SYNOPSIS

Report on

Characterization, Classification and Detection of Fake News

by
ZAINAB ZUBAIR (2100290140157)
SHIVANSH SRIVASTAVA (2100290140131)
MUSKAN AGRAWAL (2100290140091)
Session:2022-2023 (4th Semester)

Under the supervision of

Prof. (Dr.) / Dr. Vidushi (Assistant Professor)

KIET Group of Institutions, Delhi-NCR, Ghaziabad

DEPARTMENT OF COMPUTER APPLICATIONS
KIET GROUP OF INSTITUTIONS, DELHI-NCR, GHAZIABAD-201206
(MARCH- 2023)

ABSTRACT

Keywords: Fake news, social media, twitter

Now a day's internet plays a major role and becomes the necessity in everyone's life for various online resources for obtaining news. The increasing use of social media platforms like facebook, instagram, twitter, etc leads to the rapid spread of the news to millions of people in short period of time. The news can be useful but at the same time it can be harmful too. The spread of fake news has far-reaching consequences like for spoiling the name of someone for some personal agenda, creation of biased opinions at the time of election, etc. Fake news is mainly concerned for creating confusion among people and to divert their mind to something irrelevant. Fake news always catches the attention of users as creation of appealing headlines is used to generate revenues, views and spice among users. Readers should be very careful while going through the news and make sure that the obtained information is true. In this paper, our aim is to check the accuracy of the news available online with the help of Natural Language Processing, Long short-term memory and Naïve Bayes. We aim to provide the user with the ability to classify the news as fake or real and also check the authenticity of the website publishing the news.

TABLE OF CONTENTS

INTRODUCTION

As world is ruled to change rapidly. There will be millions of advantages and disadvantages of this digital world. There are different issues in this digital world. One of them is fake news. Anyone can easily spread a fake news. Fake news is spread to harm the reputation of a person or an organization. It can be a propaganda against someone that can be a political party or an organization. There are different online platforms where the person can spread the fake news. This includes the Facebook, Instagram, Twitter etc. As an increasing amount of our lives is spent interacting online through social media platforms, more and more people tend to hunt out and consume news from social media instead of traditional news organizations.The factors for this change in intake behaviours are inherent in the nature of these social media platforms:

 -It's often more timely and fewer expensive to consume news on social media compared with traditional journalism , like newspapers or television.

-It's easier to further share, discuss , and discuss the news with friends or other readers on social media.

Fake News contains misleading information that could be checked. This maintains lie about a certain statistic in a country or exaggerated cost of certain services for a country, which may arise unrest for some countries like in Arabic spring. There are organizations, like the House of Commons and the Crosscheck project, trying to deal with issues as confirming authors are accountable. However, their scope is so limited because they depend on human manual detection, in a globe with millions of articles either removed or being published every minute, this cannot be accountable or feasible manually. A solution could be, by the development of a system to provide a credible automated index scoring, or rating for credibility of different publishers, and news context. This paper proposes a methodology to create a model that will detect if an article is authentic or fake based on its words, phrases, sources and titles, by applying supervised machine learning algorithms on an annotated (labeled) dataset, that are manually classified and guaranteed. Then, feature selection methods are applied to experiment and choose the best fit features to obtain the highest precision, according to confusion matrix results. We

propose to create the model using different classification algorithms. The product model will test the unseen data, the results will be plotted, and accordingly, the product will be a model that detects and classifies fake articles and can be used and integrated with any system for future use.

We all can see the damage that can be caused because of fake news which is why there is a dire need for a tool that can validate particular news weather it is fake or real and give people a sense of authenticity based on which they can decide whether or not to take action, amongst so much noise of fake news and fake data if people lose faith in information, they will no longer be able to access even the most vital information that can even sometimes be life- changing or lifesaving. Our approach is to develop a model wherein it will detect whether the given news is false or true using LSTM (long short-term memory) and other machine learning concepts such as NLP, word embedding, one hot representation, etc. The model will give us the results for the dataset provided

LITERATURE REVIEW

Accessing credibility of news article

Most of the prevailing studies related to assessing the credibility of fake information has applied information articles from social media structures for their analysis. Websites such as Politifact.com and Snopes.com depend upon investigating newshounds and groups of experts, that distinguish unreliable information articles from dependable ones. Ma et al.(2016) and Popat et al.(2016, 2018), have wondered the human intervention for bifurcation of information articles as fake and actual and urged to examine the credibility of expert's judgments[1]. The study by Mukherjee and Weikum (2015) suggests that renowned information communities like Reddit.com, Dig.com, and Newstrust. Internet gave privilege to customers for score and reviewing information articles. Moreover, they highlighted the need for joint evaluation of credibility and trustworthiness of customers, articles, and information reassets due to the fact they believed that person sentiments and recognition additionally have an effect on the dissemination of news. The guide evaluation of fake information isn't always scalable due to the rate of incorrect information dispersion on social media systems and the sheer volume of such content. As an example, Janze and Risius (2017) used convolution neural network (CNN), SVM and DT-rank to differentiate true and false news postings by mainstream media pages on Facebook through cognitive (message and comments), visual (images), affective (various emojis) and behavioral cues (sharing and tagging) of the news posts. Popat et al. (2016), implemented a classification model for the credibility analysis of news claims through various features such as the language of articles, sources of articles, subjectivity, and implicative verbs. Also, they used Amazon Mechanical Turk to validate their approach. Another study by Popat et al. (2019) presents an end-to-end neural network model incorporating bidirectional LSTM to take advantage of generated past and new features for the assessment of news articles' truthfulness. The authors extracted features such as language style of articles, stance towards a claim, and trustworthiness of the sources. Kumar et al.(2016) used machine learning techniques including logistic regression, SVM, and random forest to detect

6

false information on Wikipedia. They focused on different characteristics related to article structure and content such as text length, markup ratio and link density[2].

Assessing Credibility of Tweets

Twitter has emerged as a mechanism to share information in constrained words and became an extremely famous medium of broadcasting. Researchers which includes (Alrubaian et al. 2018; Boididou et al. 2018; Castillo et al. 2011; Kochkina et al. 2018) have advanced process for detecting fake tweets the usage of system and deep studying strategies. Boididou et al. (2018), used system studying strategies inclusive of logistic regression (LR) and Random Forests (RF) to stumble on misleading statistics on Twitter through diverse extracted capabilities such as tweet length, account age, variety of followers, variety of tweets, variety of hashtags and retweets, and so on. Qazvinian et al. (2011) targeted on identifying tweets that endorsed the rumors the usage of Bayes class primarily based totally on content and network-primarily based totally features such as lexical patterns, part-of-speech, re-tweet, hashtags, and unified resource locators (URLs). Castillo (2011) used choice trees for the automatic class of trending information tweets and validated their technique the usage of 3-fold cross-validation. They considered diverse capabilities which includes the variety of followees, followers, retweets, URLs and hashtags along with guide labeling of data thru human assessors. Similarly, Alrubaian et al. (2018), used a mixture of random forest, naïve Bayes and choice trees to stumble on tweets containing malicious statistics. Kochkina et al. (2018) considered the problem of fake information tweets, along with 4 sub-issues inclusive of rumor detection, rumor tracking, stance class and rumor verification. They used the department LSTM technique to solve the issues. Agrawal et al. (2019) broadened a faux information detection technique the usage of logistic regression and studied how this sort of method fares while implemented to the information being shared on Twitter in a length of several months. Similar to the present literature, our research is supposed to broaden a version for the automatic detection of faux information articles and tweets[3]. Our version is designed to be relevant to stumble on faux information in each lengthy-series and quick-series texts. Similar to the researchers such as Ma et al. (2016) and Popat et al. (2018, 2019), we

used deep studying, greater specifically an LSTM neural network, to leverage its benefits in studying non-stop representations of textual data. Complementing the aforementioned processes, in this research, we've used diverse textual-primarily based totally (i.e., phrase count, text length), tagging (i.e., # hash tags, @ mentions) primarily based totally, and Syntactic capabilities (i.e., Ngrams). Our technique targeted at the textual statistics presented in information tweets and articles. The proposed version routinely extracts all noted capabilities to educate the LSTM primarily based totally version to understand the exceptional contextual which means of a sentence (Example- the phrase Bank refer to the place in which we maintain money or a riverside). The inclusion of phrase embedding maps every phrase with related exceptional meanings by growing awesome vectors. Thus, not depend on the extraction of hand made capabilities (i.e., manually extracted) as utilized by Boidiou et al. (2018) and Castillo et al. (2011). Moreover, our technique can also additionally stumble on the proliferation of Fake information at its early stages. Furthermore, the proposed technique works proficiently on any information-associated textual content both lengthy articles or quick tweets[4].

PROJECT OBJECTIVE

The main objective of this paper is to detect fake news with the dataset by using the Naive bayes algorithm and then predicting the accuracy level. The Naive bayes algorithm is used in this paper to analyze and visualize the values of the predicting data.

It is to identify and distinguish false or misleading information from genuine news and information[5]. The spread of fake news can have a significant impact on society, including influencing public opinion, spreading disinformation, and causing harm to individuals and communities. Therefore, detecting fake news is crucial to promoting informed decision-making and protecting against the harmful effects of misinformation[6].

The detection of fake news typically involves the use of machine learning algorithms and natural language processing techniques to analyze text, images, and other media for indicators of false or misleading information[1]. These indicators may include the source of the information, the language used, and the presence of inaccuracies, inconsistencies, or logical fallacies. By detecting these indicators, it may be possible to flag potentially fake news and prevent its spread[7].

RESEARCH METHODOLOGY

To assess the effectiveness of our model on long and short textual posts, we used two datasets. The first dataset consists of a large number of online news articles and the second include tweets related to real-world news events[8]. We first performed text data preprocessing by utilizing Python's natural language toolkit (NLTK) library to clean and filter out any irregularities and anomalies in the datasets.[9] Then we split our data into training and test datasets. We used Keras, an open-source deep-learning python-based library, to implement our Long Short-term Memory (LSTM) based model for text classification and Naïve Bayes. Finally, we evaluated the performance of our model based on commonly used measures such as accuracy, precision, recall, and F1 scores. We have described our detailed methodology below[10].

LSTM

Long Short Term Memory (LSTM) networks are a type of Recurrent Neural Network that can learn order dependence[11]. The output of the previous step is used as input in the current step in RNN. LSTM is a specific recurrent neural network (RNN) architecture[12]. RNNs are efficient in the processing of sequential data and have been widely used for speech and text recognition , but they have limitations in learning long-term dependencies[13]. LSTM has been introduced to overcome the shortcoming of the standard RNNs and gain optimum performance. LSTM utilizes gradient-based optimization for learning long-term contextual dependencies, which has the potential to outperform standard RNNs for textual data of different lengths. We used LSTM as the centerpiece of our model for classifying news articles and tweets into credible (represented as 0 in the datasets) vs. not credible (represented as 1). The LSTM layer consists of a set of recurrently connected blocks, known as memory blocks[12].

NAÏVE BAYES

Naive Bayes is popular algorithm which is used to find the accuracy of the news whether its real or fake using multinomial NB and pipelining concepts . There are number of algorithms that focus on common principle, so it is not the only algorithm for training such classifiers[13]. To check if the news is fake or real naïve Bayes can be used. It is a kind of algorithm is used in text

classification. The use of token is correlated with the news that may be fake or not fake in naïve Bayes classifier and then the accuracy of the news is calculated by using Bayes theorem[14].

Therefore on calculating the overall probability, we can get the approximate value and can detect whether the news is real or fake .

$$P(A|B) = P(B|A) \cdot P(A) / P(B) \text{-----------}(1)$$

Finding the probability of event, A when event B is TRUE

P (A) = PRIOR PROBABILITY

P (A|B) = POSTERIOR PROBABILITY

FINDING PROBABILITY:

$$P(A|B1) = P(A1||B1). P(A2||B1). P(A3||B1) \text{----------} (2)$$

$$P(A|B2) = P(A1||B2). P(A||B2). P(A3||B2) \text{-------------} (3)$$

If the probability is 0

P (Word) = Word count +1/ (total number of words+ No. of unique words) Therefore, by using this formula one can find the accuracy of the news[15]
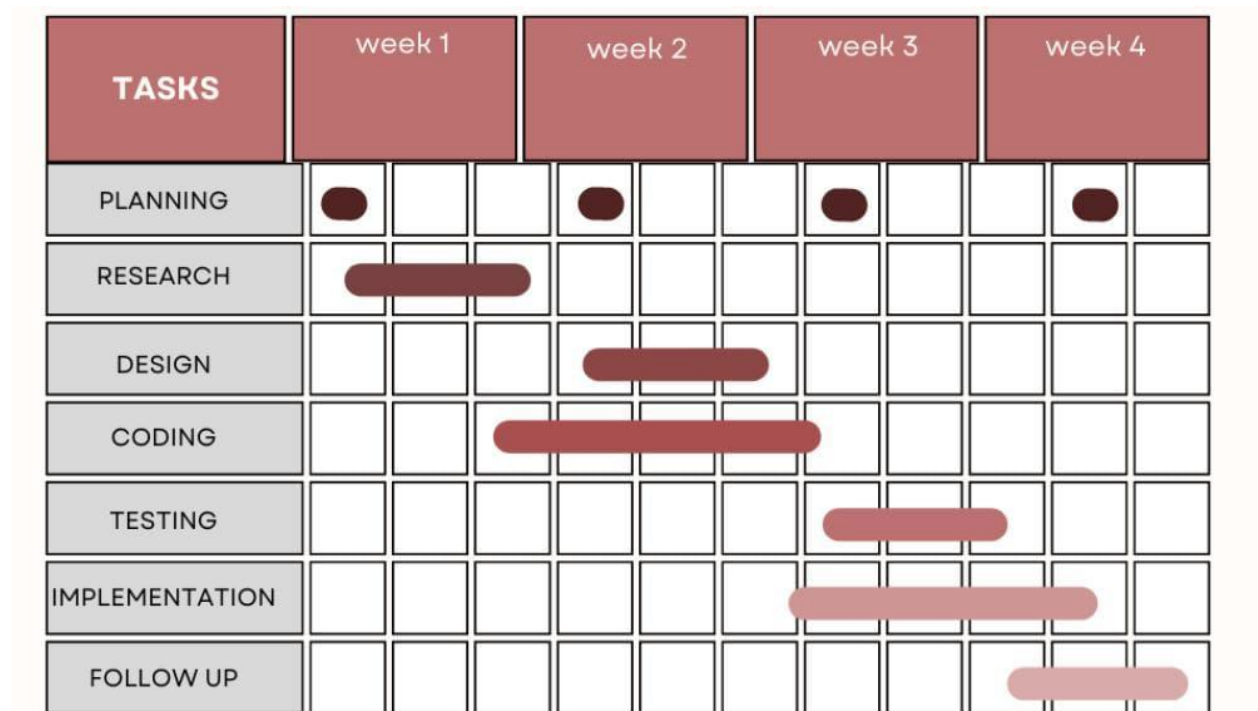
RESEARCH OUTCOME

The project outcome of using machine learning for fake news detection can vary depending on the specific approach and techniques used. However, some common outcomes of such projects could include:

- Improved accuracy in detecting fake news: By training a machine learning model on a large dataset of fake and real news articles, it is possible to develop a model that can accurately classify articles as either fake or real[16].

- Identification of key features for fake news detection: Through analysis of the machine learning model's performance, it may be possible to identify key features or characteristics that are indicative of fake news. This information can be used to improve future models or even inform news consumers on how to spot fake news[17].

- Deployment of a practical tool: Machine learning models can be integrated into existing tools or developed into standalone applications that can be used to automatically classify news articles as either fake or real. This can be useful for news organizations, social media platforms, and other entities that need to filter out fake news[18].

- Increased public awareness of fake news: By developing and promoting a machine learning-based fake news detection tool, it is possible to raise public awareness of the prevalence of fake news and the importance of being critical consumers of news media[19].

Overall, the goal of a fake news detection project using machine learning is to develop a practical tool that can accurately identify fake news and help combat the spread of misinformation[20].

PROPOSED TIME DURATION

TASKS	week 1			week 2			week 3			week 4		
PLANNING	●			●			●			●	
RESEARCH	▬	▬										
DESIGN				▬	▬							
CODING			▬	▬	▬							
TESTING							▬	▬				
IMPLEMENTATION							▬	▬	▬			
FOLLOW UP										▬	▬	

REFERENCES

[1]. Economic and Social Research Council. Using Social Mmedia. Available at: https://esrc.ukri.org/research/impact-toolkit/social-media/using-social-media

[2]. Gil, P. Available at: https://www.lifewire.com/what-exactly-is-twitter-2483331. 2019, April 22.

[3]. E. C. Tandoc Jr et al. "Defining fake news a typology of scholarly definitions". Digital Journalism , 1–17. 2017.

[4]. J. Radianti et al. "An Overview of Public Concerns During the Recovery Period after a Major Earthquake: Nepal Twitter Analysis." HICSS '16 Proceedings of the 2016 49th Hawaii International Conference on System Sciences (HICSS) (pp. 136-145). Washington, DC, USA : IEEE. 2016.

[5]. Alkhodair S A, Ding S H.H, Fung B C M, Liu J 2020 "Detecting breaking news rumors of emerging topics in social media" Inf. Process. Manag. 2020, 57, 102018.

[6]. Jeonghee Yi et al. "Sentiment analyzer: Extracting sentiments about a given topic using natural language processing techniques. "In Data Mining, 2003. ICDM 2003. Third IEEE International Conference (pp. 427-434). http://citeseerx.ist.psu.edu. 200).2003

[7]. Tapaswi et al. "Treebank based deep grammar acquisition and Part-Of-Speech Tagging for Sanskrit m sentences." Software Engineering (CONSEG), on Software Engineering (CONSEG), (pp. 1-4). IEEE. 2012

[8]. Ranjan et al. "Part of speech tagging and local word grouping techniques for natural language parsing in Hindi". In Proceedings of the 1st International Conference on Natural Language Processing (ICON 2003). Semanticscholar. 2003

[9]. MonaDiab et al. Automatic Tagging of Arabic Text: From Raw Text to Base Phrase Chunks. Proceedings of HLT-NAACL 2004: Short Papers (pp. 149–152). Boston, Massachusetts, USA: Association for Computational Linguistics. 2004

[10]. Rouse, M. https://searchenterpriseai.techtarget.com/definition/machine-learning-ML May 2018

[11]. Sumeet Dua, Xian Du. "Data Mining and Machine Learning in Cybersecurity". New York: Auerbach Publications.19 April 2016.

[12]. RAY, S. https://www.analyticsvidhya.com/blog/2017/09/common-machine-learning-algorithms/ 2017, September

[13]. Huang, T.-Q. (n.d.) https://www.researchgate.net/figure/Pseudo-code-of-information-gain-basedrecursive-feature-elimination-procedure-with-SVM_fig2_228366941 2018

[14]. Researchgate.net. Available at: Available at: https://www.researchgate.net/figure/Pseudocode-ofnaive-bayes-algorithm_fig2_325937073. 2018.

[15]. Researchgate.net. Available at: https://www.researchgate.net/figure/Pseudocode-for-KNNclassification_fig7_260397165, 2014. [16]. Rampersad G, Althiyabi T 2020 "Fake news: Acceptance by demographics and culture on social media" J. Inf. Technol. Politics 2020, 17, 1–11.

[17]. NaphapornSirikulviriya; SukreeSinthupinyo. "Integration of Rules from a Random Forest." International Conference on Information and Electronics Engineering (p. 194 : 198). Singapore: semanticscholar.org. 2011.

[18]. Jasmin Kevric et el. "An effective combining classifier approach using tree algorithms for network intrusion detection." Neural Computing and Applications , 1051–1058. 2017.

[19]. ShivamB.Parikh and PradeepK.Atrey. "Media-RichFake News Detection: A Survey." IEEE Conference on Multimedia Information. Miami, FL: IEEE. 2018.

[20]. MykhailoGranik and VolodymyrMesyura. "Fake news detection using naive Bayes classifier." First Ukraine Conference on Electrical and Computer Engineering (UKRCON). Ukraine : IEEE. 2017.