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.
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.

\[ P(S|T) = \frac{P(T|S) P(S)}{P(T)} \]

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:

\[ \text{Posterior} = \frac{\text{prior} \times \text{likelihood}}{\text{evidence}} \]

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: Comparative performance measurements of various Fake News Detection techniques

<table>
<thead>
<tr>
<th>Serial no.</th>
<th>Paper Studied</th>
<th>Approach</th>
<th>Result</th>
<th>Gap</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>“Fake News Detection System using Article Abstraction” (2019)</td>
<td>Natural Language Processing, Article abstraction, Sentence matching, Deep learning</td>
<td>They proposed a BiMPM (Directional MultiPerspective Matching) model using article abstraction and entity set matching with 0.663 AUC accuracy.</td>
<td>They will propose a different technique which will use entity matching set and article abstraction and along with BiMPM model.</td>
</tr>
<tr>
<td>2</td>
<td>“Automatic Online Fake News Detection Combining Content and Social Signals” (2018)</td>
<td>Social-based and content-based methods</td>
<td>They proposed a false news detection method and execute this method on Facebook Messenger chatbot with 81.7% accuracy.</td>
<td>They will propose a new method to train the bot in different languages in order to elongate it to various countries.</td>
</tr>
<tr>
<td>3</td>
<td>“Detecting Fake News using Machine Learning and Deep Learning Algorithms” (2019)</td>
<td>RNN, SVM, Naive Bayes Logistic Regression</td>
<td>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.</td>
<td>In future, they could pull out name entities from news body or news headline and then examine their relationships using knowledge base.</td>
</tr>
<tr>
<td>4</td>
<td>“Weakly Supervised Learning for fake news detection on Twitter” (2018)</td>
<td>Weakly supervised Classification</td>
<td>They proposed a weakly supervised method which impulsively collects large scale datasets with 0.9 F1 score.</td>
<td>In future, they could resolve the main challenge this method faced and that is to congregate a training dataset of suitable size.</td>
</tr>
<tr>
<td>5</td>
<td>“FAKE DETECTOR: Effectiv</td>
<td>Data Mining, Text Mining,</td>
<td>They proposed an automatic false news detection algorithm named as FAKEDETECTOR with 0.63 accuracy score.</td>
<td>In future, experiments can be done on live false news dataset.</td>
</tr>
<tr>
<td>6</td>
<td>“Weakly Supervised Learning for fake news detection on Twitter” (2018)</td>
<td></td>
<td>SVM, Semantic Analysis, Naive Bayes Classifier</td>
<td>They proposed a three-part method.</td>
</tr>
<tr>
<td>7</td>
<td>“Fake Data Analysis and Detection Using Ensemble Hybrid Algorithm” (2019)</td>
<td>Classification, Decision tree, Natural Language Processing, Random forest, Naive bayes, SVM, KNN</td>
<td>They proposed a hybrid approach false news detection with 94% accuracy.</td>
<td>In future, 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.</td>
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<tr>
<td>8</td>
<td>“Hoax Web Detection for News in Bahasa Using Support Vector Machine” (2019)</td>
<td>Text Mining, Support Vector Machine</td>
<td>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%.</td>
<td>In future, this work can be done on other languages.</td>
</tr>
<tr>
<td>9</td>
<td>“An Integrative approach for Malicious Tweets detection using NLP” (2017)</td>
<td>Machine Learning, Statistical Natural Language Processing</td>
<td>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</td>
<td>In future, this method can focus on user accounts as now it only focuses mainly on analyzing of tweets.</td>
</tr>
</tbody>
</table>
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 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.

3 RESULT AND DISCUSSION

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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.

REFERENCES


