



FAKE NEWS DETECTION USING MACHINE LEARNING ALGORITHMS

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Abstract: In our modern era where the internet is ubiquitous, everyone relies on various online resources for news. Along with the increase in the use of social media platforms like Facebook, Twitter, etc. news spread rapidly among millions of users within a very short span of time. The spread of fake news has far-reaching consequences like the creation of biased opinions to swaying election outcomes for the benefit of certain candidates. Moreover, spammers use appealing news headlines to generate revenue using advertisements via click-baits. Sometimes, you need to check information to make sure it's true. If you don't have enough time for it because of your studies, use thesis writing services and enjoy additional free time at your disposal. In this paper, we aim to perform binary classification of various news articles available online with the help of concepts pertaining to Artificial Intelligence, Natural Language Processing and Machine Learning. 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.

Keywords: Social Media, Fake News, Classification, Artificial Intelligence, Machine Learning, Websites, Authenticity.

1. INTRODUCTION

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.[1] The explanations for this alteration in consumption behaviours are inherent within the nature of those social media platforms: (i) it's often more timely and fewer expensive to consume news on social media compared with traditional journalism, like newspapers or television; and (ii) it's easier to further share, discuss, and discuss the news with friends or other readers on social media. For instance, 62 percent of U.S. adults get news on social media in 2016, while in 2012; only 49 percent reported seeing news on social media [1]. It had been also found that social media now outperforms television because the major news source. Despite the benefits provided by social media, the standard of stories on social media is less than traditional news organizations. However, because it's inexpensive to supply news online and far faster and easier to propagate through social media, large volumes of faux news, i.e., those news articles with

intentionally false information, are produced online for a spread of purposes, like financial and political gain. It had been estimated that over 1 million tweets are associated with fake news Pizzagate" by the top of the presidential election. Given the prevalence of this new phenomenon, Fake news" was even named the word of the year by the Macquarie dictionary in 2016 [2]. The extensive spread of faux news can have a significant negative impact on individuals and society. First, fake news can shatter the authenticity equilibrium of the news ecosystem for instance; it's evident that the most popular fake news was even more outspread on Facebook than the most accepted genuine mainstream news during the U.S. 2016 presidential election. Second, fake news intentionally persuades consumers to simply accept biased or false beliefs. Fake news is typically manipulated by propagandists to convey political messages or influence for instance, some report shows that Russia has created fake accounts and social bots to spread false stories. Third, fake news changes the way people interpret and answer real news, for instance, some fake news was just created to trigger people's distrust and make them confused; impeding their abilities to differentiate what's true from what's not. To assist mitigate the negative effects caused by fake news (both to profit the general public and therefore the news ecosystem). It's crucial that we build up methods to automatically detect fake news broadcast on social media [3].

Internet and social media have made the access to the news information much easier and comfortable [2].

Often Internet users can pursue the events of their concern in online form, and increased number of the mobile devices makes this process even easier. But with great possibilities come great challenges. Mass media have an enormous influence on the



society, and because it often happens, there's someone who wants to require advantage of this fact. Sometimes to realize some goals mass-media may manipulate the knowledge in several ways. This result in producing of the news articles that isn't completely true or maybe completely false. There even exist many websites that produce fake news almost exclusively. They intentionally publish hoaxes, half-truths, propaganda and disinformation asserting to be real news often using social media to drive web traffic and magnify their effect. The most goals of faux news websites are to affect the general public opinion on certain matters (mostly political). Samples of such websites could also be found in Ukraine, United States of America, Germany, China and much of other countries [4]. Thus, fake news may be a global issue also as a worldwide challenge. Many scientists believe that fake news issue could also be addressed by means of machine learning and AI [5]. There's a reason for that: recently AI algorithms have begun to work far better on many classification problems (image recognition, voice detection then on) because hardware is cheaper and larger datasets are available. There are several influential articles about automatic deception detection. In [6] the authors provide a general overview of the available techniques for the matter. In

[7] the authors describe their method for fake news detection supported the feedback for the precise news within the micro blogs. In [8] the authors actually develop two systems for deception detection supported support vector machines and Naive Bayes classifier (this method is employed within the system described during this paper as well) respectively. They collect the info by means of asking people to directly provide true or false information on several topics abortion, execution and friendship. The accuracy of the detection achieved by the system is around 70%. This text describes an easy fake news detection method supported one among the synthetic intelligence algorithms naïve Bayes classifier, Random Forest and Logistic Regression. The goal of the research is to look at how these particular methods work for this particular problem given a manually labelled news dataset and to support (or not) the thought of using AI for fake news detection. The difference

between these article and articles on the similar topics is that during this paper Logistic Regression was specifically used for fake news detection; also, the developed system was tested on a comparatively new data set, which gave a chance to gauge its performance on a recent data.

A. Characteristics of Fake News:

They often have grammatical mistakes. They are often emotionally coloured. They often try to affect readers opinion on some topics. Their content is not always true. They often use attention seeking words and news format and click baits. They are too good to be true. Their sources are not genuine most of the times [9].

Nowadays people around the world are getting much involved on online social networks regardless of age, community, or sex. Communicating using social networks is simple, fast, and attractive to share and transfer information. Currently, social network sites like Facebook trailed by Twitter are the market pioneers, facilitating over 1.3 billion clients with a dynamic monthly variation of 300 million users in average. Their collaborations generate Terabytes of information every second. Online social networks are attractive because of the simple and convenient way to access and circulate information with other people. However, the fast scattering of data at a high rate with minimal effort enables the widespread of false information, such as fake news, which are harmful to society and people. Fake news are low-quality information with purposefully false data, propagated by individuals or bots that deliberately manipulate message for tattle or political plans. Schudson and Zelizer claimed that the term "fake news" originated in previous centuries together with the mass media itself. Nevertheless, this term attracted increased attention after the U.S. presidential elections of 2016, when the propagation of fake news on social media pulled the attention of a larger number of online users than traditional newsreaders. In the last five months before the elections, approximately 7.5 million tweets contained a link to exceptionally one-sided or false news websites. An interesting and worrying aspect is that false and unsubstantiated news from



doubtful sources attracts more audiences than credible information. Relevant work on this topic concluded that fake news spread quicker, penetrate further, and have a deeper impact than true news. There are numerous cases where people accept and spread news without checking their correctness certified by sources. By doing this, they become part of a group that deliberately or unintentionally propagates fake news. The intention behind the proliferation of fake news may be manipulation of public views for financial or political benefit, or simply fun. The negative consequences of this phenomenon are, therefore, undeniable, ranging from wrong decision-making to episodes of bullying and violence. As online social networks are major sources of information that can mislead individuals or communities, there is a serious need for solutions to verify the authenticity of the content. Many researchers consistently try to develop machine learning (ML) models with different sets of features targeted toward automating the fake news detection process using visual or text-based linguistic approaches. However,

the following four questions remain unanswered.

- 1) Which linguistic features are most significant in classifying the news data into real and fake?
- 2) Which word embedding (WE) technique with linguistic features predicts fake news better than other ML methods like convolutional neural networks (CNNs) or bidirectional encoder representations from transformers (BERTs)?
- 3) Which classification method is the most appropriate for fake news detection on available data sets?
- 4) Does ensemble voting classifier improve the fake news detection results?

To answer these questions, we propose a new method called WELFake exclusively focused on text data in three stages.

- 1) Fake news prediction using linguistic feature sets (LFS);
- 2) WE over LFS for improved fake news detection over a WELFake data set.
- 3) Comparative analysis of the linguistic features based results with state-of-the-art CNN and BERT methods

II. LITERATURE SURVEY

Mykhailo Granik et. al. in their paper [3] shows a simple

approach for fake news detection using naive Bayes classifier. This approach was implemented as a software system and tested against a data set of Facebook news posts. They were collected from three large Facebook pages each from the right and from the left, as well as three large mainstream political news pages (Politico, CNN, ABC News). They achieved classification accuracy of approximately 74%. Classification accuracy for fake news is slightly worse. This may be caused by the skewness of the dataset: only 4.9% of it is fake news. Himank Gupta et. al. [10] gave a framework based on different machine learning approach that deals with various problems including accuracy shortage, time lag (BotMaker) and high processing time to handle thousands of tweets in 1 sec. Firstly, they have collected 400,000 tweets from HSpam14 dataset. Then they further characterize the 150,000 spam tweets and 250,000 non-spam tweets. They also derived some lightweight features along with the Top-30 words that are providing highest information gain from Bag-of-Words model. They were able to achieve an accuracy of 91.65% and surpassed the existing solution by approximately 18%.

Marco L. Della Vedova et. al. [11] first proposed a novel ML fake news detection method which, by combining news content and social context features, outperforms existing methods in the literature, increasing its accuracy up to 78.8%. Second, they implemented their method within a Facebook Messenger Chabot and validate it with a real-world application, obtaining a fake news detection accuracy of 81.7%. Their goal was to classify a news item as reliable or fake; they first described the datasets they used for their test, then presented the content-based approach they implemented and the method they proposed to combine it with a social-based approach available in the literature. The resulting dataset is composed of 15,500 posts, coming from 32 pages (14 conspiracy pages, 18 scientific pages), with more than 2,300,000 likes by 900,000+ users. 8,923 (57.6%) posts are hoaxes and 6,577 (42.4%) are non-hoaxes.

Cody Buntain et. al. [12] develops a method for automating fake news detection on Twitter by learning to predict accuracy assessments in two credibility-focused Twitter datasets: CREDBANK, a crowd sourced dataset of accuracy assessments for events in Twitter, and PHEME, a dataset of potential rumours in Twitter and journalistic assessments of their accuracies. They



apply this method to Twitter content sourced from BuzzFeed's fake news dataset. A feature analysis identifies features that are most predictive for crowd sourced and journalistic accuracy assessments, results of which are consistent with prior work. They rely on identifying highly retweeted threads of conversation and use the features of these threads to classify stories, limiting this work's applicability only to the set of popular tweets. Since the majority of tweets are rarely retweeted, this method therefore is only usable on a minority of Twitter conversation threads.

In his paper, Shivam B. Parikh et. al. [13] aims to present an insight of characterization of news story in the modern diaspora combined with the differential content types of news story and its impact on readers. Subsequently, we dive into existing fake news detection approaches that are heavily based on text-based analysis, and also describe popular fake news datasets. We conclude the paper by identifying 4 key open research challenges that can guide future research. It is a theoretical approach which gives illustrations of fake news detection by analysing the psychological factors.

III. PROPOSED WORK

The system proposes a new method called WELFake exclusively focused on text data in three stages. 1) Fake news prediction using linguistic feature sets (LFS); 2) WE over LFS for improved fake news detection over a WELFake data set. 3) Comparative analysis of the linguistic features based results with state-of-the-art CNN and BERT methods. The WELFake model does not require additional metadata information related to the user or media for the classification of real and fake news. Instead, it aims for a reformation of the state-of-the-art techniques in the detection of fake news over social media websites by using a combined LFS and WE technique. We highlight three contributions of our WELFake model..

Advantages

1) Collection of various linguistic features from state-of-the-art methods and identification of a subset that performs well on the larger WELFake data set, and

- 2) Ensemble learning on WE features using various ML methods.
- 3) This model is best suited only for conventional data set as well as for large size data sets.
- 4) The accuracy of the model is achieved in high rate.

IV. METHODOLOGY

This section discusses several ML methods, including CNN and BERT for text classification.

ML Classification Methods

We review in this section a few ML methods used for fake news classification in the WELFake model.

- 1) Naive Bayes: This is a supervised learning algorithm based on Bayes' theorem that gives fast predictions with better accuracy in the domain of sentiment analysis, spam filtration, and text classification?
- 2) Support Vector Machine: This is a supervised learning algorithm that works for both classification and regression problems. The algorithm finds the best line for set separation and predicts the correct set for new data values.
- 3) Decision Tree: This is a supervised learning algorithm that classifies the data for both categorical and continuous dependent variables. This classifier uses tree structures to solve a problem by distributing complete data sets into homogeneous ones. Internal nodes, branches and leaf nodes in this tree structure represent the data set, the decision rules and the outcome. There are two attribute selection measures for the best attribute node: information gain and Gini index.
- 4) Random Forest: This is a supervised learning algorithm based on ensemble learning that ensembles several decision trees (DTs) into a random forest (RF) and calculates the average results. The large number of trees in the RF may increase the model accuracy.
- 5) K-Nearest Neighbor: This is majorly useful for classification problems based on feature similarity. The algorithm can use any integer value for K based on the problem statement and statistics, and employs the Euclidean, Manhattan, or Hamming metric for calculating the distance between data.



6) Boosting: This connects all base learners sequentially. Initially, it passes a few records to the first base learner (BL1) (of any model) for training, evaluates all the records on BL1, and passes the incorrectly classified ones to the second learner (BL2) for training. BL2 tests all the records and passes the incorrectly classified ones to the next learner BL3. This process continues until a specified number of base learners.

7) Bagging: This is known as bootstrap aggregation, this is an ensemble technique that uses multiple base learners and provides different subsets of the original data set to each model for training (bootstrapping). The testing process decides the output based on the majority votes from the different models (aggregation). Apart from different sample sets, one can train the models with different subsets to reduce over-fitting.

Screen:1. FakeNews Dataset



Screen:3. Home Page of Project

Screen:2. ML Analysis

Screen:4. ML Classification Report

V. CONCLUSION

Spreading of fake news always deliver a bad and negative impact to a society. Is still lots and lots of a confusion in a society, when it comes to differentiating between fake and true news. Fake news really is a false alarm to any person as it always just misleads the readers, and the person always ends up being confused and not acting in the right way. Their daily life with their naked eyes. So, this is when our project can use certainly to predicts whether project the given news is fake or not? By considering our project's ideology people can at least be able to check whether the news they have got in the front of their eyes are legit or not and the people will become more aware of the fake news circulation. This system has been completed in this final year which certainly needs more improvements in the near future by using a wampserver.

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