

A review of Fake News Detection Methods

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Abstract – False news is the dissemination of false information to grab the audience's attention, which, at first glance, may seem credible. False news is frequently produced by people with personal, political, or economic objectives in mind. It is frequently disseminated online or through conventional media. Fake news can reach dozens and even millions of people via social media, even if it's labeled as fake. In order to lessen the impact of spreading misinformation as well as to eliminate the sources of this false information, all efforts should be made to reduce its impact on citizens. This paper examines and evaluates the many methods for identifying false news.

Key Words: Convolutional Neural Network (CNN), Hybrid feature learning unit (HFLU), K Nearest Neighbors (KNN), Support Vector Machine (SVM), Naïve Bayes, Random Forest, Regression Tree, Bidirectional Encoder Representations from Transformers (BERT), GDU (Gated Diffusive Unit), Long Short Term Memory (LSTM)

1. INTRODUCTION

As the term implies, fake news is defined as "news items that are deliberately and irrefutably false" [1] to deceive people about facts, and assertions. Particularly on social networking networks, spreading fake news has proven to be simple. Fake news is typically created to influence people's opinions, further a political agenda, or create misunderstandings about a significant topic [2]. Because of this news, elections may be impacted, ethnic conflict may increase, and criticism may be stifled.

Fake news is of many types. They are 'targeted misinformation, clickbait, fake headlines, fake viral posts, hoaxes, etc. Untrue piece of information spread for personal gain is known as targeted misinformation [3]. The most frequent definition of clickbait is false information created to grab readers' attention and persuade them to click on a link to a certain website. Fake headlines are the headlines that make up stuff in order to attract readers' attention and are frequently used by media and newspapers with lower credibility. Hoaxes are another sort of false information that purposefully misleads the reader by harming and financially depleting its readers.

Various tactics to combat different kinds of false news are now being actively investigated.

This paper reviews various methods of fake news recognition. The different methods are presented in Chapter

3. Chapter 4 depicts the comparison of these methods. Chapter 5 includes the conclusion of the study.

2. LITERATURE REVIEW

A unique diffusive network-based false news authenticity checker has been introduced in [4]. A hybrid feature learning unit (HFLU) has been used in this system, which is trained to learn both obvious and implicit feature representations of news. The research suggests a unique deep diffusive network model with a gated diffusive unit to manage diverse information in social networks.

A content-based fake news classification system has been proposed in [5] using the voting ensemble classifier method. Logistic Regression, Regression tree, ensemble AdaBoost, Naïve Bayes, Fuzzy Rule, KNN, Decision tree, and PNN are the voting classifiers utilized in this system. The model's classification accuracy for false news recognition was as high as 95%.

Soft voting classifiers in [6] incorporated four machine learning techniques i.e., Naive Bayes, Support Vector Machine (SVM), and Logistic Regression—to classify news items as false or authentic. This approach gives an accuracy of 93% for fake news classification.

The classification of false and true news using transfer learning on the Bidirectional Encoder Representations from Transformers (BERT) language model was done in [7]. An accuracy of 97.021 percent was achieved with this fine-tuned BERT model using NewsFN data. A Hybrid Classifier-based fake news detection system is compared with the SVM-based fake news classification system in [8]. A Hybrid classifier-based system gives more than 90% accuracy and SVM based system gives more than 84% accuracy for fake and real news classification tasks.

A deep learning network named BerConvoNet has been used to classify fake and real news [11]. CNN and BERT embedding techniques are combined to create BerConvNet. In [13] CNN and Long Short-Term Memory (LSTM) have been used to classify false news items in a multimodal strategy. Here, the news was categorized according to its source and its history. This model categorizes credible news items with a training accuracy of 99.7% and validation accuracy of 97.5%.

3. METHODOLOGY

3.1 Diffusive network-based system

The deep diffusive network model of FAKEDETECTOR is made up of representation feature learning and credibility label inference [4]. This model has been used to simulate the relationship between news pieces, authors, and topics. Here, the GDU (Gated Diffusive Unit) model takes many inputs from several domains concurrently and delivers its learned hidden state h_i to the output layer and other unit models. In this system, a backpropagation algorithm is employed to train the network model.

3.2 Modified Voting Ensemble-based system

The input module is composed of the enhanced dataset generated during the dataset preparation procedure. This dataset which consists of various articles, their authors, details, etc. is fed to voting classifiers. Voting classifiers used in this system are Logistic Regression, Regression tree, ensemble AdaBoost, Naive Bayes, Fuzzy Rule, KNN, Decision tree, and PNN. The dataset is partitioned as a training and testing dataset. The training data stream is fed to the learning node to build the prediction model. The outputs from each scoring node are collected by the "voting module" and sent into a different stream.

3.3 Soft Voting Classifier based system

The dataset for fake news detection is collected from Kaggle. Then the data is preprocessed. Preprocessing steps include label encoding, tokenization, removal of stop words, and stemming [6]. Label encoding marks real news as 1 and false news as 0. During tokenization, textual data is broken up into tokens, without punctuation. Machine learning techniques are made more accurate and efficient by removing insignificant words from the textual data in the stop word removal step. After preprocessing important features are extracted from the textual data using the count vectorizer. To choose an appropriate set of features for the learning model, GridSearchCV hyperparameter tuning has been performed. Then the data is fed to four classifiers for the classification task. An ensemble approach aggregates the estimations of two or more classifiers in order to produce a model that makes more accurate judgments. Then the voting ensemble classifier makes predictions based on the output class with the highest probability.

3.4 Deep Bidirectional Transformers-based Language Model

News items were categorized reliably into two categories using a pre-trained BERT language model [7]. The NewsFN Dataset contains the title and content of news stories about politics from a variety of news sources categorized as either "Fake" or "Real." During the preprocessing step, misfits from the dataset have been eliminated to reduce overall variation

in the data. Then the dataset is partitioned as a training and testing dataset. The dataset is then fed to the BERT model to classify the real and fake news.

3.5 Hybrid Classifier based system

In this system, the dataset from Kaggle has been used. Features are extracted from the dataset using the K-fold approach. Here, a hybrid classifier has been used for real and fake news classification problems. KNN and the Random Forest Classifier Algorithm are combined to create the Hybrid Classifier. The K-NN method stores all the data available and classifies each new point according to how similar it is to the previous point [9]. Random Forest uses many decision trees on different subsets of the input dataset and averages the results to increase the dataset's predicted accuracy [10].

3.6 BerConvoNet based system

At first, words from the input text dataset have been converted into numerical representations. Word embedding is the most popular technique for transforming a word into its vector form. This is done by a pretrained unsupervised model called BERT [12]. To extract the different attributes of a news story, multiscale feature blocks (MSFB) have been used. Then the feature map thus obtained from the MSFB block is fed to a fully connected layer [11].

3.7 Convolutional Neural Network and Long Short-Term Memory based system

A fake news dataset from Kaggle [14] is used in this system. The dataset is organized into 12 distinct groups based on the type of news. The four-layer model for the false news identification system is composed of two CNN layers, one LSTM layer, and one FC layer [13]. CNN model is particularly effective when dealing with similar data, like words in phrases. When dealing with a set of data connected to another set of data, the LSTM model has been found to be quite helpful. After performing the different preprocessing steps (uppercase letters to lowercase conversion, tokenization, padding), feature vectors are generated using the glove embedding method. These feature vectors are fed to the CNN+LSTM model for the classification task.

4. COMPARISON

The comparison of various fake news detection is shown in Table 1.

No	Title	Method	Dataset	Accuracy
1	FAKEDETECTOR: Effective Fake News Detection with Deep Diffusive Neural Network. [4]	Diffusive Network	Tweets posted by PolitiFact at its official Twitter account & fact check articles on the PolitiFact website	63%
2	Content-based fake news classification through modified voting ensemble [5]	Logistic Regression, Regression tree, ensemble AdaBoost, Naïve Bayes, Fuzzy Rule, KNN, Decision tree, and PNN	1. fact checks from Google Fact Check Explorer 2. ISOT Fake News Dataset	95% for both the primary and external datasets and 65% when using the random dataset.
3	An Ensemble Machine Learning Approach for Fake News Detection and Classification Using a Soft Voting Classifier [6]	Naïve Bayes, Support Vector Machine, and Logistic Regression, Soft Voting ensemble classifier	Publicly available dataset from Kaggle	93%
4	Classification of Fake News by Fine-tuning Deep Bidirectional Transformers-based Language Model [7]	Bidirectional Encoder Representations from Transformers (BERT) language model	NewsFN Dataset	97.021%
5	Hybrid Text Classification Method for Fake News Detection [8]	SVM, Hybrid classifier, Random Forest	Publicly available dataset from Kaggle	91.5%
6	<i>BerConvoNet</i> : A deep learning framework for fake news classification [11]	BerConvoNet framework BERT	1. George McIntire Dataset, 2. Dataset from Kaggle 3. Dataset from Gossip cop 4. Dataset from PolitiFact	94.25% 97.45% 75.18% 90.27%
7	Fake News Classification Bimodal using Convolutional Neural Network and Long Short-Term Memory [13]	CNN, LSTM	Dataset from Kaggle [14]	97.5%

Table 1: Comparison

5. CONCLUSION

Spreading false information to influence people's opinions on a variety of issues is not a new practice. Internet-based knowledge transfer has made this a more pervasive and challenging issue. Some false news stories may not have a significant negative impact, but others can stimulate anti-democratic views. Various methods of fake news classification have been discussed in this paper. Out of the different methods discussed, fake news classification based on CNN and Long Short-Term Memory is found to be the best system by giving higher classification accuracy of 97.5% in detecting real and fake news.

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