Detecting Fake News

Sofia Yang
School of Engineering and Applied Sciences
University of Virginia
Charlottesville, VA 22903
syy6zn@virginia.edu

Christopher Zelaya
School of Engineering and Applied Sciences
University of Virginia
Charlottesville, VA 22903
qft2jk@virginia.edu

February 24, 2023

1 Abstract

With the continuous advancements in technology and fast spreading news on social media, the general public is consuming information without giving second thought on verifying the authenticity of the information. So we will make use of machine learning algorithms to determine labels for words that are often associated with fake news. In this work we will apply machine learning techniques to identify fake news using the content of the news articles. To achieve this goal, we will be using Term Frequency and Inverse Document Frequency vectorizer and Passive Aggressive Classifier algorithms.

2 Method

We plan on using several tools to accurately predict the reliability of a new article , specifically Classification. The first tool is a Term Frequency and Inverse Document Frequency (TFDI) vectorizer. This vector utilizes Term Frequency and Inverse Document Frequency. The more a certain word is repeated compare to other words the document may be a decent match. The IDF checks how significant a certain word is if it occurs several times in other documents as well. As our classifier we will be using a Passive Aggressive Classifier. Its purpose is to make updates to correct our loss without changing the weight of our vector. The way we plan to evaluate our model is based on an accuracy score. We currently do not know what score will be considered a good one but anything over 90% would be a great model. We loaded our data and cleaned it up. From there we initialized a Pipeline scaling our features, applying and fitting our data with the TFDI and Passive Aggressive Classifier.

2.1 Prior Method

The prior methodology used machine learning models to create a model that will determine if a given news article is fake or true news. The model result created a low cost amount to nearly zero. This prior methodology did supervised learning by cleaning the true and false data set separately. Using the content from each news article to identify keywords that are associated to the true news or false news articles. It also removes the noise from the data by keeping all the text lowercase and removing punctuation.

3 Motivation

Our project is to determine whether or not a specific news article is fake or real. As responsible citizens, it is important to be up to date with the issues that are being presented across the nation. Nowadays, fake news is spreading rapidly from person to person without any verification. On a deeper level, sometimes this is due to impose certain ideas or values by political agenda. Certain companies, blogs, and such may create fake news to get more views. For such reasons, we would like to have our machine learning project be centered around detecting fake news so that everyone can be informed properly about issues that are verified and pressing! Our machine learning algorithms will be simulated on data from news reports, blog posts, social media posts, etc.

4   Experiments

In our preliminary experiments we split the real news and fake news data sets into training and test sets. With the testing data set being a mix of both real news and fake news. Then, we cleaned the two training sets, one of the cleaning methods we used is having all of the content be in lower case and remove all punctuation to prevent any possible noise that could result in our model being skewed. We fit the two cleaned training data sets with the supervised learning algorithm. With our fitted supervised learning model we ran our test data set on the model and we received an accuracy of 96%. The baseline we used did not include the tuning of hyper-parameters and we did not clean the data in a detailed manner.

In our final experiment the one we planned to use we loaded our data and cleaned it up. From there we initialized a Pipeline scaling our features, applying and fitting our data with the TFDI and Passive Aggressive Classifier. This experiment can be found in out Google Colab submission.

5   Results

Using our final method we were able to produce a accuracy score of 98%. This is much better than the prior methods that achieved 92% accuracy and better than our preliminary experiment which achieved 96% using a Linear SVC.

6   Conclusion

Overall we think our model is perfect for the Virginian voter. Our news detection will make it easier for Virginians to understand if what is being presented to them is factual or not. This will decrease the chances of them being misled and will overall inform the state of what is actually happening. There are too many instances of ignorant people harming others; our model will hopefully decrease that and provide a great service to the community. I can see our model being used by voters in the upcoming elections and it will be a great way for them to remain informative.

References

[1] Eisgandar.(2022, September 23).In Detect Fake amp; Real News glove EMB, LSTM Kaggle. Retrieved September 28, 2022, from

https://www.kaggle.com/code/eisgandar/detect-fake-real-news-glove-emb-lstm