A Survey on Detection of Disinformation

A. D. Waghmare[1], Dr. G. K. Patnaik[2]
[1]*Research Scholar, SSBT's COET*
[2]*Professor, SSBT's COET*
[1]*aakashjan8@gmail.com*, [2]*girishpat2001@yahoo.com*

Abstract

Today social media is widely used as the source of information. There is a wide propagation of fake news on social media so it will be difficult to believe on the news. Fake news has negative impacts on individuals as well as on society. Information spreads rapidly over the social media and so there is a need of mechanism which detect and stops the spreading of fake news. Therefore, detection of fake news is the need of time and also a challenging problem. The current survey broadly focuses on the various methods to detect fake news in social media and also describe popular fake news data-sets. At the end of this paper few open research challenges are discussed that can give new directions.

Keywords*: *Fake News, social media

I. Introduction

Fake news is a fabricated information that mimics news media content in form. Fake news detection getting more attention because of increase in circulation of misinformation on social media, news blogs and online newspapers. Nowadays online content plays an important role in controlling the users decision and opinions. Fake news easily spreads over social media and the other social media outlet. The detection of fake news is believed to be a complex task given that humans tend to believe misleading information and the lack of control of the spread of fake content. Fake news problem arise especially form the US election in 2016 and demonetization in India. Detection of fake news is very hard for humans. If you have a deep knowledge of the covered topic then only person can manually identify fake news. Though you have a great knowledge, it is very hard to identify fake news. Detecting fake news is a complex task and also they spread easily using social media. The challenge is to produce a tool which identify what is real or fake. Before we discuss new solutions to detect fake news, it is the need of time to do survey on various methods which detects fake news.

II. News Carrier Platforms

Carrier platforms are the supplier of news content. Following the carrier platforms according to categories.

1) Standalone website: News stories produce by any sites and dedicated URL is given for each story.

a) Popular news sites: On popular sites you may find huge content.

b) Blogs: The biggest user-generated content are available on Blog sites and heavily rely on unsupervised content, so it may provide a false information.

c) Media sites: It consists of media-rich content.

2) Social media: Circulation of the content is done through sharing on these sites.
   a) Facebook: Users can create Facebook pages and requesting to like, share and comment.
   b) Twitter: Twitter allows you to create a tweet and retweet.
3) Emails: It is really challenging to validate the authenticity of news which you get through emails.
4) Broadcast networks: It is an audio multimedia category, very less number of users get the news through this.
5) Radio service: News may spreads through Radio talk shows and validation of the audio is very challenging job.

III. Fake News Types

There are various fake news types around the social media. Summarization of this categories are given below.

• *Visual-based:* It uses graphical representation as content, this includes images, video, or combination of both.
• *User-based:* Focus is on certain users accounts may be based on certain age, gender and culture.
• *Post-based:* Post on the Facebook along with image or video and caption, a tweet, meme, etc.
• *Network-based:* Friends on Facebook and mutually connected friends on LinkedIn.
• *Knowledge-based:* Description to an unresolved issues e.g. false article on how to cure cancer.
• *Style-based:* How we present the news to its readers, fake news are written by person who is not journalist–in that case the style of writing can be different.
• *Stance-based:* It may have lot of statements and little information.

IV. Datasets

News data can be gathered from Expert journalists, Fact-checking websites, Industry detectors, and Crowd-sourced workers. So there is no standard datasets for the fake news detection problem. Some publicly available datasets are listed below:

1.BuzzFeedNews: It consists of news published in Facebook.
2.LIAR: This dataset includes human-labelled short statements that are collected from News, Interviews or Speeches.
3. BS Detector : This consists of reliable complied list of domains.
4.CREDBANK : This dataset consists of approximately 60 million tweets. Over 1,000 news events are created from these tweets.

V. Data Preprocessing

Before the detection of fake news through various methods, it requires preprocessing of the data like removal of stop-word, tokenization, a lower casing, sentence segmentation, and punctuation removal. This will reduce the size of actual data.

1. Stop Word Removal:- Stopwords are less important words in a language that will create noise when used as features in text classification. Articles, prepositions and conjunctions and some pronouns are considered stop words. These words were eliminated and the processed documents were passed on to the next step.

2. Stemming:- Stemming is the way of changing the words into their original form, and decreasing the number of word types in the data. We use stemming to make classification faster and efficient. Porter stemmer is the commonly used stemming algorithms due to its accuracy.

VI. Existing Technologies

Following are the existing ways to deal with detection of fake news.
1. BS Detector:- BS Detector is a plug-in used browsers. Source of fake news will be detected by BS Detector and alert the user accordingly. Itcan identify articles on Facebook that seem to be from a questionable source. When a user scrolls over an article that seems to be fake, a warning appears informing the user that the source of the article may not be from a credible source. BS Detector gives warning message if the article is fake. It does not specify the percentage of error. But now, they blocked the extension and working on their own technique to control the problem.

2. Politi Fact:- PolitiFact is a fact-checking website used by editors and writers which gives the credibility of claims by US officials. It first decide on which news to evaluate depending upon some characteristics like significance and worthiness of the claim. After that a panel of more than two people thoroughly go through it to evaluate final rating of the claim.

The drawback of this system is that human intervention is required. Secondly, it works only for US politics. Also, every claim is not being fact-checked by them. The choice of evaluation depends upon them.

3. Flock Fake News Detector:- While chatting when the links are being sent to each other, FND algorithm get called. It checks the content of links to their databases computed according to rankings. If the source is not found to be reliable, it gives a statistic rating and generates a warning message

VII. Fake News Detection Methods

There are various approaches to detect fake news. Feature extraction based approaches are discussed in [1], [3], [4], [5], [6], [7]. Following are the few approaches with their key characteristics, advantages and limitations.

A. *Linguistic approach***:-** Techniques to analysis of frequency, usage and patterns uses the linguistic approach to detect false information. Different linguistic approaches are:

1. Naive Bayes Classifier: It is a simple probabilistic classifiers based on applying Bayes theorem. It predicts relationship probabilities for each class such as the probability that given record or data point belongs to a particular class. It assumes that all the features are unrelated to each other.

   Here the fake news articles often use the same set of words while true news will have a particular set of words. It is quite observable that few sets of words have a higher frequency of appearing in fake news than in true news and a certain set of words can be found in high frequency in true news.
2. Support Vector Machine (SVM):- SVM are used for very high dimensional problems. SVM can only work with labeled data and thus only work in a supervised training fashion.

3. Term frequency inverse document frequency:- Term frequency is how many times a term appear in a document.
4. N-gram Model:- It could be a sequence of words, bytes, syllables, or characters.
5. Psycho-linguistic features: Tone of the language, statistics of the text, part-of-speech category are determined.

B. *Clustering based Methods:*- Clustering involves scanning a large number of data set and forming a small number of clusters.
K-Nearest Neighbor (KNN):- This simple algorithm is a distance-based classifier, where each new datapoint is compared to the existing datapoints, i.e. neighbors. The class of the existing datapoint is assigned to the new datapoint based on the shortest distance. The k indicates the amount of neighbors that will be checked when a new data point has to be assigned a label.

C. *Predictive Modeling based Methods:-:-* To perform instant fake detection, predictive modeling approach is very effective.

1. *Logistic Regression* [4]*:*-It is a analysis that works when the dependent variable is binary. It is used to explain the relationship between one dependent binary variable and independent.
2. *Decision tree (DT):*-A decision tree is a set of decision nodes with a tree graph structure, like a flowchart. At each decision node, the input is tested, and based on the outcome, we go along a branch to the next node. Based on the test outcome we traverse the tree. If the node is a leaf node, that is the classification that the decision tree has arrived at (real news or fake news). Decision trees features can be dependent. Its classes do not need to be linearly separable and outliers are handled well. Decision tree itself is easy to interpret. Given the large number of sparse features, a decision tree would overfit, so perform poorly on test data.
3. *Random Forest Classifier*:-When it comes to Random Forest, the splits in the decision trees are based on random subsets of features, instead of taking all of them in consideration. A disadvantage is that the bias increases, however, on the other side the variance decreases, which is a result of the bias-variance trade-off.

D. *Deception Modeling based Methods:-* There are two approaches for deceptive clustering Rhetorical Structure Theory and Vector Space Modeling.

E. *Content Cues based Method[5]:* This method gives platform for what journalists like to write and what users like to read. Normally, users are more interested in contaminated news stories. These news stories written in multiple ways delivering the same message are generated by multiple sources.

F. *Non-Text Cues based Methods[5]:* This method convincing it's reader to believe in contaminated news, so in this regard this is very valuable method. This method leverages two different analyses: Image Analysis and User Behavior Analysis.

VIII. Discussions And Open Challenges

In this survey, we took a comprehensive view on mechanisms, rationale, impact, characteristics, and detection of fake news. Several algorithms have been developed for detection in different domains. However, they are not directly comparable to each other due to the lack of large-scale publicly available datasets. This prevents a benchmark comparison between different categories of algorithms. There is need of techniques which detect multimedia fake information.Reducing the damage of false information is an essential direction that is open for research.Further research in finding effective educational strategies to "vaccinate" people against believing false information, and how to scale these strategies to millions of users that use social platforms is necessary.

References

.

[1] Vivek Singh, "Automated fake news detection using linguistic analysis andmachine learning," in *International Conference on Social Computing, Behavioral-Cultural Modeling, & Prediction and Behavior Representation in Modeling and Simulation*, 2017, page no. 1–3.

[2] S. B. Parikh, "Media-Rich Fake News Detection" in International Conference on Multimedia Information Processing and Retrieval IEEE 2018

[3] K. Shu, "Fake news detection on social media: A data mining perspective," *ACMSIGKDD Explorations Newsletter*, vol. 19, no. 1, page no. 22–36, 2017.

[4] V. L. Rubin, "Towards news verification: Deception detection methods for news discourse," in*Hawaii International Conference on System Sciences*, 2015.

[5] Y. Chen, "Misleading online content: Recognizing clickbait as false news," in *Proceedingsof the 2015 ACM on Workshop on Multimodal Deception Detection*, page no. 15–19.

[6] B. Markines, "Social spam detection," in *Proceedings of the 5th International Workshopon Adversarial Information Retrieval on the Web*. ACM,2009, page no. 41–48.

[7] N. J. Conroy, "Automatic deception detection: Methods for finding fake news," *Proceedings of theAssociation for Information Science and Technology*, vol. 52, no. 1, page no. 1–4, 2015