

Fake News Detection in Social Networks using Machine Learning: A Review

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Abstract: Fake News is spreading so rapidly these days. This is low-quality news that is generated to targeted someone. This could be created for financial gain or political gain. In no time, millions of tweets are generated and that could be false, people start believing in fake news when there is not enough information available to examine whether the information or the tweet that has been created is true or false and also people start believing in the information that they hear frequently and that could be false. It has been continuing since traditional media but now it is easier in social media to share or comment on such false information. With the growth of this false news or information, it is impossible to manually filter such news. So, there is some computational approach to recognize fake news with different Machine Learning Algorithms like SVM, Naïve Bayes, etc. This review paper mentioned different types of techniques required to detect hoax news. Also discussed different methods used in existing models with their accuracy.

1 INTRODUCTION

We live in a society where people generally depend on social media principles where many people are likely to look up and get news from social media instead of traditional news such as newspapers. False news is poor-quality news that contains false news which is intentionally created. The vast spread of fake news day by day has the ability for tremendous bad effects on society or any individual. Fake news is written to mislead readers so that they could believe false information that is intentionally generated, that makes it hard to detect fake news dependent on report contents only hence, we need to involve reserved information, that could be useful? social involvements on social media which help to form a conclusion.

Social Media is in a timely fashion and not that much expensive for consumers to consume news rather than other traditional news media like newspapers so it makes it easy to share news further or comment on and that news is sharing on social media could be fake.

However, news articles are produced online because it is low-cost and faster to release news through social media. These are produced online for different purposes like political and financial gain.

Fake data is spreading over social media and fake cures also. Now how to distinctly differentiate real news, misinformation opinion: False news can identify by comparing various properties and theories in both media i.e., social media and traditional media. Now, define the fake news detection difficulties and will summarize the techniques to detect fake news. Next, define the datasets that will be used in this method and evaluation of a new model used by existing methods.

Two main features of this definition: intent and second is authenticity. First, false news involves false knowledge that can be proved as it is. Second, fake news is generated to mislead consumers with dishonest intentions.

There could be several reasons for spreading fake news.

Fake news could be rumors that are generally not generated from any news events, only for political gain or any financial gain or it could be misinformation that is generated unpremeditated. Fake news could be produced by fun or to hustle a specific person. Recently, fake news is dynamic as changing its phase from traditional media to social media or online news.

2 LITERATURE REVIEW

Here are two components that make users naturally endangered to false news:

Naïve Realism- In this, users start believing that their viewpoints for reality are the only views that are accurate and, those whose viewpoints vary are considered as prejudiced(Ward, 2013).

Confirmation Bias- In this, users believe to receive only that information that their existing views are confirmed(Nickerson, 1998).

Venomous accounts could be created online. The major reason for venomous accounts could be the cost-effectiveness of creating an account on social media. It is less expensive to create bots online for social media. A bot could be an account on social media and is managed by different computer algorithms so that it can produce content and link with bots or people automatically on social media(Ferrara, 2016). Social bots are said to be venomous entities when it is designed with a specific purpose, basically to harm, such as to spread or manipulate false news on media. People start believing in false news on account of the following factors:

Due to the credibility on social media, that means users review a source of fake news as credible if others review the same source as credible. And they do so when there is not enough information available to decide whether the source is fake or real, or the truthfulness of any source.

Due to the frequency heuristic, that means users naturally start supporting that information which they hear time and again even it could be fake news.

2.1 Techniques Used in Fake News Detection

Naïve Bayes: In ML,(Yuslee, 2021) naïve bayes is simply a “probabilistic classifier” which is based upon applying Naïve Bayes theorem using naïve independence suppositions between the features.

$P(S|T) = \{P(T|S) P(S)\} / P(T)$, Where $P(S|T)$ is the probability of S when T has already occurred, $P(T|S)$ is the probability of T when S has already occurred, $P(S)$ is the probability of S occurring, and $P(T)$ is the probability of T occurring.

The above equation can be written as:

Posterior = {prior x likelihood} / evidence

Support Vector Machine (SVM)(Fung, 2002), is a supervised Machine Learning algorithm and can be used for classification problems or regression

problems. It uses a technique that transforms your data and then observes an optimal boundary based upon those transformations, and this optimal boundary should be between the possible outputs. This technique is called the kernel trick. SVM is capable of doing regression and classification.

Regression is a supervised Machine Learning algorithm and it is a subdivision of ML algorithms(Mahir, 2019). It foretells the product values based upon input values from the data fed in the system. The algorithm creates a model on the features of training data.

SGD “Stochastic Gradient Descent”, a very common and popular algorithm used in different Machine Learning tasks, mainly builds the basis of NN(Helmstetter, 2018). Gradient means in SGD is slope of a surface or it could be slant of any surface. Hence, gradient descent in SGD means decreasing a slope to reach the lowest point on that surface(Zhang, 2020). Random forest algorithm is basically a supervised algorithm. In this algorithm, comes a direct relationship between the no of trees in the forest and results it can get. In simple words, the larger the number of trees, the more precise the result(Stahl, 2018).

2.2 Types of Data Present in Social Media

As discussed in a paper(Parikh, 2018), three types of data are available in social media posts, Text data (Multilingual) which focuses the root of text in systematically and semantically manner. This data is analyzed by computational linguistics, since many posts are produced in texts format so much work has been executed. Second, Multimedia is multiple forms of media that is combined in a post. Multimedia could be an audio, images, graphics and video. This is an attractive data type and it raise the attention of the viewers and third is Hyperlink.

Table 1: Comparitive performance measurements of various Fake News Detection techniques

Serial no.	Paper Studied	Approach	Result	Gap
1	“Fake News Detection System using Article Abstraction” (2019)	Natural Language Processing, Article abstraction, Sentence matching, Deep learning	They proposed BiMPM (Bidirectional MultiPerspective Matching) model using article abstraction and entity set matching with 0.663 AUC accuracy	They will propose a different technique which will use entity matching set and article abstraction and along with BiMPM model
2	“Automatic Online Fake News Detection Combining Content and Social Signals” (2018)	social-based and content-based methods	They proposed false news detection method and execute this method on Facebook Messenger chatbot with 81.7% accuracy	They will propose a new method to train the bot in different languages in order to elongate it to various countries
3	“Detecting Fake News using Machine Learning and Deep Learning Algorithms” (2019)	RNN, SVM, Naive Bayes Logistic Regression	They proposed a model to check the affirmation of news pulled out from Twitter which is helpful for fake news recognition with accuracy 0.94	In future, they could pull out entities from news body or news headline and then examine their relationships using knowledge base
4	“Weakly Supervised Learning for fake news detection on Twitter” (2018)	Weakly supervised Classification	They proposed a weakly supervised method which impulsively collects large scale datasets with 0.9 F1 score	In future, they could resolve the main challenge this method faced and that is to congregated a training dataset of suitable size.
5	“FAKE DETECTOR: Text Mining, Effective	Data Mining, Text Mining,	They proposed an automatic false news	In future, experiments can be done on live false

	e Fake News Detection with Deep Diffusive Neural Network” (2018)	Diffusive Network	credibility inference model which they have named as FAKEDECTOR with 0.63 accuracy score.	news dataset.
6	“Fake news detection in social media” (2018)	SVM, Semantic Analysis, Naive Bayes Classifier	They proposed a three-part method.	In future, this proposed method will be test out. In this paper, this is yet to do due to limited knowledge and time
7	“Fake Data Analysis and Detection Using Ensemble Hybrid Algorithm” (2019)	Classification, Decision tree, Natural Language Processing, Random forest, Naive bayes, SVM, KNN	They proposed a hybrid approach false news detection with 94% accuracy	In future work, this algorithm will compare with the deep NN and then test result will be drawn. This can be done to save time in training the deep NN
8	“Hoax Web Detection for News in Bahasa Using Support Vector Machine” (2019)	Text Mining, Support Vector Machine	They proposed a model that aims is to find fake and real news. This system is done on Indonesian Language with an accuracy of 85%	In future, this work can be done on other languages
9	“An Integrated approach for Malicious Tweets detection using NLP” (2017)	Machine Learning, Statistical Natural Language Processing	They proposed a method which is based on two aspects: without knowing previous background of the consumer, the affirmation of spam-tweets and the other	In future, this method can focus on user accounts as now it only focusses mainly on analyzing of tweets

			based on analysis of language for detecting spam on twitter with 93% accuracy	
10	“Fake News Detection Using Sentiment Analysis” (2019)	Random Forest, Naïve Bayes	They proposed a method for fake news detection which integrates sentiment to improve the accuracy (0.88 AUC)	In future work, dataset can be images as well as videos in addition to this method
11	“A Sensitive Stylistic Approach to Identify Fake News on Social Networking” (2020)	One-Class SVM	They proposed a method to find false news in texts format, pull out from social media with an accuracy of 86%	In future work, accuracy and precision could increase
12	“Not Everything You Read Is True! Fake News Detection using Machine Learning Algorithms” (2020)	NLP, K-nearest neighbor, ML	They build a fake news detector which classify text or the news headlines as hoax or non-hoax with 71% accuracy	This detector can be build using different algorithms.

3 RESULT AND DISCUSSION

In literature review section different techniques have been used to proposed fake news detector model like Naïve Bayes, (Yuslee, 2021), SVM, (Fung, 2002). As mentioned in a paper(Bhutani, 2019), they have done accuracy comparison between different Machine Learning algorithms. Firstly, they have tested Naïve Baye Model on each vector, so it gives 73% accuracy on count vector, 75% on N - gram vector, and character vector Word Level TF-IDF as well. Then regression model was executed. It gives 76% and 74% on count respectively and word level

features. Thirdly, SVM was performed and it gives accuracy of 74% in all the features.

Figure 1 shows(De Oliveira, 2020) the overall accuracy comparison chart of Deep Learning and Machine learning algorithms including SVM, Logistic Regression, Naïve Bayes, RNN, LSTM.

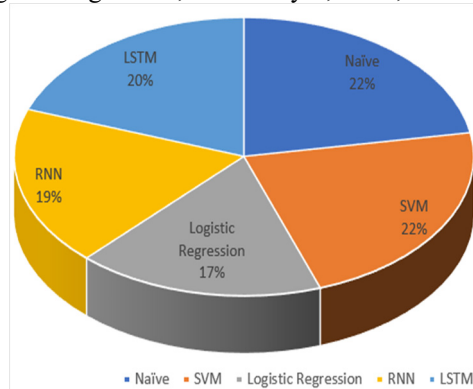


Figure 1. Comparison of Deep Learning and Machine learning algorithms based on accuracy

Figure 2 shows the accuracy of different methods used in the literature review Section II. Accuracy of Random forest technique(Reddy, 2019) is 94% when the author proposed a hybrid approach false news detection. Second, Article Abstraction(Kim, 2019) gives an accuracy of 66.30 % when they proposed BiMPM (Bidirectional MultiPerspective Matching model and one of the authors proposed(Della Vedova, 2018) false news detection method with content based and social based methods that gives an accuracy of 81.70%. Accuracy of SVM(Rahmat, 2019) is 85% when it is used in hoax web detection system. Statistical NLP accuracy(Gharge, 2017) is 93% when author proposed an integrated approach for false tweets detection. KNN gives the accuracy(Tiwari, 2020) of 71% when they build a fake news detector.

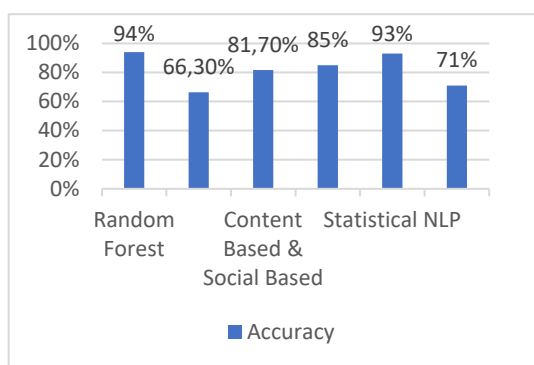


Figure 2. Overall accuracy of different techniques.

4 CONCLUSION

In this manuscript, we summarized various Machine Learning techniques used in detecting false news and the type of data we see on social media posts i.e., text, multimedia or hyperlinks. Whereas there is conspicuous achievement in detection of false news or fake posts with the use of various Machine learning approaches. Although, dynamic features of hoax news in social media is causing problem in classification of false news. These days false news is creating various issues from sarcastic articles to a fabricated news. Lack of trust and false news in the media are raising problems with great effect in our society.

Although, the main feature of Machine Learning is its potentiality to robotize repetitive tasks and consequently, increasing productivity. Lots of research work is going to execute Machine Learning methods like Naïve Bayes, SVM, Random forest, KNN.

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