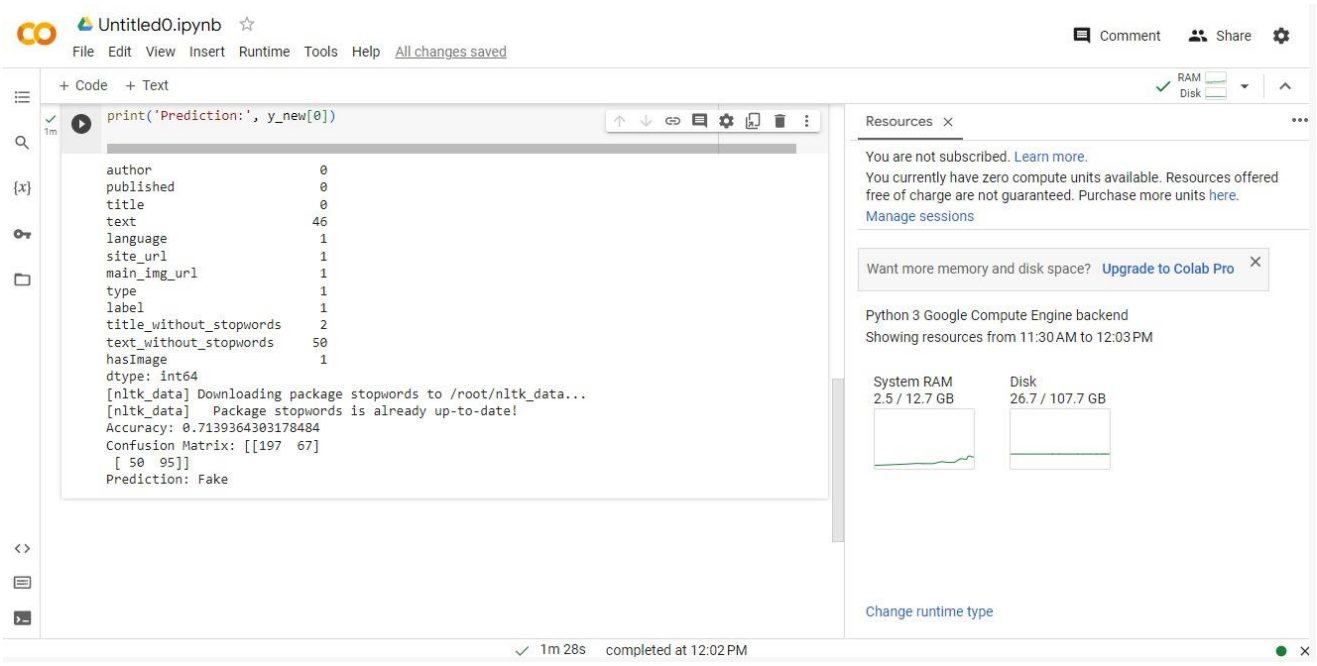
SOURCE CODE:

```
import pandas as pdimport

numpy as npimport re

import nltk

from nltk.corpus import stopwords

from sklearn.feature_extraction.text import CountVectorizerfrom

sklearn import svm

from sklearn.metrics import accuracy_score, confusion_matrixfrom

sklearn.model_selection import train_test_split
```

```
# Load dataset

df = pd.read_csv('/content/drive/MyDrive/news_articles.csv')# Check

for missing values

print(df.isna().sum())

# Drop rows with missing valuesdf =

df.dropna()

# Data preprocessing

nltk.download('stopwords')

stop_words = set(stopwords.words('english'))ps =

nltk.PorterStemmer()

def preprocess_text(text):

# Removing punctuations and special characterstext =

re.sub('[^a-zA-Z0-9]', ' ', text)

# Converting all text to lowercasetext =

text.lower()

# Tokenizing the texttokens =

text.split()

# Removing stop words and stemming the words

tokens = [ps.stem(word) for word in tokens if word not in stop_words]return '

'.join(tokens)

df['text'] = df['text'].apply(preprocess_text)#

Feature Extraction

cv = CountVectorizer()

X = cv.fit_transform(df['text']).toarray()y =

df['label'].values

# Model Training

X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

```
classifier = svm.SVC(kernel='linear')

classifier.fit(X_train, y_train)

# Model Evaluation

y_pred = classifier.predict(X_test) print('Accuracy:',

accuracy_score(y_test, y_pred))

print('Confusion Matrix:', confusion_matrix(y_test, y_pred))# Model

Deployment

text = preprocess_text('Breaking News: COVID-19 vaccine causes autism')X_new =

cv.transform([text]).toarray()

y_new = classifier.predict(X_new)

print('Prediction:', y_new[0])
```





For the implementation and comparison purpose, the three pre-existing approaches are considered against the Ensemble Learning Methodology proposed in this paper. The results of mentioned three models are compared with the proposed model, it is found the accuracy among top 200 results is mentioned in the table 5.1. The demonstration is done using python programming on R studio and some machine learning algorithm.

Article	Accuracy	Implementation Method
R. V. L, C. Yimin, and C. N. J (2016)	76%	NLP
M. Granik and V. Mesyura (2017)	74%	Naive Bayes
Y. Seo, D. Seo, and C. S. Jeong (2018)	86.65%	CNN
Kshitij D. Yadav, Yash Gautam, KushagraSingh, Dr. Visnu Dharsini (2023)	**93.50%**	**Naive Bayes, SVM, NLP**

Table 5.1 Result Comparison

VI. CONCLUSION

Assessing the accuracy of online news content holds paramount importance. This paper delves into the elements involved in identifying fraudulent news sources. It is essential to bear in mind that not all deceptive news stories will disseminate through social media platforms.

Presently, the evaluation of the suggested Naïve Bayes classifier method involves the utilization of SVM and NLP. In forthcoming developments, it is anticipated that a hybrid approach may yield more favorable outcomesfor achieving the same objective. The described system identifies counterfeit news based on the employed models and additionally offers recommended news articles on the subject, offering substantial value to users. In the future, there is potential to elevate both the prototype's efficiency and accuracy to a considerable extent while also improving the user interface of the proposed model.

References

[1] Asst. Prof. Anjali Jain, Asst. Prof. Harsh Khatter and Avinash Shakya, "A Smart System for Fake News Detection Using ML", Research Gate, ICICT, DOI: 10.1109 / ICICT46931.2019.8977659, 2019.

[2] Dr. M. J. Lazer (Harvard University) and Dr. Mathew Baum (Harvard University), "The Science of Fake News", science.org,vol. 359, no 6380, American Economic Review,2018.

[3] Santiago Alonso Gracia, Gerardo Gómez García and Mariano Sanz Prieto, "The Term of Fake News on the Scientific Community", mdpi.com / Journals /Social Sciences / Volume 9 / Issue 5 , Deaf Studies and Journal, 2020.

[4] Amanda Robb, "Anatomy of A Fake News,https://www.rollingstone.com/feature/ anatomy-of-a-fake-news-scandal-125877/, 2017.

[5] Jacob Soll, "The Long and Brutal history of Fake News", https://www.politico.com / magazine / story / 2016 / 12 / fake-news-histo ry-long-violent-214535/, 2016.

[6] Jinling Hua and Rajib Shaw, "Infodemics of Internet", mpdi.com / Journals / IJERPH / Volume 17 / Issue 7 / 10.3390 / ijerph17072309, International Journal of Environmental Research, 2020.

[7] Nadia K. Conroy, Victoria L. Rubin and Yimin Chen, "Automatic Deception Detection: Methods for Finding Fake News", asis&t.com https://doi.org/10.1002/pra2.2015 .145052010082, Proceedings of the Association for Information Science and Technology,2016.

[8] Fatemeh Torabi Asr and M. Taboada, "A Collection of News Articles with False and True Labels", scholar.google.com/citations, Misinfotext,2019.

[9] Kai Shu, Amy Sliva, Suhang Wang, Huan Liuand Jiliang Tang, "Fake News Detection on Social Media: A Data Mining Perspective", Research Gate, ACM SIGKDD Explorations Newsletter19(1) /DOI:10.1145/3137597.3137 600, ACM SIGKDD Explorations Newsletter,2017.

[10] S. Das Bhattacharjee, A. Talukder, and B. V. Balantrapu, "Active learning based news veracity detection with feature weighting and deep-shallow fusion," Proc. - 2017 IEEE Int. Conf. Big Data, Big Data 2017, vol. 2018– January,pp.556–565,2018.

[11] S. Helmstetter and H. Paulheim, "Weakly supervised learning for fake news detection on Twitter," Proc. 2018 IEEE/ACM Int. Conf. Adv. Soc. Networks Anal. Mining, ASONAM 2018, pp. 274–277, 2018.

[12] T. Granskogen and J. Gulla, "Fake news detection: Network data from social media used to predict fakes," CEUR Workshop Proc., vol. 2041, no. 1, pp. 59–66, 2017.

[13] A. Dey, R. Z. Rafi, S. Hasan Parash, S. K.Arko, and A. Chakrabarty, "Fake newspattern recognition using linguistic analysis,"2018 Jt. 7th Int. Conf. Informatics, Electron.Vis. 2nd Int. Conf. Imaging, Vis. PatternRecognition, ICIEV-IVPR 2018, pp. 305– 309,2019.

[14] Deb Roy, Sinan Aral and Dr. Alice, "The Spread of True and False News Online", Science.org, Vol 359, Issue 6380 / pp.1146- 1151 /DOI: 10.1126/science.aap955, Journal of Economic Perspectives, 2018.