IJCRT.ORG ISSN : 2320-2882

INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS (IJCRT)

An International Open Access, Peer-reviewed, Refereed Journal

HOAX DETECTOR

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Abstract- A deliberate falsehood often referred to as a hoax (hocus to trick), has been on the rise at an alarming rate. In society, this situation could cause unrest, anxiety, and panic. Images blown up by hoaxes have the potential to harm people.

In this paper, we propose using a machine learning ensemble approach for automated news article classification. Our research looks into a variety of textual properties that can be used to tell the difference between fake and genuine content. We use ensemble methods to train a variety of machine learning algorithms and then use those properties to test their output on four real-world datasets. The performance of our proposed ensemble learner approach is superior to that of individual learners, according to experimental results.

Keywords: Hoax, Logistic Regression, Dataset, Threshold Value

1. INTRODUCTION

Hoax is derived from the term (hocus to trick) and was designed to manipulate or invite people to perform an action through threats or deceptions. The hoax's motive can be both commercial and political, and it can have negative consequences such as reputational, financial, and even life-threatening consequences. The faster hoax news spreads, the more it will affect an already established community.

Unfortunately, the spread of hoaxes is aided by social media, which hastens the dissemination of information. The spread of news is indeed being used as a means of making money, resulting in hoaxes spreading faster and uncontrollably. As with many of the issues that occur in the world, such as global warming, there can be a new website spreading hoaxes every day. Elections, disease outbreaks, and other issues are just a few examples. Because it uses a machine learning approach to automatically detect hoax websites, this research will aid people in improving the efficiency of blocking hoax news.

The development of automatic hoax detection software takes place in stages. To obtain a dataset that can be manually labeled, the first stage is to automatically collect content using a crawler engine in a hoax news portal as well as a trusted news portal. The next step is to parse the content so that it can be transformed into features that represent hoax news characteristics. Our ability to make decisions is largely determined by the information we consume; our worldview is shaped by the information we consume.

Consumers have been known to react irrationally to news that later turned out to be false. One recent example is the spread of the novel coronavirus, which saw fake reports about the virus's origin, nature, and behavior spread across the Internet. Fortunately, a number of computational techniques exist that can be used to identify fake articles based on their textual content. The majority of these methods rely on fact-checking websites like "PolitiFact" and "Snopes." Researchers maintain a number of repositories that contain lists of websites that have been identified as ambiguous or fake.

The problem with these resources is that they require human expertise to identify fake news of

articles/websites. More importantly, fact-checking websites only contain articles from specific domains, such as politics, and are not designed to detect fake news from a variety of domains, such as entertainment, sports, or technology. Data in various formats, such as documents, videos, and audios, can be found on the World Wide Web. It's difficult to detect and classify news published online in an unstructured format (such as news, articles, videos, and audios) because it necessitates human expertise.

Computational techniques such as natural language processing (NLP) can, however, be used to detect anomalies that distinguish one person from another. Text article that is deceptive in nature versus fact-based articles. Other techniques include examining the spread of fake news in comparison to real news. More specifically, the method

examines how a fake news article differs from a genuine article in terms of how it spreads across a network. At a theoretical level, the response to an article can be differentiated. To classify the article as real or fake on a theoretical level.

A more hybrid approach can be used to examine an article's social responsibility as well as its textual features to determine whether or not it is deceptive in nature. Detecting and classifying fake news on social media sites like Facebook and Twitter has been the subject of many studies. Fake news has been classified into different types on a conceptual level; this knowledge is then used to generalize machine learning (ML) models across multiple domains logistic regression (LR), linear support vector machine (LSVM), decision tree (DT), and stochastic gradient descent (SGD) is among the most accurate machine learning (ML) models, with SVM and logistic regression achieving the highest accuracy (92%). Combining features like text and speaker yielded a 27.7% accuracy, whereas combining all the different metadata elements with text yielded a 27.4% accuracy.

2. LITERATURE REVIEW

In history there was dramatica use of false news detectors for fake news. Moreover, data is growing rapidly such as structured data and unstructured data.

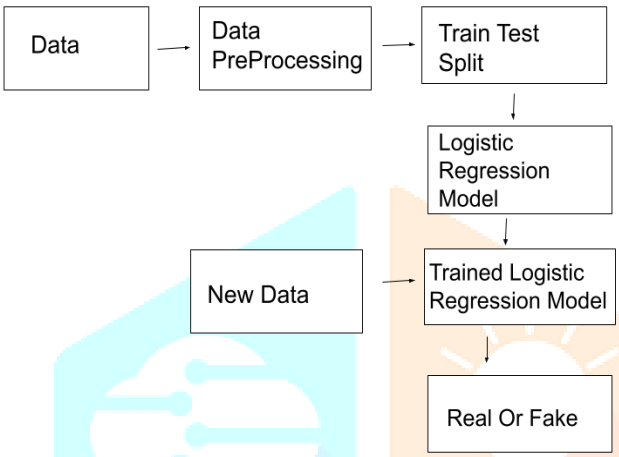
S. Helmstetter and H. Paulheim[1] has used the classifiers for detection different types of news

In paper[2] Al Messabi, K., Aldwairi, M., Al Yousif, AThoban, ABelqasmi proposes a method for detecting malicious domain names that employs eight distinct features to reliably distinguish malicious websites prior to their visit. We used Python to introduce our approach to detecting malicious domain names, and Weka to test it with five weeks of real-world results.Moreover, V. L. Rubin, Y. Chen and N. J. Conroy worked on paper [3] This paper discusses three types of fake news, each one in contrast to serious reporting, to the pros and cons as a corpus for the text analytics and predictive modeling. Filtering, vetting, and verifying online information continues to be essential in library and information science, as the lines between traditional news and online information are blurring.D. Michie, D. J. Spiegelhalter, and C. C. Taylor in paper[4] has a new evolutionary concept learning algorithm proposed, and an ECL (Evolutionary Concept Learner) learning system is implemented. MLP (Multilayer Perceptron), ID3 (Iterative Dichotomiser), and NB (Nave Bayes) are three conventional learning systems that are compared to this scheme. The contrast considers target definitions of various levels of complexity (e.g., with interacting attributes) and various training set qualities (e.g., with imbalanced classes and noisy class labels). The results of the comparison show that, while no single system is perfect in every case, the proposed ECL system has a very good overall efficiency. In paper[5] L. Breiman, J. Friedman, R. Olshen, and C. We explain how decision trees can be used to derive rules and point out some variations in regression tree induction. Finally, we discuss advanced strategies such as ensemble approaches, oblique cuts, grafting, and dealing with massive data sets.However, in paper[7] D. M. J. Lazer, M. A. Baum, Y. Benkler, et al.They review existing social and computer science studies on false news belief and the processes that propagate it. We focus on unanswered scientific questions posed by the spread of its most recent, politically focused incarnation of fake news, which has a long history. In paper[13] K. Shu, A. Sliva, S. Wang, J. Tang, and H. Liu, we present a comprehensive review of detecting fake news on social media, including fake news characterizations on psychology and social theories, existing algorithms from a data mining perspective, evaluation metrics and representative datasets.We also talk about relevant research areas, open issues, and potential research directions for social media fake news identification. In paper[12] When people mask their writing style, certain linguistic features shift, and stylistic deception can be detected by recognising those features. This research makes a significant contribution by developing a tool for detecting stylistic manipulation in written documents. In paper[13] H. Ahmed, I. Traore, and S. Saad introduced a new ngram model for automatically detecting fake contents, with an emphasis on fake reviews and fake news. Two separate feature extraction techniques and six machine learning classification techniques are investigated and compared. Experiments using current public datasets and a recently added fake news dataset show very promising and better results as compared to the previous dataset. In paper [14]N. J. Conroy, V. L. Rubin and Y. Chen,The paper offers a classification of many types of veracity evaluation methods that fall into two categories: linguistic cue approaches (with machine learning) and network analysis approaches. A novel hybrid approach that blends linguistic cues and machine learning with network-based behavioural data shows promise.In paper[15] This research into user use and attitudes toward online reviews was performed, as we can see. We submitted a questionnaire to our local consumer panel in May-June, and we got 2,104 answers. The majority of the respondents (90%) are from the United States and Canada (10 percent).

The aim of the survey is to learn how online reviews affect customer attitudes toward local businesses and how they guide traffic to those businesses.As in paper[16] of BBC news Samsung is accused of hiring students to post derogatory remarks about HTC phones on social media.The "unfortunate event," according to Samsung, went against the company's "fundamental values."

3. METHODOLOGY

The learning algorithms are trained with different hyper parameters to achieve maximum accuracy for a given dataset, with an optimal balance between variance and bias. Each model is optimized for the best result by training it multiple times with a set of different parameters using a grid search. Finding the best parameters with a grid search is computationally expensive.



3.1 ALGORITHMS

Logistic Regression- Logistic Regression (LR) model is used to classify text based on a large feature set with a binary output (true/false or true article/fake article) to classify problems into binary or multiple groups, use an intuitive equation. We tuned hyper parameters to get the best results for each dataset individually, while multiple parameters were tested first. Before obtaining the highest accuracies from the LR model, it was tested. The logistic regression hypothesis function can be Defined mathematically as follows:

$$h_\theta(X) = 1 / (1 + e^{-(\beta 0 + \beta 1 X)})$$

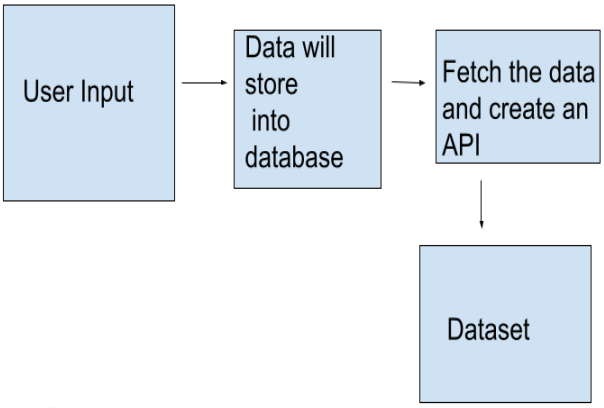
$$\text{Cost}(h_\theta(x), y) = \log(h_\theta(x)), y = 1,$$

$$-\log(1 - h_\theta(x)), y = 0$$

The output of logistic regression is transformed into a probability value using a sigmoid function; the goal is to minimize the cost function to achieve the best probability. The cost function is computed as follows:

3.2DATASETS

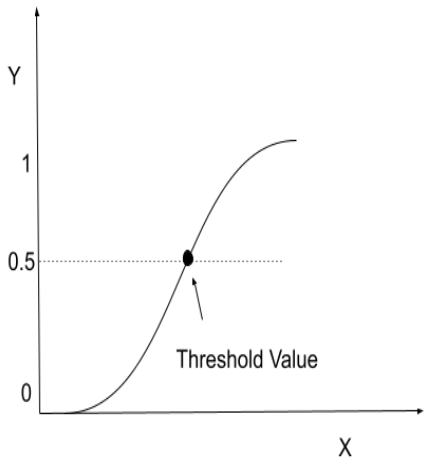
The datasets we used in this research are open source and freely accessible on the internet. The data includes both fake and truthful news articles from multiple domains. The truthful news articles published contain a true description of real-world events, while the fake news websites contain claims that are not aligned with facts. In this, we have used dynamic datasets whenever the user enters any news the API dataset will be formed. As data can be from any area worldwide it is capable of taking any input from different websites and keep analyzing its report on the basis of fake or real as we are doing this project by using a logistic regression model the data will be trained according to this model we will train our data and then test it for further analysis.



So the datasets we used in the model are dynamic datasets that can take random news in different areas and can verify whether it is fake or not.

4. WORKFLOW

Since we train this logistic regression model we get a trained model so we will do some evaluations on this model so we find the accuracy score of this model using the test data once we have done this we have a trained logistic regression model so for this trained regulation model we feed new data to this model which tells us whether the news is real or fake. So here we are going to discuss how the model i.e. logistic regression is working here. So here we are going to explain our model by using this x-y graph which represents the different functions happening in our hoax detector model and how they actually work in a realistic manner by explaining the whole workflow of the logistic model on which our hoax detector is working.



So as we can see in this given graph which is showing the logistic regression model here so as we can see here there is a curve that represents sigmoid and that is the formula under the graph which is behind this model of logistic regression so sigmoid function basically looks like this so when u plot graph according to this graph we have plotted both x and y values in this function we will get a sigmoid curve so that is a threshold value in our case threshold value is 0.5 so if our prediction is greater than 0.8 so it will give the label as one of the threshold value is less than 0.5 it will give the value as 0? So in this case if threshold value is greater than 0.5 the label is 1 which means the news is fake news so if the threshold value is less than 0.5it will be 0 which means it is real use so for this we need to make a function in this sigmoid equation that is given so what is it as we can see here Z= w*X+b.

So, this is straight line which is similar to y=mx+c so let's know what these all term means here x is the input features so in this case input feature is nothing but we have converted those content text into the numbers so that it represents the input features here and y represents our prediction probability so this value will be between 0 to 1 and this will determine whether the label will be 0 or 1 and w represents weights and b represents biases which represents how important a particular feature is For example e have several columns so in our dataset the title ,author, text etc. so if a particular column has "i" weight value it means that particular column is very important in this case author column will have a very huge weight value so as we can see here that weight value is multiplied with the input feature so if the text column is having very less important than that particular column will have very less weight value it means the text column cannot signify or cannot influence our result and "b" represents bias which basically an intercept so this is the math behind the logistic regression so this what happens under the hood of logistic regression model.

So continuing the prediction so we will load the logistic migration model in the variable called a model and then we need to train our model by model. Fit by using this fit function we are training our model. And once we trained our model we checked the accuracy score we used the metric called accuracy score. Then the model will ask to predict after importing the function accuracy score and the model's prediction compared to the original label values.

5. ACCURACY

Accuracy is a commonly used metric that represents the percentage of correctly predicted true or false observations. The following equation can be used to calculate the accuracy of a model's performance: In most cases, a high accuracy value indicates a good model, but given that we are training a classification model in this case, a high accuracy value does not necessarily indicate a good model. In our case, the accuracy is 90%.

6. RESULT

As we are taking dynamic data types and we have tested 100 hoax news websites and 100 real news which are collected outside the dataset we have compared the result with the Twitter detector which has achieved an accuracy rate of only up to 76% and our accuracy is about 90%. On the three datasets, logistic regression is a relatively simple model that achieved an average accuracy of over 90%. There are several reasons for the high average accuracy: first, the logistic regression model is fine-tuned using an extensive grid search with various hyper parameters; second, some datasets have similar writing styles.

7. CONCLUSION

The task of manually classifying news necessitates a thorough understanding of the domain as well as the ability to spot anomalies in the text. The problem of classifying fake news articles using machine learning models and ensemble techniques was discussed in this study. The information we used in our research came from the Internet and included news articles from a variety of domains to cover the majority of the news.

The study's main goal is to find textual patterns that distinguish fake news from legitimate news. We extracted various textual features from the articles and fed the feature set into the models. To achieve optimal accuracy, the learning models were trained and parameter-tuned. Some models have been found to be more accurate than others. There are numerous open issues in the detection of fake news that researchers must address. Identifying key elements involved in the spread of news, for example, is an important step in reducing the spread of fake news. To identify the key sources involved in the spread of fake news, graph theory and machine learning techniques can be used. Similarly, real-time detection of fake news in videos can be done.

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