A Review on Fake News Detection Methods Using Machine Learning

Mojahidul Islam[1], Chinmay Bhatt[2], Varsha Namdeo[3]
CSE, SRK University, Bhopal, India[1, 2, 3]

Abstract- *Social media is one of the most accessible news sources these days for some people worldwide because of their low worth, speedy access, and quick spread. Nonetheless, this accompanies some befuddling signs and huge dangers of openness to 'bogus stories' composed to misdirect per users. Such data can influence the public's voice and permit fiendish gatherings to control the result of public occasions, like races. Phony and deluding news can truly affect the individuals who wind up as targets. This paper centers on investigation of 2017 to 2021 papers and examination of various phony news discovery strategies. This overview gives a broad audit about the new and past assessments on bogus news identification utilizing diverse Machine Learning calculations.*

Keywords:- Fake News Detection, Machine Learning, Deep Learning, Rumor, Hoax.

Introduction

Once in a while, we all have come across the term what's App University. This is not just the term which is specifying the access of information through social media site but also concern with the reliability of information through sources like social media and various other platforms of information and entertainment. The widespread and accessibility of the internet gives information to the masses at a click, but it also made it hard to verify the information. With the question of reliability and verification, the question of fake news also comes.

The information and news regarding the spread of global pandemic covid-19 like self-verification of being infected, it spread based on temperature, about vaccination; the speech of political figures during public addressing and the unverified statement of them regarding the military invasion, about developing and doing public goods; false and misleading images of people for malign or praise them; manipulation of videos and audios are some of the cases and example of fake news.

Fake news is not a very new thing, but its extensive penetration is very new and this is highly supported by various media sources. Facebook, WhatsApp, blogs, Twitter, YouTube, and sadly but the news channels are also included in the list of spreading fake news. This can't be said that these channels and online platforms are unaware of this. Not long ago Facebook owner Mark Zuckerberg was called by Senate and questions him about its minimum control over the spread of fake and hates news through its platform and even after this interrogation, the Fb is still used in the same way.

A view of an individual becomes information for others and based on those biased and unverified information others build their surroundings. The increase in information based on this approach made a society running with false ideas. This falsification of information is hardly verified by an individual as they busy themselves in their individual and virtual world. But the society based on the false and biased idea is a bomb which tickles every time to burst whenever a new idea intervenes and become a threat to the dominance of the exiting idea which is neither good for an individual or a society.

In the last few years, we have heard and read about the statement of ministers in national science congress about saying Darwin's theory of evolution a myth, saying the first plastic surgery done millions of years ago with some verse on Ganesha, the first airplane of Ravana with much advancement than today's plane, and the utility and usefulness of cow's waste are an example of fake news which are building people's perception and

making them doubt of sciences. Similarly, during the time of demonetization, the news channels were spreading false news about the chip in new notes of rupees 500 and 2000. Also, with the help of social media one's view about the other community is used to create division at political, religious, caste, and nationality levels. These examples show how fake news is controlling and making our scientific, religious, social, and other beliefs and relations. Although the main beneficiaries of this fake news are the party in power for their political gain, others are also gaining momentary.

Table 1. Defining Some Terms Related To Fake News.

Word	Meaning
Rumor	"An moving information whose truth status was not at the time of posting"
Fake News	"A news article that is definitely false"
Hoax	"A intentionally created falsehood made to pose as truth"
Clickbait	"An intentional strategy which is intended to attract attention and encourage visitors to collect revenue"

II. Related Work

In 2013, Aditi Gupta, Henmark Lamba and Anupam Joshi achieved more than 90% correct result in identifying false images from twitter of Hurricane Sandy which impacted the United States. Meanwhile, they did a character-ization analysis to analyze the impact patterns of the fake pictures by analyzing mor than 10,000 images on Twitter. During this time, they worked on Niave Bayes and Decision tree model. After applying these two ML algorithm they arrives at good result having accuracy of 97% by Decision Tree. [1]

In 2017, Elena Kochkina, Arkaitz Zubiaga & Maria Liakata worked on classification of rumor stance on social media platform with the help of sequential classifiers. In this they use Twitter as their social media platform and describe tweets into 4 categories: 1.Support, 2.Deny, 3.query and 4. Comment on an earlier post. They used four sequential classifier-hawkes processes, Long Short Term Memory (LSTM), linear CRF and tree CRF on 8 data sets and all data are related to breaking news. They discover sequential classifiers that use the recitation property in social media interaction outperform non sequential classifiers also LSTM works better than other sequential classifiers. [2]

In 2018, Kalina Bontch., Ahmet Aker, Maria Liakata work on rumor detection using NLP and data mining Methods. They defines false news that circulates on social media into two types: long standing rumors and new emerging rumor generate during recent events. They develops a rumor classification system that consist of 4 parts: 1.Detection of rumor, 2.Tracking of rumor, 3. Stances of rumor and 4.Veracity of rumor. And use this system on the PHEME dataset which is publicly available for rumors and non rumors. [3]

In 2018, C.M.M Kotteti, Na Li and Lijun Qian work on increasing the detection of fake news with data imputation. To improve performance they used a novel data preprocessing method to fill the missing value in

the raw dataset. With the help of data modeling, they applied missing values for numerical and hierarchical attributes. For hierarchies they select the most frequent value in columns and are numeric for the average value of the column. He did 3 things to cover the missing values. 1 is Removed columns with missing values, 2 is Missed values with empty text and 3 is Used data impersonation techniques to apply missing values and found that multilayer perceptron (MLP) classes improved accuracy by 16%. [4]

In 2018, Supanya Aphiwongsophn and Prabhas Chongstitvatana purpose the ML algorithm to identify fake news. In this paper three popular methods are used: 1.Naive Bayes 2. Support Vector Machine and 3. Neural Network. They used normalization method for cleaning data so that it works better with correct data. In this paper they found that Naive Bayes has an accuracy of 96.08% and the other two complex techniques has an accuracy of 99.90%. [5]

In 2018, a. Jain and A. Kasbe work on detecting fake news and they proposed a method so that we can implement this method on Facebook. He used Naive Bayes for forecasting. They used a dataset from Github with 11000 articles divided into (index, text, title and label). Apart from politics, this data contains news related to science and business. For implementation they used both the title and text for their primary source and also added some references by n-gram And then he compared the results and find that Naïve Bayes (on text with n-grams) gives the accuracy of 0.931 and they also showed some ways to improve this model. [6]

In 2019, Deepayan Bhowmik, Oluwaseun Ajao and Shahrzad Zargari proposed a model that identify false news tweets from twitter post using combination of (CNN) and (RNN) models. For the dataset they collected 5,800 tweets centered on five rumor stories: Charlie Hebgo, Sydney Siege, Germanwing Crash, Ottawa Shooting, and Ferguson Shooting. Their proposed work on hybrid of CNN & RNN intuitionally identifies important feature related with false news stories without any prior knowledge of news and achieve more than 80% accuracy. [7]

In 2019, Varshil Mehta and Wenlin Han work on performance evaluation of fake news detection methods. They divide the dataset of fake news into 2 categories. The first is news and the second is the social context model and they divide news into 2 categories of visual (picture, video) and linguistic (text, title) based. They compared performance between traditional ML methods (Naïve Bayes , Random forest) and the latest deep learning methods (LSTM DROP, LSTM-CNN). The purpose of this paper is to provide a basis so that people can choose between these two approaches. They found that the hybrid CNN - RNN model gives better performance/ results. [8]

In 2019, J. C.S. Reece, A. Correia, F. Murai, A. Veloso and F. Benevuto works on searching on a wide variety of features from news articles, posts and stories that can help predict fake news with greater accuracy. He showed the importance of these new features for the evaluation of fake news. Some of those features are bias, reliability / trustworthiness, engagement, domain location, and temporal patterns. They used a dataset containing 2282 buzzfeed (news articles). They used KNN, Naïve Bayes, Random Forest, Support Vector Machine and XGBoost algorithm for evaluation and to discuss the opportunities and challenges of this approach and they found out that XGBoost work better than all with the accuracy of 0.86. [9]

In 2020, Iftikhar Ahmad, Muhammad Yousaf, Suhail Yousaf and Muhammad Ovais Ahmad classified fake news articles using machine learning models and ensemble techniques (Logistic Regression, Random Forest, Perez- LSVM). In this paper various textual properties are used to differentiate fake new from real news. The experiment was conducted on 4 publicly available dataset which is of different domians and also calculated the performance by performance metrics. The maximum accuracy is 99% achieved by random forest and Perez-LSVM on ISOT Fake News Dataset [10].

In 2020, C. Yuan, Q. Ma., W. Zhou proposed a model structure-aware multi-head attention network (SMAN) based approach to detect fake news. This method is based on the reliability of both publishers and users. The datasets used for this approach were real-world datasets. This approach can be used for early detection of fake news that optimizes the detection process with the help of asymmetric graphs between publisher and users.

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They use this model on 3 different dataset (Twitter 15, Twitter 16, Weibo) and find that this model gives very high accuracy [11].

In 2021, S.M. Shifath, Md. S. Islam and Md. F. Khan proposed a transformer-based approach for detecting COVID-19 fake news. They performed experiments on traditional language models and CNN. The dataset is social media posts related to COVID-19 and labels indicating whether the posts are fake or real. They also experimented with transformer-based models and tested different hyper parameters. The highest accuracy is 0.979 which is shown by RoBERTa. [12].

III. Methodology

Multiple supervised classification algorithms used to evaluate accuracy:

Accuracy - Accuracy is the display of most natural illustration and is only part of the preconceived notion of complete ideas. One might think that, if we could possibly achieve higher clarity, our model is correct. Indeed, precision is a rare measure but as long as you have metrics data where positive and negative estimates are almost the same.

$$\textbf{Accuracy = (TN +TP) / (TP+FP+TN+FN).}$$

Precision - It is a measure of positively anticipated ideas in the perfectly expected positive outlook. Higher accuracy indicates a lower deceptive value.

$$\textbf{Precision = TP / (FP+TP)}$$

Recall or Sensitivity- It is the, measure of the number of positive ideas that are expected of all ideas in the original class - yes.

$$\textbf{Recall = TP / (TP+FN)}$$

F1 score -F1 Score is standard with Precision and Recall weights. As a result, the score is looking for false negatives and false positive both. Naturally it's not as straight forward as precision, but F1 score is often more important than accuracy, like in the event that it is still distributed in separate categories. Exactness works best when counterfeit and illegal pros and cons have costs to compare.

$$\textbf{F1 Score = 2*(Recall * Precision) / (Recall + Precision)}$$

Where TP, TN, FP and FN indicate genuine positive, genuine negative, false positive and false negative, individually.

Relative Study of Techniques in Fake News Detection

Author & Year	Dataset	Technique	Accuracy
A. Gupta & H. lamba [1]	Twitter feeds (total 1,782,526 tweets)	Naïve Bayes Decision Tree	0.91 0.97

Arkaitz Zubiaga & Elena Kochkina[2]	Supporting tweets on twitter	SVM Linear CRF Tree CRF	0.657 0.603 0.552
M. kotteti, X. Dong, Na Li & L.Qian [4]	LIAR dataset containing (12,836 records)	SVC Linear SVC-CS Decision Tree MLP Classifier Gradient boosting	0.245 0.195 0.394 0.457 0.442
Supanya Aphiwon. & Prabhas Chongsti.[5]	Twitter feeds	Naive Bayes Neural Network SVM	0.96 0.99 0.99
A. Jain & A. kasbe[6]	From Github (11,000 articles)	NB (on title) NB (on text) NB(on title with n-grams) NB (on text with n-grams)	0.806 0.912 0.807 0.931
Oluwaseu Ajao, & Shahrzad Zargari [7]	5800 tweets on five rumoured stories	LSTM LSTM- DROP LSTM-CNN	0.82 0.73 0.80
Wenlin Han & Varshil Mehta [8]	Collect data in (multi-media, text, audio, hyperlink	Naïve Random forest LSTM LSTM DROP LSTM-CNN	0.67 0.56 0.82 0.73 0.80
J. C.S. Reece, A. Correia, F.	2282 Buzzfeed	KNN NB	0.80 0.72
Murai, & A.Veloso [9]	news article	RF SVM XGB	0.85 0.79 0.86
Iftikhar Ahmad, Md Yousaf & Suhail Yousaf[10]	ISOT Fake News Dataset	Logistic Regression Random Forest Perez-LSVM	0.97 0.99 0.99

C. Yuan, Q. Ma, W. zhou& J. Han [11]	Twitter 15 Twitter 16Weibo	SMAN SMANSMAN	0.929 0.935 0.956
Md. Faiyaz Khan and Md.Saiful Islam [12]	Social media posts related toCOVID-19	Bi-LSTM 1D-CNN BERT ROBERTa	0.928 0.926 0.971 0.979

IV. Discussion and Future Work

This part contains the impediments of the current work on recognizing counterfeit news and the thought for future work. As there are ton of work previously done on recognizing counterfeit referenced work, ensemble procedures for various calculations for information preprocessing for future work. In the paper [4] they filled the missing worth with attribution strategies, yet they played out this just on 1 dataset, so later on we can chip away at these methods with various sorts of datasets and look at the outcomes.

V. Conclusion

In this study paper, we concentrated on the work done work now in the field of phony news recognition with various methods and approaches. This paper additionally represented the instruments accessible to work on the investigation cycle and to think about existing strategies and methods. Our examination will be designated towards applying better advanced outfit method and to likewise incorporate some incredible word installing strategies. We likewise mean to create steady outcomes with the assistance of outfit procedures with the dataset which contains information from various areas. Group strategies can improve forecasts and accomplish better execution while lessening the scattering.

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