Fake News Classification Model Using Machine Learning

Narsin Vamshika, Bachu Akhila , Varikuppala Praveen Kumar, Singireddy Vaarshik Reddy,

Under the Guidance of **K.Madhuravani** (Assistant Professor),

Department of Computer Science and engineering,

Sreyas Institute of Engineering and Technology, Hyderabad, India.

Student of Sreyas Institute of Engineering and Technology, 18VE1A05M3

Student of Sreyas Institute of Engineering and Technology, 18VE1A05J3

Student of Sreyas Institute of Engineering and Technology, 18VE1A05P7

Student of Sreyas Institute of Engineering and Technology, 18VE1A05N8

ABSTRACT

The World Wide Web's introduction, as well as the rapid adoption of social media platforms (such as Facebook and Twitter), paved the way for unprecedented levels of knowledge distribution in human history. Certain entities, however, take advantage of such platforms, sometimes for monetary gain and sometimes for the purpose of promoting prejudiced viewpoints, changing mindsets, and disseminating satire or ridiculousness. This phenomenon is known as fake news. Because the spread of fake news can have serious consequences, such as election rigging and widening political divides, developing methods to detect fake news content is critical. A computerised classification system is used to classify a wide range of things. Fake news is a term used to describe this occurrence. Given the serious consequences of fake news, such as swaying elections and widening political divides, developing methods for detecting fake news content is critical. It is difficult to automate the classification of a text article as misinformation or disinformation. We suggest employing a machine learning ensemble approach for automatic classification in this paper. Our research looks into various textual properties such as word counts, term frequency, and inverse document frequency that can be used to distinguish between fake and real content. We train a Passive-Aggressive Classifier and evaluate its performance on real-world datasets using these properties. The datasets will be used in part to train and part to test the classifiers. It is possible to determine whether the news is fake or not by testing the different features of the datasets on the classifier.

Keywords: Passive Aggressive Classifier, Tfidf Vectorizer, Confusion Matrix, Accuracy Score.

1. INTRODUCTION

Nowadays, fake news is causing a variety of problems, ranging from sarcastic articles to fabricated news and planned government propaganda in some outlets. Fake news and a lack of trust in the media are growing issues in our society, with far-reaching consequences. A purposefully misleading storey is obviously 'fake news,' but the blathering social media discourse is changing its definition. Some of them now use the term "fake news" to dismiss facts that contradict their preferred points of view. The significance of disinformation in American political discourse has received considerable attention, particularly in the aftermath of the American presidential election. The term "fake news" became common parlance for the issue, specifically to describe factually incorrect and misleading articles published primarily for the purpose of profiting from page views. The goal of this project is to develop a model that can accurately predict the likelihood that a given article is fake news. Following media attention, Facebook has been the target of much criticism. They have already implemented a feature that flags fake news on the site when a user encounters it, and they have publicly stated that they are working on distinguishing these articles in an automated manner. It is undeniably not an easy task.

2. LITERATURE SURVEY

A literature survey or a literature review in a project report is that section which shows the various analyses and research made in the field of your interest and the results already published, taking into account the various parameters of the project and the extent of the project. It is the most important part of your report as it gives you a direction in the area of your research. It helps you set a goal for your analysis - thus giving you your problem statement.

Machine learning algorithms for fraud detection have a huge body of research, with the majority of it focusing on classifying online reviews and publicly available social media posts.

The matter of determining 'fake news' has received a lot of attention in the literature, especially since late 2016 during the American Presidential election. There are studies underway in this field that employ algorithms such as the Hybrid Cloud method to detect bogus news.

However, such algorithms are less accurate and need more storage. Humans are occasionally used as input in this method. As a result, there is a large danger that data provided by a single human would be inaccurate, reducing the accuracy of false news detection. As a result, an algorithm with a higher efficiency than the existing algorithm is required.

Hybrid approach-based models require larger data sets to train the data, and because this method does not always classify the data, there is a higher danger of matching with unrelated data, affecting the news' accuracy.

2.1 EXISTING SYSTEM

There exists a large body of research on the topic of machine learning methods for deception detection, most of it has been focusing on classifying online reviews and publicly available social media posts. Particularly since late 2016 during the American Presidential election, the question of determining 'fake news' has also been the subject of particular attention within the

literature. There are projects which are being done in this domain which use algorithms such as Hybrid Cloud approach to detect the fake news. But such algorithms have very less accuracy and take more storage. This algorithm uses humans as input sometimes, so the risk that the data given by a single human is very high which hinders the accuracy of the fake news detection so an algorithm with a efficiency greater than the current algorithm is needed. Hybrid approach-based models need larger data sets to train the data and this method also does not sometimes classify the data so there is a higher risk of matching with the unrelated data which in turn will affect the accuracy of the news.

3. PROPOSED SYSTEM

The proposed system is built based on the Tfidf Vectorizer which converts a collection of raw documents into a matrix of TF-IDF features. Primarily, we take input in the form of a dataset and then the dataset is handled using the model built. The next step is to extract the most optimal features for the TF-IDF vectorizer, which is done by using an n-number of the most commonly used words, primarily removing stop words such as "the," "when," and "there," and only using those words that appear at least a given number of times in a given test dataset. Since this problem is a kind of text classification, implementing a Passive-Aggressive Classifier will be best as this is standard for text-based processing. Finally, we are obtaining the accuracy and printing the true and false positives and negatives using a confusion matrix. A confusion matrix is nothing but a table used to describe the performance of a classification model or classifier on a data set. We obtain the accuracy based on how well our classifiers are working and the data set is the best fit for it. True and false positives and negatives are used to calculate accuracy.

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

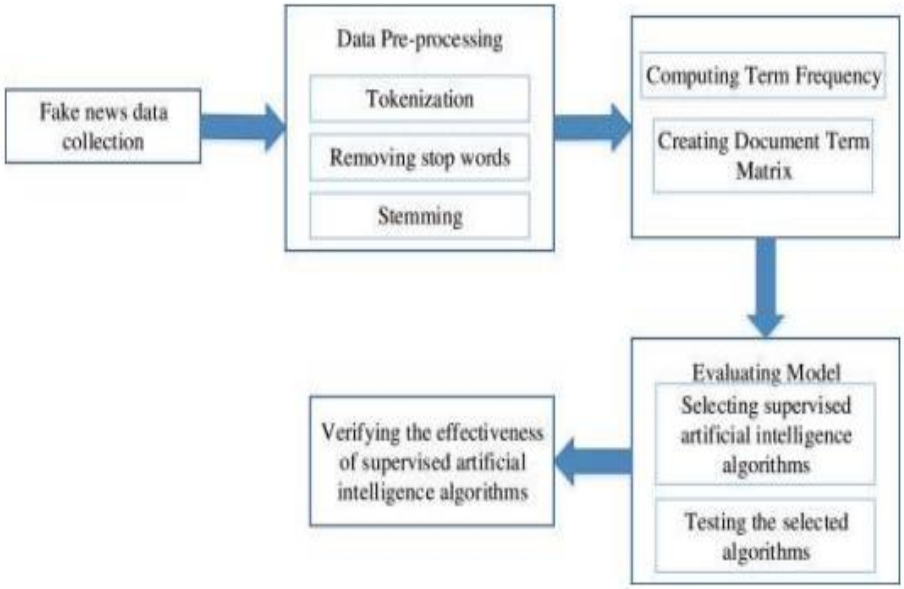

Fig.1. Architecture Diagram of the proposed system

3.1 DATA PREPROCESSING

The following is the strategy of detecting political fake news during the model construction process: The first stage is to acquire a political news dataset (the Liar dataset is used for the model), perform preliminary noise removal, and then apply the NLTK (Natural Language Toolkit) to perform POS and feature selection. After that, partition the dataset and use machine learning methods (Nave Bays and Random Forest) to build the proposed classifier model. The system response is used in conjunction with N.B. and Random Forest, and the model is then constructed with the response message. After doing testing on a test dataset and verifying the findings, the precision is monitored for approval. The model is then applied to previously unseen data chosen by the user. The full dataset is constructed, with half of the data being bogus and the other half being real articles, resulting in a 50% reset accuracy for the model. A random selection of 80% of the data from the fake and actual datasets is made to be utilised in our complete dataset, with the remaining 20% being used as a testing set once our model is finished. Before applying a classifier to text data, we must clean noise by using Stanford NLP (Natural language processing) for POS (Part of Speech) processing and tokenization of words, and then encode the resulted data as integers and floating point values to be accepted as an input to machine learning algorithms. The research used the python scikit-learn package to do tokenization and feature extraction of text data, as this library provides important utilities like Count Vectorizer and Tiff Vectorizer. The data is presented in a graphical format with a confusion matrix.

DATA PREPROCESSING CODE:

```
import matplotlib.pyplot as plt
def plot_confusion_matrix(cm, classes,
                          normalize=False,
                          title='Confusion matrix',
                          cmap=plt.cm.Blues):
 plt.imshow(cm, interpolation='nearest', cmap=cmap)
 plt.title(title)
 plt.colorbar()
 tick_marks = np.arange (len(classes))
 plt.xticks(tick_marks, classes, rotation=45)
 plt.yticks(tick_marks, classes)

 if normalize:
  cm= cm.astype('float') / cm.sum(axis-1)[:, np.newaxis]
  print( "Normalized confusion matrix")
 else:
  print ('Confusion matrix, without normalization')

 thresh = cm.max() / 2.
 for i, j in itertools.product(range(cm.shape[0]), range(cm.shape[1])):
   plt.text(j, i, cm[i, j],
      horizontalalignment="center",
      color="white" if cm[i, j] > thresh else "black")

plt.tight_layout()
plt.ylabel('True label')
plt.xlabel('Predicted label')
```

3.2 PURPOSE

As technology advances, individuals around the world are exposed to more digital news, which adds to the spread of hoaxes and misinformation online. Fake news can be found on social media and the Internet, among other places. Fake news, on the other hand, aims to persuade the reader to trust false information. These articles are tough to comprehend. Because the rate of manufacturing digital news is high and fast, running every second of every day, the world would no longer respect truth if it were not possible to detect fake news. Fake news makes it simpler to mislead people and propagate false information. These persons that disseminate false information profit from the number of interactions on their articles. These people who spread incorrect information profit from the number of people that interact with their articles. False information is disseminated for a variety of reasons, including obtaining political favour, promoting businesses and products, and exacting revenge. Humans are gullible, and it can be difficult to tell the difference between fake and real news.. Due to relationships and trust, most people are easily affected, particularly by the sharing of friends and family. We have a tendency to build our emotions on news, which makes receiving it easier when it is relevant and based on our own views. As a result, we settle for what we want to hear and fall into these traps. Fake news, in essence, is based on false information that may be transmitted via the Internet. Fake news can also refer to the dissemination of false statements based on false information and the sensationalization of articles on social media. We can detect bogus news in a variety of industries around the world, including politics, education, and financial markets.

3.3 SCOPE

We offer an overview of false news identification and explore possible research areas in this field. The following is a list of the study's main motivations: Here's a rundown of the study's primary motivations: Fake news has been spreading on social media for years, yet no universal definition of the word "fake news" exists. Appropriate clarifications are required to properly guide the future paths of false news detection research. Social media has proven to be a potent tool for spreading fake news. In social media, there are some emerging trends that can be used to detect bogus news. A fundamental grasp of the state-of-the-art false news detection methods can be gained by reviewing existing fake news detection approaches in various social media settings. Fake news detection on social media is still in its infancy, and there are still a slew of difficulties that need to be investigated further. It's critical to talk about prospective research avenues for improving false news detection and mitigation. This survey will cover two parts of the false news detection problem: characterization and detection, in order to aid research in fake news detection on social media. The context of the false news identification problem will be described first, utilising ideas and properties from psychology and social studies, and then the detection methodologies will be shown. The following is a list of our main contributions to this project: We go over the narrow and broad definitions of fake news, which encompass the majority of existing definitions in the literature, as well as the particular characteristics of fake news on social media and their ramifications in comparison to traditional media. We provide an overview of existing false news detection approaches, as well as a principled strategy for classifying representative

methods into different categories; and we highlight numerous remaining difficulties and future possibilities for fake news identification in social media.

3.4 IMPLEMENTATION

The initial stage in detecting fake news is to obtain the training data, which may be obtained either from a file or from the internet. The words can be counted in two ways. The Fit and Transform methods are two methods for transforming data. The fit technique assigns a unique serial number to each and every word, whereas the transform approach counts the number of times a certain word appears in the data set. Rather than applying these approaches independently, we may combine them into a single method called fit transform, which saves both space and time. To count the number of times a word appears, term frequency is necessary, and inverse document frequency is utilised to assign weight to the words. It gives the most significant words the most weight and the least important terms the least weight. So, to save time and space in the detection, we combined both methods into a single function called tf idf, which estimates the height of a certain word. The dataset has now been divided into two parts: test and train. The train data is classified into groups of comparable entities using a passive aggressive classifier. The test data does not match the train data group with which it is being matched. As a result, it is possible to establish whether a piece of news is fake or not.

RESULT ANALYSIS

PC/Laptop, RAM are the hardware requirements used in this work (minimum of 4GB). Python Language, Jupyter Notebook (IDE), and Pandas, numpy, sklearn, and matplotlib are the software requirements utilised in this paper.

DATASETS

Out[3]:

	title	text	subject	date
0	Donald Trump Sends Out Embarrassing New Year'...	Donald Trump just couldn t wish all Americans ...	News	December 31, 2017
1	Drunk Bragging Trump Staffer Started Russian ...	House Intelligence Committee Chairman Devin Nu...	News	December 31, 2017
2	Sheriff David Clarke Becomes An Internet Joke...	On Friday, it was revealed that former Milwauk...	News	December 30, 2017
3	Trump Is So Obsessed He Even Has Obama's Name...	On Christmas day, Donald Trump announced that ...	News	December 29, 2017
4	Pope Francis Just Called Out Donald Trump Dur...	Pope Francis used his annual Christmas Day mes...	News	December 25, 2017
5	Racist Alabama Cops Brutalize Black Boy While...	The number of cases of cops brutalizing and ki...	News	December 25, 2017
6	Fresh Off The Golf Course, Trump Lashes Out A...	Donald Trump spent a good portion of his day a...	News	December 23, 2017
7	Trump Said Some INSANELY Racist Stuff Inside ...	In the wake of yet another court decision that...	News	December 23, 2017
8	Former CIA Director Slams Trump Over UN Bully...	Many people have raised the alarm regarding th...	News	December 22, 2017
9	WATCH: Brand-New Pro-Trump Ad Features So Muc...	Just when you might have thought we d get a br...	News	December 21, 2017

Fig.2: True Dataset

Out[8]:

	title	text	subject	date
0	As U.S. budget fight looms, Republicans flip t...	WASHINGTON (Reuters) - The head of a conservat...	politicsNews	December 31, 2017
1	U.S. military to accept transgender recruits o...	WASHINGTON (Reuters) - Transgender people will...	politicsNews	December 29, 2017
2	Senior U.S. Republican senator: 'Let Mr. Muell...	WASHINGTON (Reuters) - The special counsel inv...	politicsNews	December 31, 2017
3	FBI Russia probe helped by Australian diplomat...	WASHINGTON (Reuters) - Trump campaign adviser ...	politicsNews	December 30, 2017
4	Trump wants Postal Service to charge 'much mor...	SEATTLE/WASHINGTON (Reuters) - President Donal...	politicsNews	December 29, 2017
5	White House, Congress prepare for talks on spe...	WEST PALM BEACH, Fla./WASHINGTON (Reuters) - T...	politicsNews	December 29, 2017
6	Trump says Russia probe will be fair, but time...	WEST PALM BEACH, Fla (Reuters) - President Don...	politicsNews	December 29, 2017
7	Factbox: Trump on Twitter (Dec 29) - Approval ...	The following statements were posted to the ve...	politicsNews	December 29, 2017
8	Trump on Twitter (Dec 28) - Global Warming	The following statements were posted to the ve...	politicsNews	December 29, 2017
9	Alabama official to certify Senator-elect Jone...	WASHINGTON (Reuters) - Alabama Secretary of St...	politicsNews	December 28, 2017

Fig.3: False Dataset

Out[8]:

	title	text	subject	date	class
0	Donald Trump Sends Out Embarrassing New Year'...	Donald Trump just couldn t wish all Americans ...	News	December 31, 2017	0
1	rump Staffer Started Russian ...	House Intelligence Committee Chairman Devin Nu...	News	December 31, 2017	0
2	Sheriff David Clarke Becomes An Internet Joke...	On Friday, it was revealed that former Milwauk...	News	December 30, 2017	0
3	Trump Is So Obsessed He Even Has Obama's Name...	On Christmas day, Donald Trump announced that ...	News	December 29, 2017	0
4	Pope Francis Just Called Out Donald Trump Dur...	Pope Francis used his annual Christmas Day mes...	News	December 25, 2017	0
5	Racist Alabama Cops Brutalize Black Boy While...	The number of cases of cops brutalizing and ki...	News	December 25, 2017	0
6	Fresh Off The Golf Course, Trump Lashes Out A...	Donald Trump spent a good portion of his day a...	News	December 23, 2017	0
7	Trump Said Some INSANELY Racist Stuff Inside ...	In the wake of yet another court decision that...	News	December 23, 2017	0
8	Former CIA Director Slams Trump Over UN Bully...	Many people have raised the alarm regarding th...	News	December 22, 2017	0
9	WATCH: Brand-New Pro-Trump Ad Features So Muc...	Just when you might have thought we d get a br...	News	December 21, 2017	0

click to scroll output; double click to hide

Fig.4: Merged Dataset

Out[10]:

	text	class
20742	Many Americans believe it s racist to keep m...	0
8850	Most of us don t know what it s like to be hom...	0
7253	WASHINGTON (Reuters) - Paul Ryan, the top Repu...	1
3027	WASHINGTON (Reuters) - Twenty-two million Amer...	1
3520	Just when you thought things couldn t get craz...	0
15648	BEIRUT (Reuters) - Western intelligence agenci...	1
12131	EXCLUSIVE: FBI New York Field Office Told To C...	0
5296	(Reuters) - Here are some of the highlights of...	1
19427	NEW YORK (Reuters) - U.S. President Donald Tru...	1
14251	JOHANNESBURG (Reuters) - Zimbabweans took to t...	1

Fig.5: Binary Converted Dataset

Out[19]: Text(0.5, 0, 'Predicted label')

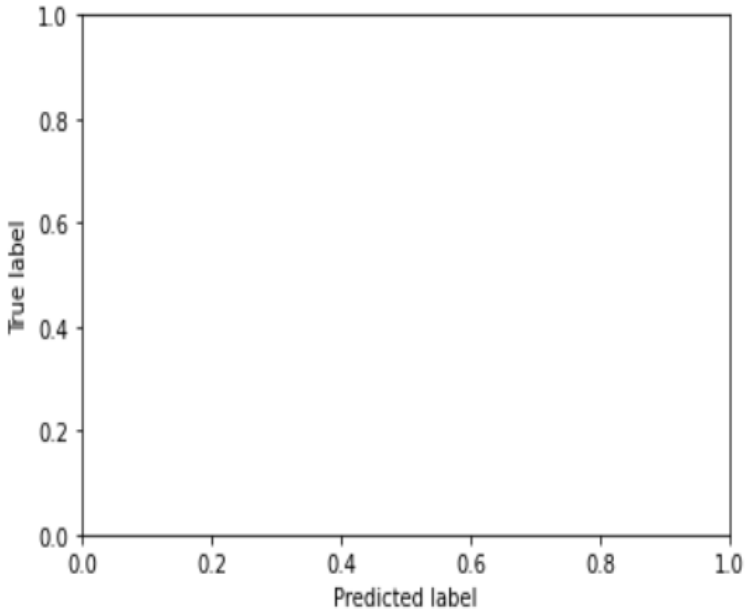

Fig.6: Layout of Confusion Matrix

OUTPUT

21st Century Wire says This week, the historic international Iranian Nuclear Deal was punctuated by a two-way prisoner swap bet ween Washington and Tehran, but it didn t end quite the way everyone expected. On the Iranian side, one of the U.S. citizens wh o was detained in Iran, Nosratollah Khosravi-Roodsari, has stayed in Iran, but on the U.S. side all 7 of the Iranians held in U.S. prisons DID NOT show up to their flight to Geneva for the prisoner exchange with at least 3 electing to stay in the U.S TEHRAN SIDE: In Iran, 5 U.S. prisoners were released, with 4 of them making their way to Germany via Switzerland.Will Robinson Daily MailNone of the Iranians freed in the prisoner swap have returned home and could still be in the United States, it has be en reported.The seven former inmates, who were released as part of a deal with the Islamic republic, did not show up to get a f light to Geneva, Switzerland, where the exchange was set to take place on Sunday.Three of the Iranians have decided to stay in the United States, ABC reported, with some moving in with their families. However it is not known where the other four are.Thre e of the Americans who had been detained in Iran Washington Post journalist Jason Rezaian, former U.S. Marine Amir Hekmati an d Christian pastor Saeed Abedini left Tehran at around 7am the same day, but weren t met by their counterparts in Switzerland Continue this story at the Mail OnlineREAD MORE IRAN NEWS AT: 21st Century Wire Iran Files

Prediction: Fake News

Fig.7: Tested Output

RESULTANT CONFUSION MATRIX

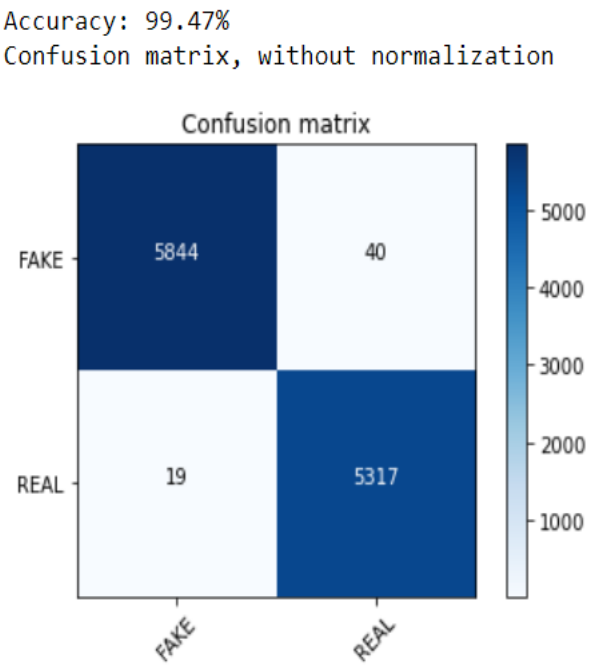

Fig.8: Resultant confusion matrix

CONCLUSION

Fake news is a dangerous problem that is spreading like wildfire as it becomes simpler for information to reach the general public in numerous forms. We can manage and limit the spread of such misinformation more rapidly and efficiently with machine learning than we can with manual efforts. The purpose of this project is to study, synthesise, compare, and assess current research on false news in depth. We may conclude that employing a Passive Aggressive Classifier and a TF-IDF vectorizer is effective because this model achieved 92 percent accuracy.

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