

Fake News Detection in Social Media Using Machine Learning

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ABSTRACT: Social media for news consumption is a double-edged sword. On one part, its low cost, easy access, and rapid spread of information lead people to seek out and consume news from social media. On other hand, it facilitates the wide spread of fake news, that is with intentionally false information. The fake news has serious negative impacts on the society. Therefore, fake news detection on social media has recently gained tremendous attention. Sentiment Analysis is a process of extracting useful information from large amount of data, and classifies them into different sentiments. Python is simple but powerful, high-level and dynamic programming language, which is well known for its functionality of processing natural language data by using NLTK (Natural Language Toolkit). Users use different words when they express sentiments in different domains. If we use a classifier trained in one domain to other domains, the performance will be very low due to the difference between these domains. In this work, we develop a general solution to sentiment classification when we do not have any labels in target domain but have some labelled data in different domains, considered as the source domain. The Naive Bayes Classifier model is used to accurately classify the sentiments as positive or negative. The purpose of the work is to come up with a solution that can be utilized by users to detect and filter out sites containing false and misleading information.

KEYWORDS: Machine Learning, Sentiment Analysis, Python, NLTK, Naive Bayes Classifier.

I. INTRODUCTION

There was a time when if anyone wanted any news, he needs to wait for the next-day newspaper. However, with the growth of online newspapers who update s news almost instantly, people have found a better way to be informed of the matter of his interest. Nowadays social-networking systems, online news portals, and other online media have become the main sources of news through which breaking news are shared rapidly. However, many news portals serve special interest by sending distorted, partially correct, and sometimes imaginary news that is likely to attract the target group of people. Fake news has become a major concern for being destructive, sometimes spreading confusion and extensive disinformation among the people. The extensive spread of fake news has high-level potential for extreme negative impacts on individuals and society. The term fake news has become a common word nowadays. Whatever, an agreed definition of the term fake news is still not found. These are generated with the intention to mislead in order to damage a community or person, create chaos, and gain financially or politically. Since people are unable to spend enough time to cross-check the reference and to be sure of the credibility of news, automated detection of fake news is inevitable. Therefore, it is receiving great attention in the research community.

Fake news detection on social media exhibits unique nature and challenges that make existing detection algorithms ineffective. Fake news is intentionally written to divert people to believe false information, which makes it difficult to identify them based on the news content; therefore, we included auxiliary information(Stance Based Approach), like user social engagements (such as the public comments they post)on social media, to help its identification. Second, using this auxiliary information itself is challenging as users social engagements with those fake news produces data that is huge, unstructured, and noisy. Since the problems of fake news detection on social media is both competitive and needed, we have planned to develop this fake news detection method in order to reduce the impacts of it on the society. Related research areas, open problems, and future research directions for fake news detection on social media is also considered. Considering them, we have reached a solution to develop the model using supervised machine learning techniques involving the NLTK libraries.

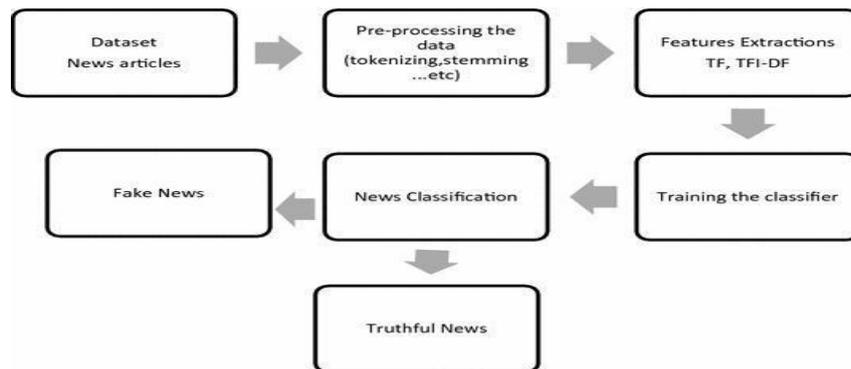
II. RELATED WORK

The prior works on fake news detection have applied several traditional machine learning methods [1] [2] and neural networks[4] [6] to detect fake news. However, they have focused on detecting news of particular types. Accordingly, they developed their models and designed features for specific datasets that match their topic of interest. It is likely that these approaches would suffer from dataset bias and are likely to perform poorly on news of another topic. Some of the existing studies have also made comparisons among different methods of fake news detection[5]. We have also found that traditional machine learning architecture like Naïve Bayes can achieve very high accuracy with proper feature selection. The flaws of other systems are understood and we have tried to come up with a model that rectifies these bugs to an extent.

III. METHODOLOGY

Our propaganda was to create a website with the developed model linked to it. The user needs to input the link of the news for which the veracity is to be found. For the sake of easiness, we have considered some of the best social-networking sites-twitter and youtube. Our website here collects the reviews/comments for the corresponding news link given as input. Based on that , the created model classifies the news as fake or real.

What have we done here?



The first approach was to collect the necessary datasets for the purpose of training the model. We have taken into account some of the relevant NLTK corpora datasets like movie reviews, product_reviews_1, product_reviews_2 and pros_cons. Also for improving the efficiency of the system, we have downloaded a publically available dataset from Kaggle.com which contains various movie reviews in large amounts. All these datasets were combined together to train the model.

We have developed the model in Jupyter notebook, where we have imported the necessary downloaded packages and modules. We implemented our model using the version Python 3 which supports the necessary modules. Once the platform and datasets were designed, we executed our coding part.

Since we were dealing with reviews, our datasets were text files which served as the model input. Each sentence in the dataset were tokenized, (first sentence tokenization and then word tokenization). From there, punctuations and stopwords were removed, using NLTK corpus called stopwords.

Next step included the POS(parts of speech) tagging. Each of the remaining word in the list is given a tag. We now have a set of sentiments with associated POS tags. From the list of words, the most meaningful adjective words were selected that can accurately identify the emotion behind the sentence and the further procedure is done with it.

The Naive Bayes Classifier model used for training was the MultinomialNB, as it provided a higher accuracy rate than to the other NB models, which can be imported from the Sklearn module present in the Scikit in NLTK Classifier. NLTK has the built in Scikit Learn module known as Sklearn Classifier. It can own the features of any model than is imported through Scikit Learn.

Once we have done with the model training pickling is done. To avoid training the model again and again, we stored the model using pickle which is a python module that allows us to retain python objects that might have taken a long time to create before closing the kernel. Once these steps are completed, our model is developed. It can now classify a given set of reviews as positive or negative. The final step is the deployment of the model.



Deployment of the model is done using Flask Application. The input to the website is the news link and its corresponding comments were extracted in the back-end using the twitter and youtube APIs. Lastly, these collected reviews were fed into the model which we have loaded using the pickle module in Flask Application.

III. EXPERIMENTAL RESULTS

Figures shows the output of the various tests done in the project. Figure:1 is the view of our website which is available to the user to provide the news links. Figure:2 shows the results obtained while developing and training our model. The model provided around 84 % accuracy and hence we are successful in classifying the news as fake or real.

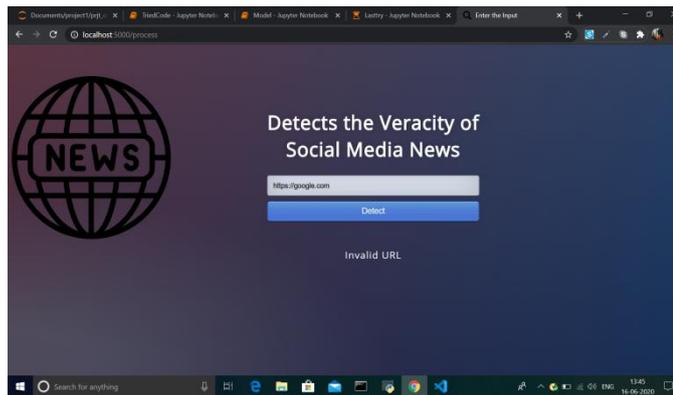


Fig. 1. Website Front Page

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In [4]: classifier = nltk.MaxEntBayesClassifier.train(training_set)
print("Classifier accuracy percent:",(nltk.classify.accuracy(classifier, testing_set))*100)

Classifier accuracy percent: 82.102929292929

In [5]: from nltk.classify.scikitlearn import SklearnClassifier
from sklearn.naive_bayes import MultinomialNB

# training various models by passing in the sklearn models into the SklearnClassifier from NLTK
NB_C1F = SklearnClassifier(MultinomialNB())
NB_C1F.train(training_set)

Out[5]: SklearnClassifier(MultinomialNB())

In [6]: from nltk.classify import ClassifierI

# Defining the ensemble model class
class EnsembleClassifier(ClassifierI):
    def __init__(self, classifiers):
        self.classifiers = classifiers

    # returns the classification based on majority of votes
    def classify(self, features):
        votes = []
    
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1 get on, dude
2 Now if disassemblyed children don't come back to school. It still be the same in September
3 read the op' in and you will know the truth. it says thousands of years ago that we forsook eating bats
4 NOW
5 I always have to watch you because it's important for the earth
6 And they still die alone like many other cases that they had to isolate
7 Not sending kids to school what the hell.
8 Why can't they just put subtitles so we don't need to see someone doing sign language? Just curious?
9 My kids won't be going back until its safe, no matter which school up more says otherwise.
10 How Justice for the globe list is I pray your eyes are open it does help some one
11 When he mentions that these related regulations are in line with other countries you just can't compare t
12 THIS BBC PAGE SUPPORTS LYING GOVERNMENT
13 Closing schools out the government not opening , phone in sign to get paid , SHARE ON YOU
14 If you want our children to go to school, all we should sit in full in parliament and the House of Lords
15 JUST STAY INSIDE ITS NOT HARD U FOOLISH PEOPLE
16 Sigh! I'm not going to school.
17 They still be testing the innocent kids in the schools from the effect of 5G Africa's which is potentially
18 The whole school thing doesn't even make no sense if this virus was real then how can they protect the sa
    
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# Initializing the ensemble classifier
ensemble_c1f = EnsembleClassifier(NB_C1F)

# list of only feature dictionary from the features list of tuples
feature_list = [f[0] for f in testing_set]

# looping over each to classify each review
ensemble_predictions = [ensemble_c1f.classify(features) for features in feature_list]

In [11]: # Function to do classification given review and return the label a
# and the amount of confidence in the classification
def sentiment(text):
    features = nltk.Features(text)
    return ensemble_c1f.classify(features), ensemble_c1f.confidence(features)
sentiment("I love it.")

Out[11]: ('neg', 0.48)

In [24]: def sentiment(text):
    features = nltk.Features(text)
    return ensemble_c1f.classify(features), ensemble_c1f.confidence(features)
sentiment("It turns out to have a wonderful review")

Out[24]: ('pos', 0.48)

In [ ]:
    
```

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In [36]: from nltk.classify.scikitlearn import SklearnClassifier
from sklearn.naive_bayes import MultinomialNB

# training by passing in the sklearn model into the SklearnClassifier from NLTK
NB_C1F = SklearnClassifier(MultinomialNB())
NB_C1F.train(training_set)

Out[36]: SklearnClassifier(MultinomialNB())

In [32]: print("Classifier accuracy percent:",(nltk.classify.accuracy(NB_C1F, testing_set))*100)

Classifier accuracy percent: 83.329292929293

In [34]: filename = "NB_c1f.pickle"
pickle.dump(NB_C1F,open(filename,"wb"))

filename = "NB_c1f.pickle"
pickle.dump(classifier,open(filename,"wb"))

In [37]: from nltk.classify import ClassifierI

# Defining the ensemble model class
class EnsembleClassifier(ClassifierI):
    
```

Fig. 2 Model Training (a) Training Using MultinomialNB (b) The comment extracted from a news site (c) Classification of the news as Positive or Negative (d) Accuracy obtained for the model training

IV. CONCLUSION

With the increasing popularity of social networking sites, a large fraction of the people consume news from social media instead of traditional news medias. However, social media has also been used to spread fake news rapidly, which has strong negative impacts on individual users and the society especially financial sectors. Our model classifies a given set of news as fake or real based on the word features used by the people in their reviews. It can correctly identify the sentiment that different people have towards the same set of news and based on the majority votes , news are classified.

The use of Naive Bayes Classifier as the training model has helped us achieve greater efficiency and also to develop a model that dominates the other existing detection algorithms. We have reviews correctly classified from different domains. The future work includes creating a model with greater accuracy.

REFERENCES

- [1] Bhagyashri Wagh , Prof. J. V. Shinde, Prof. P. A. Kale, “A T'witter Sentiment Analysis Using NLTK and Machine Learning Techniques” , International Journal of Emerging Research in Management &Technology ISSN: 2278-9359 .
- [2] Kai Shu , Amy Sliva , Suhang Wang , Jiliang Tang , and Huan Liu , “Fake News Detection on Social Media: A Data Mining Perspective” arXiv:1708.01967v3 [cs.SI] 3 Sep 2017
- [3] Kai-Chou yang National Cheng Kung University Tainan, Taiwan , Timothy Niven National Cheng Kung University Tainan,Taiwan. “Fake News Detection as Natural Language Inference”.arXiv: 1907 .07347v1 [cs.CL] 17 Jul 2019.
- [4] Kelly Stahl, Dept.of Mathematics and CS, Caifornia State University Stainslaus. “Fake News Detection In Social Media” ,15 May, 2018.
- [5] Junaed Younus Khan, Md. Tawkat Islam Khondaker, Anindya Iqbal1 and Sadia Afroz. “A Benchmark Study on Machine Learning Methods for Fake NewsDetection”, arXiv:1905.04749v1,12 May 2019.
- [6] Clifton phua, vincent lee1 , kate smith & ross gayler, “A Comprehensive Survey of Data Mining-based Fraud Detection Research” ,1009.6119v1. Sept 2011
- [7] <https://towardsdatascience.com/basic-binary-sentiment-analysis-using-nltk-c94ba17ae386>
- [8] <https://github.com/gmellini/twitter-scraper>
- [9] <https://python.gotrained.com/youtube-api-extracting-comments/>