Fake News Detection Using Machine Learning

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FAKE NEWS DETECTION USING MACHINE LEARNING

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Abstract— The rising popularity of social media platforms such as Facebook, Twitter, Instagram, and electronic newspapers has accelerated the propagation of fake news. With the present use of such social networks, individuals are disseminating more disinformation than ever before, the most majority of which have no basis in truth. Differentiating between authentic and fraudulent news becomes tough in this situation. In this paper, we offer a methodology for classifying news articles that incorporates natural language processing and machine learning methods. To assess the correctness of the new article, the suggested model employs a variety of vectorizers and classifiers. We want to give the user the option of classifying news as fake or true.

Keywords—Cyberspace, fake news, Natural language processing, Machine learning, Vectorizers, Classifiers, Accuracy

I. 1.INTRODUCTION

Despite the fact that social media has become an almost inevitable aspect of our culture, we cannot always rely on it. On social media, misinformation is not a new occurrence. Every day, we read a lot of things on social media, some of which are genuine, but most of them are not. This inaccurate or misleading information results in fake news, which is made up of made-up stories with no verified facts, sources, or quotes. Fake news articles have grown in popularity on social media sites like Facebook, What's App, YouTube, etc in recent years.

When it comes to posting content on social media, most individuals don't think twice. People neglect to verify if content such as violent video clips, photos, memes, and so forth is fake or real after getting it. It occurs because the only thought that comes to people's thoughts at the time is to inform them of the content and its repercussions.

During the COVID-19 period, there were a variety of false news stories that circulated quickly on social media and among the general public. Indians' phones were inundated with disinformation, ranging from proposing a variety of home treatments to circulating fake warnings advising people to avoid foods like ice cream and chicken and sharing conspiracy theories.

In [7] the authors have performed binary classification of various news articles available online with the help of concepts pertaining to Artificial Intelligence, Natural Language Processing and Machine Learning. It also provides the user with the ability to classify the news as fake or real and also check the authenticity of the website publishing the news. In [8] the authors have demonstrated a model and the methodology for fake news detection. It is attempted to collect news using machine learning and natural language processing, and then use Support Vector Machine to identify whether the news is real or fake. The suggested model's findings are compared to those of other models. The suggested model is accurate up to 93.6 percent in determining the validity of outcomes.

The goal of the research is to look how particular methods will work in checking the accuracy of the entered news. For this model Machine Learning is specifically used throughout along with its classifiers

and Vectorizers. The prepared model will give a real time access to check whether the news is real or fake.

2. LITERATURE REVIEW

In their study, author Mykhailo Grani demonstrates a basic strategy for detecting bogus news using a naïve Bayes classifier. This method was turned into a software system and put to the test on a collection of Facebook news posts. They came from three major Facebook sites, one on the right and one on the left, as well as three major mainstream political news pages (Politico, CNN, ABC News).They achieved classification accuracy of approximately 74%.The accuracy of false news classification is slightly lower.This may be caused by the skewness of the dataset: only 4.9% of it is fake news.

Author Anjali Jain in their paper has mentioned system that detects fake news based on the models applied.Also it has provided some suggestions related to the topic mentioned in the news which is very helpful for any user.

Author Z Khanam in their paper has focused on detecting the fake news by reviewing it in two stages:characterization and disclosure. The basic concepts and principles of false news are highlighted in the first stage on social media. During the discovery stage, the current methods are reviewed for detection of fake news using different supervised learning algorithms.

Author Uma Sharma in their paper have used various NLP and Machine Learning techniques. The model is trained on a suitable dataset, and its performance is evaluated. The user may verify the news article or keywords online, as well as the website's authenticity.The accuracy for dynamic system is 93% and it increases with every iteration.

Author Iftikhar Ahmad in their paper have extracted different textual features from the articles using an LIWC tool and used the feature set as an input to the models. To achieve optimal accuracy, the learning models were trained and parameter-tuned. Some models have been shown to be more accurate than others.

3. ARCHITECTURE
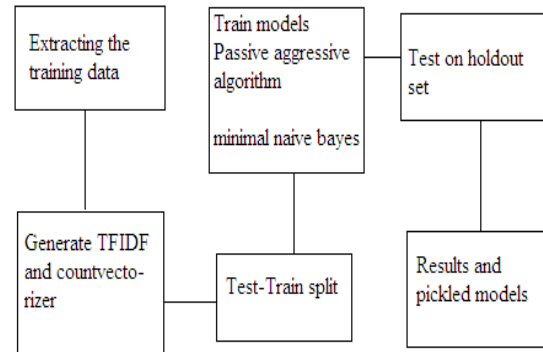
3.1 BLOCK DIAGRAM OF SYSTEM ARCHITECTURE

The block diagram for the specified project is depicted in the graphic above. The initial stage, as indicated in the block diagram, is to extract the training data and check for any null values. The count vectorizer and tfidf vectorizers are used to extract features from the data sets in the second stage. As a result, the models will be made. Classifiers such as the nave bayes classifier and the passive aggressive classifier will be used to verify these models. On this foundation, the confusion matrix will be built. The next stage will be to verify the correctness of each model's output. The last stage is to determine if the news is true or not.

3.2 Approach

Due to the complicated nature of fake news recognizing the category of news becomes a difficult

task. It is obvious that the technique designed must contain a few perspective to handle the issue.hence the model designed is a combination of various classifiers and vectorizers.

3.2.1 Data Collection

The dataset required for this project is taken from kaggle.com.The size of the dataset is 6335*4.It means that there are 6335 rows along with 4 columns. The name of the columns are 'URLs','Headline'.'Body' and 'Labels'. The first column identifies the news the second column and third column are title and text and the fourth column has labels denoting whether the news is real or fake.

3.2.2 Preprocessing The Text

The performance of a text classification model is highly dependant on the words in a corpus and the features created from those words. Common words also known as stopwords increase the feature dimensionality. Since Social Media contains highly unstructured data it becomes very important to process the data before performing any operation on the data. For this purpose, basic preprocessing was done. This step comprises of data cleaning.

Data Cleaning :

Cleaning the data set becomes an important task inorder to highlight the important attributes that we will require for the machine learning system. Cleaning (or preprocessing) the data typically consists of a number of steps:

1.Remove punctuation

Punctuation can help us grasp a phrase by providing grammatical context. However, because our vectorizer only counts the number of words and not the context, we eliminate all special characters.

2.Tokenization

Tokenizing breaks down text into smaller parts, such as sentences or words. It provides previously unstructured text structure.

3.Remove stopwords

Stopwords are frequent words that may be found in almost any text. We eliminate them since they don't provide us with much information about our data.

3.2.3 Feature Extraction

Text data can be used to generate many features like word count, frequency of large words, frequency of unique words etc. Feature extraction helps in the reduction of unnecessary data in a data collection.
The reduction of data allows the model to be built with less machine effort and enhances learning speed. Feature extraction can be done using various Vectorizers.

1.Bag of words or Count Vectorizer:

Bag of Words (BOW) or Count Vectorizer is a method used to extract features from text documents. It creates a matrix depending upon the presence of a word in a sentence. It gives result 1 is the word is present and 0 is the word is absent. It thus creates a bag of words present in the document depending upon its importance.

2.TF-IDF Vectorizer:

TF-IDF Vectorizer measures the relative frequency of a word that appears in a document and also compares it with its frequency over all other documents. The text vectorizer Term frequency-inverse document frequency converts the text into an usable vector.Term Frequency (TF) and Document Frequency (DF) are combined in this approach (DF).
The term frequency is the number of occurrences of a specific term in a document.Inverse document frequency (IDF) is the weight of a term, it aims to reduce the weight if the occurrences of a phrase are dispersed throughout all documents

Term Frequency is calculated as:

$$TF = \frac{No.\ of\ repetition\ of\ words\ in\ a\ sentence}{No.\ of\ words\ in\ a\ sentence}$$

Inverse document frequency is calculated as:

$$IDF = Log \frac{No.of\ sentences}{No.of\ senetences\ containing\ words}$$

TF-IDF is given as:

TFIDF=TF*IDF

3.2.4 Classification

We used calssifiers like Naïve Bayes Classifier & Passive Aggressive to test & train the data.Then selected the best classifier for building our model according to the accuracy of the classifier while predicting the test data.

1.Naive Bayes Classifier:

This classification method is based on the Bayes theorem, which states that the existence of one characteristic in a class does not imply the inclusion of any other feature. It allows the posterior probability to be calculated.

$$P(x) = \frac{P(c)\ *P(c)}{P(x)}$$

P(c|x)= posterior probability of class given predictor
P(c)= prior probability of class
P(x|c)= likelihood (probability of predictor given class)
P(x) = prior probability of predictor

2.Passive Aggressive Classifier:

It performs by reacting passively to accurate classifications and aggressively to any misclassifications. The Passive Aggressive Classifier is a machine learning method that belongs to the category of online learning algorithms.

4. METHODOLOGY

The project's system is divided into two parts: front end and back end. The user interface, or front end, will be web-based, allowing the user to submit text and verify if the information is genuine or not. We used HTML and CSS frameworks such as Tailwind to create the front end. Machine learning classifiers and vectorizers are used at the back end. Using classifiers like as the navies byer classifier, we investigated, built, and trained a model. We utilised the Python language in our project, and there are numerous libraries available in Python, such sklearn, pandas, and others that can be used quite simply in machine learning..We have also used Flask for deployment the web based on the build model to help client side implementation
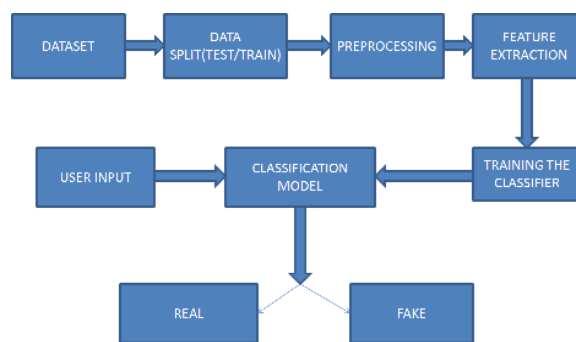
4.1   System Architecture

5. IMPLEMENTATION

4.1 Working Of The Back End

Step 1: Importing the required libraries.
Step 2: Reading the data from the dataset.
Step 3: Pre-processing the data.
Step 4: Splitting the data as train set and test set.
Step 5: Extracting the features from the text data

using various Vectorizers.

  a) Using bag of words or Count vectorizer for bith training and test data set.
  b) Using tf-idf vectorizer for both training and test data set.

Step 6: Checking whether both the dataframes are equal or not.

Step 7: Performing classification using classifiers

  a) Using naïve bayes classifier for both the models created with count vectorizer and tf-idf vectorizer. Also creating a confusion matrix showing the details.
  b) Using passive aggressive classifier for both the models created with count vectorizer and tf-idf vectorizer. Also creating a confusion matrix showing the details

Step 8: Checking the accuracy provided by each model and selecting the best model

Step 9: Saving the best model created using python library.

Step 10: Also creating a function using which we can enter any news and check whether it is real or fake.

4.2 Working Of The Front End

In the front end there will be a user interface model created using html and CSS. User can enter any news in the space provided and click on the predict button provided below it. You will get the output as real if the news is true and as fake if the news is false.

5.CONCLUSION

Fake news is categorized as any kind of cooked-up story with an intention to deceive or to mislead. In this project we tried to present the solution for fake news detection task by using Machine Learning techniques. Many events have resulted to a rise in the prominence and spread of phony news. The widespread impacts of the massive onset of fake news can be seen, humans are conflicting if not outright poor detectors of fake news. With this, endeavours are being made to automate the task of

fake news detection. The most mainstream of such actions include blacklisting of sources and authors that are unreliable. Even though these tools are useful.

Here, the purpose of this project was to build a model that help us to classify fake and real news with the help of ML (machine learning) techniques and to choose the best model with highest accuracy. Therefore the best model selected is using passive aggressive classifier with accuracy of 93.83 %. The outcomes of this project shows the capability of ML to be fruitful in this task. We have tried to build a model that helps in catching many intuitive indications of real and fake news as well as in the visualization of the classification decision.The problem that needs to be solved can be solved using AI and Machine learning techniques.

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