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Research Article

Machine and Deep Learning based Fake News Detection Approaches using Natural Language Processing: A Review

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ABSTRACT

In this Era of digital science and social media, social media plays a vital role in everyone's life. Social media and world wide web provides a fast and easy platform to their user for sharing their thoughts, views experience etc. These platforms can also be misused to scatter rumors such as fake news articles. The spread of fake news articles has become a serious problem to deal with. Fake news can be defined as some sort of falsity information, that is scattered by someone for his own interest. Fake news may have many side effects like manipulating public opinion about something, defame of a genuine personality, monetary loss etc. Keeping in mind these side effects, there is a need of fake news detection methods which can work efficiently. Manual methods were used in old days to identify this type of falsity information but these manual methods were tedious and time consuming so automatic detection methods are required for the same. In recent past many researchers are working to develop various auto-models to detect this kind of misinformation. Different models which are based on Machine learning have been developed for the identification of fake news articles spread through social media platforms. Deep learning solutions also caught Ears and Eyes of everyone in this field. In this paper we are going to present an analysis of various machine learning and deep learning based fake news detection techniques as well as the comparative study of these techniques in terms of used models.

Keywords: Fake news, Deep Learning, Machine Learning, Natural Language Processing, CNN

INTRODUCTION

Now a days, social media platforms and world wide web are two main facilities to share different ideas and information in a quick manner[1]. The users of these facilities can create, update and scatter different type of text and media like news articles through these mediums. Although such platforms enrich the user with facilitates to share their emotions, concerns etc, yet these platforms are strong sources to travel the misleading information. This misleading information can create adverse effects on various aspects such as public opinions, defamation of genuine personality or other monetary aspects [9]. This type of dissemination of misinformation is generally termed as fake news. With consideration to these type of negative impact of fake news, new scalable and automatic fact checking strategies are immensely required to detect the credibility of the same. In this paper a review of the automated techniques for the detection of fake news have been discussed and compared based on the used technology.

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IMPACT OF FAKE NEWS

In current scenario information can be easily shared using social media platforms. These platforms work like a key source to spread or broadcast fake information. Fake news may have different type of negative impacts on the society and on an individual itself. Main consequences of fake news spread are

- It can manipulate the opinion of public, which can impact the political aspects and voting pattern at the time of election.
- It can defame a genuine personality.
- It can led to different digital consequences like phishing, cyber-attacks and many more.

This is very difficult to aware the society and individual about such disasters, What does seem possible is eradicating the root cause. Fake news detection is emerging area now a days for research communities and industry professionals, to focus on. Human eye cannot precisely differentiate between true and false text, so need for automated system.

FAKE NEWS DETECTION METHODS

1.IMPACT ANALYSIS

In [1] the study about the impact of fake news has been done. To conclude the possible impacts of fake news on voting patterns in concern with U.S. elections 2016, was the main goal of this paper. The remedies to reduce the negative impact of fake news has also been discussed. D. M. J. Lazer et al. in [9] discussed that how fake news may result in monetary loss. Fake news can be used for monetary gain. S. A. Garc´ıa et al. in [15] has discussed the impact of fake news on scientific community. It was investigated that how this topic impacts research community. It was concluded that it is a Emerging topic. In [7] S. Vosoughi et al worked on tweets to identify their credibility. The spread pattern of true and false news has also been investigated. K. Shu et al. in [8] surveyed different techniques of fake news detection with the perspective of data mining. In this paper various psychological properties of fake news in traditional media as well as social media has been discussed.

2. MACHINE LEARNING BASED TECHNIQUES

V. Pe´rez-Rosas et al. in [5] presented difference between linguistic features of fake and real news contents. They collected and created fake news datasets using different sources. SVM model with different feature sets, has been used to develop the fake news detector. This model has achieved 91% accuracy on political domain. H. Ahmed et al. in [6], has developed a model to detect fake news as well as fake opinions. Fake opinions like fake online reviews can be there to effect the businesses either positively or negatively. C. K. H. et al in [12] has developed models for detection of fake news. Different machine learning models are to used to detect the real from fake. finally all these models are compared on different parameters. M. L. Della et al in [16] used Machine learning based approach to classify news articles. They used twitter and Facebook dataset. This method is then implemented in Facebook chatbot to show it's application. K. Shu et al. in [17] used Machine learning based approach to classify news articles. They used twitter and facebook dataset. S. Gupta et al. in [18] used Machine learning and deep learning based approach to classify news articles. They used twitter and facebook dataset. T. Traylor et al in [19] used Machine learning and deep learning based approach to classify news articles. J. C. Reis et al in [20] used Machine learning and deep learning based approach to classify news articles. H. Saleh et. al. in [21] used hybrid model for fake news detection. In this mainly RNN+LSTM is used for detection with improved accuracy. ED Ajik et al. in [22] implemented CNN LSTM model for kaggle dataset with improved accuracy.

3. DEEP LEARNING BASED TECHNIQUES

In [2] Wang et al. created a new fake news dataset: Liar with six different labeling. A Natural language processing (CNN) based fake news detection model has also been implemented to classify this dataset. The CNN based model has achieved 27% accuracy. Ruchansky N et al in [3] developed a deep learning based fake news detection model, which is a combination of three modules named: Capture, Score and Integrate. The Capture module was used to capture various textual and temporal aspects, the work of scoring module was to assign scores with respect to suspicious users. These two modules were lastly integrated with Integrate module and has been assigned a credibility tag to the news article. In [4] an stance detection model has been implemented. Multilayer perceptron with one hidden layer is used to pass the lexical and similar features. Two bag of words(BOW) representations are

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used for the input of text, these are term frequency(TF) and term frequency-inverse document frequency(TF-IDF). Headlines and body pairs are used for extraction of features.

In [10], S. bajaj have classified fake news using multiple models and techniques, namely, logistic regression, feed-forward network, RNN(Vanilla), gated recurrent units (GRUs), long short-term memory (LSTMs) and others. They compared all these models on parameters such as precision, recall and F1 score,with results indicating best recall and F1 score by the GRUs, while the best precision using attention-based CNN. Zhang et al. in [11] the subject and creator of a news article is takenin consideration too, with a model of their own, referred as deep diffusive network model, which is based on RNN andGRUs as well, complemented by regularization techniques. , in [13] Shu K et al has developed a Fake news tracker system to detect fake news, which the system uses for classification. This system firstly collects the news contents as well as social contents. After collecting these contents it creates a dataset . Finally a system for tracking fake news has been developed. This system is based on feature extraction as well as Machine learning models. Deep learning based LSTM has also been used, all techniques are compared in last.

In [14] M Umer et al. developed a stance detection model. Four different hybrid deep learning models has been developed with the use CNN and LSTM. Two models has also used principle component analysis and chi-square for feature reduction and concluded the suitability of these techniques with CNN and LSTM for better performance.

FLOW CHART FOR CLASSIFICATION OF NEWS ARTICLE

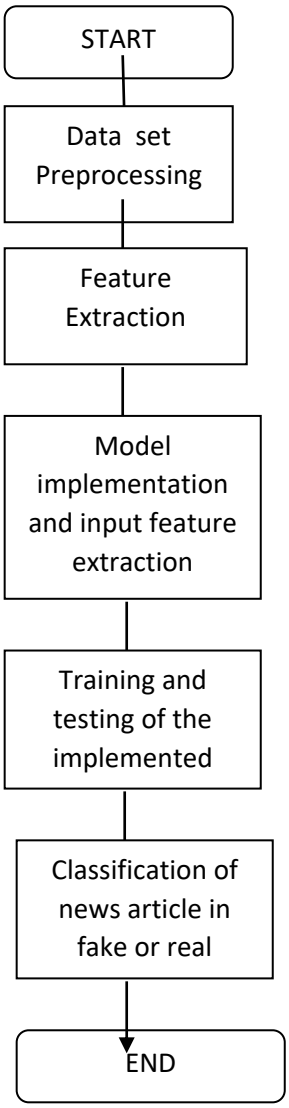

Table 1 Summary of Research Finding

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Ref. No.	Approach	Purpose
[1]	Study and analysis of the impact of fake news with political perspective.	The impact of fake news is elaborated. Political implications of fake news has been discussed.
[7]	Natural language processing	Analyzing the spread of rumours Using tweets
[8]	Fake news detection on social media survey based on data mining perspective	Survey and Analysis of fake news detection on social media
[9]	Study of monetary gain impact of fake news	Monetary gain impact of fake news
[12]	Machine Learning, Deep Neural Network	Comparison of different ML techniques for classification
[15]	Impact of fake news on scientific performance	Analysis of impact of fake news

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Table 2 Fake News Detection approaches and Datasets

CONCLUSION

From the literature it is studied that scalable fact checking strategies are immensely required to detect the fake news. In the current fake news corpus, there have been multiple related works based on Machine learning[5-6][12][16-20] and Natural language processing[7] for collecting and determination of fake news but no reliable

system is available yet. So a system is required to label these kind of news articles and find the credibility of these kind of articles. Manual methods for labeling such kind of articles are time consuming and inefficient. Deep learning caught the attention of everyone recently in this field[2-4][10-11][13-14][21-22]. Machine learning models have been implemented for detection of fake news from various web platforms and social media. In this paper we have analyzed various machine learning and deep learning based fake news detection techniques.

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