Fake News Detection Using Source Information and Bayes Classifier

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Abstract. As an information source social media is the platform used by today’s world other than television or journal. With the reach of social media in an unpredictable manner has created a lot of issues. Among them spreading of fake news is the crucial one. This paper has analysed various techniques used in fake news detection and prevention. A method for detecting fake news by using machine learning probabilistic classifier ie. Bayes classifier is proposed here. Along with Bayes classifier the source of the news is also considered for identifying fake news.

Keywords- Social media; Fake news; Detection

1 INTRODUCTION

Accessing news is now easier task with the emerging of internet and social media. Along with the development in the area of mobile devices which has made the availability of less expensive smart phones makes the gathering of news much comfortable.

But with the increase in easiness there are challenges emerging which need to be considered crucial. Social media being a mass media can influence society in an unexpected manner as there are people who make use of this for their own profit. The information shared through a social media can be manipulated in different ways. This manipulation of data createpath for generation of fake news. There are websites which are intended to create and spread fake news alone, some may mix up fake news and truth and make social media users confused. The adverse effect of fake news is that it can change the opinion of people towards some socially relevant issues.

According to the World Health Organization the outbreak of COVID-19 created an ‘infodemic’ means massive quantity of information among which some are true and some are false. There are lot of information reaching to common people from social media regarding the different ways to improve immunity, methods to prevent COVID-19, food habits to be followed and so on among which majority are not having any basic scientific declaration. Spreading such news are getting more reach among people during this pandemic situation as people are more carefully looking measures to save their life. Utilizing this situation for getting revenue by spreading fake news is a pathetic situation.

The spread of fake news particularly through social media is happening because there is no editorial checking or fact checking is performed. Another reason for this reach of fake news is due to easiness in creating accounts in social media. An individual or an entity without any track record can easily make an account with most of the social media platforms available today. Most of the social media platforms need only basic information about a user which can...
be easily manipulated. Due to this a person can own multiple accounts in the same social media platform. Also, any user can publish or post any number of information in social media which creates an abundance of data. Data published through social media can be real or fake.

The news published through social media is either true or false. There are situations where the news is truth but won’t match with the individual’s view in majority cases the news is considered under fake news. If the individual is having lot of followers that group also consider the news as fake. Similarly, the news which is fake can be considered as truth and will be shared with others.

Fake news is a serious threat to society. Wide spread of fake news can even shape the opinions of a society regarding political or social agenda. Social media usage for spreading fake information has made the spread of fake news quickly and in a broad manner. Another main reason for generation of fake news is the economic gain obtained by the parties who publish the news which is fake. For each click on the link, for each comment, for each share of the news the publisher will get revenue. And if the news is based on the current political or pandemic or gossips it will get more shares and likes. But there are also cases where there won’t be any content in the news as the title given. During this situation a user who opens the information can easily understand the news is fake. But in many the thing is different. The news will be a mix of truth and fake or in other words to make the news to look more trustworthy some truth is mixed with the majority fake data. In this situation it is difficult for a user to identify the fakeness and thinking it as truth it may get shared and will believed by a group of people. The spreading of fake news is happening in social media mainly because as there are abundant of data getting posted in day the user won’t go through the content thoroughly before sharing it with others.

Identifying fake news in social media is a tedious task. If it is print media the amount of news propagating will be comparatively less than online sources, so it is somewhat easy to identify which is fake and which is real with the help of experts. But in social media the data or the news count is enormous and the publishing speed is seconds which makes it impossible to detect fake news with the help of human experts. Here the need of automatic detection of fake news arises.

In automatic detection of fake news there are some features taken from the news text commonly by researchers are given below:

1. Lexical features: these are the features at word level such as total number of words, number of characters in a word, how frequent large words are occurring, unique words.
2. Syntactic features: these are the features at sentence level which includes how frequent function words and phrases are used, usage of punctuations, way of tagging done, graph count, graph length.
3. Visual features: these are based on the pictures included in the news article. By analyzing the images used in an article it can be identified that whether the article is intended to spread any wrong information or truth. This mainly considers the clarity of picture used, authenticity of the image and so on.
4. Statistical features: it includes the number of images used in a post, image ratio, long image ratio, multi-image ratio, hot image ratio, height and width of the image.
5. Users: In most cases it is not the human user spreading the fake news in bulk quantity. It is done by some social bots which are non-human account which automatically shares fake information among millions of people within fraction of seconds. Identifying the user or the owner of the news article is important.
6. Post features: these are the features collected when people react to a fake news post. People usually react by using comments, shares or likes. The topic of the post is another feature which can analysed.

7. Network based features: network-based features are used to identify how fake news is getting diffused in social media. The path through which the news is getting spread is an important feature. It is a fact that the spreading of fake news should be taken as a serious issue and preventive measures should be adopted. It is not possible to make people aware completely on how to distinguish between fake news and real since nowadays fake news are generated by adding some truth data also into it, which makes people more confused. Automatic detection is the only way to prevent this.

These mentioned features are almost same at some point for all the fake news generated. By analysing these features in news, it can be identified whether it is fake or not. Many of the researchers opted machine learning and artificial intelligence for developing automatic tools for fake news checking. Since machine learning and artificial intelligence works excellent in classification problems, in fake news detection also classification of news is comfortable with machine learning and artificial intelligence techniques. Apart from that the hardware needed is cheaper and they also provide huge data sets for investigation.

Among the features discussed the source of the news generated is taken as the feature for fake news detection in this paper. Once the news is identified as fake by using Bayes classifier, the source of the news is identified. Once the source identified it is observed further to decide whether the content posted by that source in future should be considered true or fake.

The paper is organized as apart from the current section, section 2 covers the related studies, section 3 gives the methodology and section 4 concludes the paper.

2. RELATED WORKS

Detecting fake news in social media networks by Monther Aldwairi, Ali Alwahedi[1] developed a tool for identifying and removing fake news from a set of result obtained from a search engine or news feeds by social media. It is a downloadable tool which can be downloaded by the user and can be made as an add on to the search engine used. Once a user search for some information in a search engine in which this tool is installed, the tool will go through all the links obtained by the search engine. By analyzing the way of words contained in the link, the number of words used, the usage of punctuation marks, bounce rates the tool will classify the search result as fake and real. The pages or results which are classified under real are given to the user and the results which are classified as fake is blocked.

Incorporating user comment graph for fake news detection by Hao Liao, Qixin Liu, Kai Shu, Xing Xie[2] proposes a graph comment user advanced learning framework to detect fake news. This paper studies user comment information as the major feature to provide a solution for fake news detection. User comment feature is extracted and the context is taken in the form of a network.

Multi-source Multi-class fake news detection by Hamid Karimi, Proteek Chandan Roy, Sari Saba-Sadiya, Jiliang Tang[3] uses the multiple features of fake news for fake news detection. This paper also introduces an idea that classify the news into different categories apart from conventional binary categories as fake or real. This paper considers news which is a mix of real and fake ones.
Fake news tracker: a tool for fake news collection, detection and visualization by Kai Shu, Deepak Mahudeswaran, Huan Liu[4] introduces a system for fake news detection named fake news tracker. The system collects news content and social context automatically which provides huge data set for fake news research. Fake news detection social media: A data mining perspective by Kai Shu, Amy Silva, Suhang Wang, Jiliang Tang, Huan Liu[5] have reviewed fake news detection in various perspectives. This paper provides a better direction for researchers for further research in fake news detection. Fake news Spreader detection on twitter using character N-Grams by Inna Vogel, Meghana Meghana[6] has developed method for identifying users who have shared fake news before and users who haven’t shared any fake news till now. Different feature extracting techniques and learning experiments is studied in this paper. Character N-grams is used for feature extraction and SVM classifier is used for classifying the news. Fake news stance detection using deep learning architecture by Muhammad Umer, Zainab Imtiaz, Saleem Ullah, Arif Mehmood, Gyu Sang Choi and Byung- Won On[7] combined CNN and LSTM to create a hybrid network which is used along with PCA and Chi square. The feature set is passed through pre-processing to get the word vector. Detecting fake news over online social media via domain reputations and content understanding by Kuai Xu, Feng Wang, Haiyan Wang, Bo Yang[8] analysed the domain reputation of the users in facebook. The users who publish fake news, their registration character, timing and character are found to be different from the real users. Defensive modelling of fake news through online social networks by Gulshan Shrivastava, Prabhat Kumar, Rudra Pratap Ojha, Pramod Kumar Srivastava, Senthilkumar Mohan[9] used differential equations to generate the model. Further its stability and equilibrium are also calculated.

3. METHODOLOGY

This paper uses the source information of the user. The publisher of the news is identified and using Bayes classifier the news published by the fake source is classified as fake or real. Whenever a news is published in social media the IP of the publishing source is taken and analysed for its credibility. Check is done to detect whether the IP is valid or not. If valid it returns 1 otherwise 0. Mainly the check is done based on DNS attack. If it is DNS attack then the IP is detected as fake and the news from that IP is considered under fake category. Now if the IP is detected as real there are chances for the content to be wrong or fake. By just getting the source or IP is real it cannot be concluded that the news is real. So the next step is to analyse the credibility of the news content. The news content will be having text, images, videos, hyperlinks and so on. All these contents should be checked for identifying the news credibility. Here the usage of words is used as a feature to identify the truth of the news. It has been found that in every fake news there are some similarity hidden in them. There are some words which are used in the news which can be used as a feature for classifying the news under fake category. Bayes classifier is a probabilistic classifier which is provided by machine learning based on Bayes theorem. The probability of a word to be there in a news article which makes the news fake is calculated along with overall probability of a news to become fake. The ratio of the probability of a word in a news to be fake to the probability of overall probability of a news to be fake is taken.
That value is checked with a threshold value. The overall design of the proposed model is given in Figure 3.1

![Diagram of fake news detection using source information and Bayes classifier](image)

Figure 3.1 Fake news detection using source information and Bayes classifier

The threshold value is the value which is accepted as the value for news to be real. If the bayes classifier value is above the threshold for a particular news then that news is categorized under truth or real news from a real user. Whereas, if the value obtained is less than the threshold value then the news under investigation is categorized as fake.

4. CONCLUSION

Fake news detection is an emerging area especially with the outbreak of COVID-19 there are much news spreading from various sources which are real and fake. This paper introduced a technique to identify fake news by analyzing both the information source and the content of the published news.

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