False News Recognition Using Machine Learning

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Abstract. In these modern times where internet has become widely popular and used by almost everyone, anyone can share or upload articles without any credibility. False news refers to articles that are published with the intent of deliberately misleading readers. In the recent times false news on internet has become more and it has become a major problem as it is difficult to differentiate between the real and the false news. False news and false posts have become more prevalent on social media sites such as Facebook and Twitter. From these platforms the news will be spread like wildfire without any authenticity. It can be used to sway election outcomes against certain candidates, can be used for click baiting purposes, and can be used to earn revenue by misleading the users. In this paper we will use natural language processing techniques like bag of words and TF-IDF and machine learning concepts of classification algorithms like SVM and passive aggressive classifier to train our machine to differentiate false news from real news and we will compare the accuracy of methods used to find accurate model.

Keywords: False news, Real news, classification, feature generation, bag of words, TF-ID.

1. Introduction

The social media it is easy to follow the news and also people can easily share, discuss it with friends but it is not possible in traditional news sources. So, we can say that social media outperforms traditional news sources. Despite the benefits of social media news, the standards of the news through publicbroadcasting is quite low than oldbroadcast sources. This is due to fast and easy to supply news online there is a large volume of false news. False news means news articles which spread intentionally wrong news. This false information has the potential to harm individuals, societies, and countries. This is because it can lessen the authenticity of news. The false news spreads easily and faster like wildfire through social media than the speed at which authenticate news spreads through traditional news channels. The false news intentionally persuades people to accept false beliefs. It causes confusion on what is true and what is false. This causes distrust on news sources. False news is mainly spread for the political or financial gain. So it is important to build methods to automatically detect false news.
This gives rise to mass media where anyone can pursue events which fascinate them. This mass media has huge impact on society and there are people who take advantage of this fact. They use this to manipulate the knowledge, beliefs of a person. The spread of false news has now become a global issue. So recognition of false news is important. Many scientists use machine learning and artificial intelligence to detect false news. In this paper we are going to see false news sorting using classifiers, Logistic Regression.

2. Literature Review

A simple false news recognition using naive bayes classifier is shown in the paper by Mykhailo Graniket. al. [1]. The dataset used in this approach is Facebook news posts. They gathered large data of political news from mainstream news pages like CCN, ABC News and also from three large facebook pages. The classification achieved through this method is 74%. This accuracy is not totally best. This is because only small amount false news are present in the dataset. This is around 4.9%.

Himank Gupta et. al. [2] used a different approach in their paper. It is based on machine learning which deals with accuracy shortage, time lag and high processing time that is it handles thousands of tweets in a second. From HSpam14 dataset, 400,000 tweets were collected in which 150,00 are spam tweets nad 250,000 are not spam. The accuracy achieved in this model is 91.65%.

Macro L. Della Vedova et. al. [3] used a method in which they discovered that combining news content, social features gives better results and increases accuracy noticeably. They implemented it in Facebook Messenger chatbot. To detect false news, they used dataset for testing the model. Then after testing they used content based approach that is to combine social based approach. The dataset consists of 15,500 posts which were collected from 32 pages with 230,300 or more likes. The dataset consists of 8,923 false news and 6,577 real news.

Cody Buntain et. al. [4] detects false news on twitter to predict accuracy depending on credibility. Authors discussed the various authentication schemes for accessing the information and providing the security in cloud, internet of things, wireless sensor networks, ransomware[5-18], learning through gaming [19], comparative study was analyzed [20] and snow prediction model was developed [21-23].

3. Methodology

The static model works using machine learning classifier techniques. The model is trained on four different classifiers to determine the best classification technique for false news recognition. Python has large number of libraries which has these inbuilt classification techniques.

![Figure 1. System Architecture](image)

For static false news recognition, first we need to consider a dataset on which we can train the model. Then divide the dataset into two that are training dataset and testing dataset. After dividing
the dataset apply preprocessing techniques on the training dataset. After the preprocessing we will get clean data which is important for our model. Then generate feature vector from the preprocessed data using vectorization techniques. The generation of feature vector is converting the dataset into machine understandable vector, so the machine can perform operations. After getting the feature vector we train our model on this feature vector using classification techniques. In this report we are going to use naïve Bayes classifier, support vector classifier, logistic regression and passive aggressive classifier. After training we get four different classification models for four different classification techniques. Now, training of model is done.

After training the model we use test dataset to find out the accuracy with which the model predicts the outcome. We give the testing dataset after application of preprocessing and feature classification techniques to our classification model. The model gives the outcome as true or false for each news in our dataset. Then we will find out the accuracy with which the model gives the correct outcome and after considering accuracies for four models we will predict the best classification technique for false news recognition.

3.1 Preprocessing Of Data
The data can be structured data and unstructured data. The structured data is the data which uses correct grammar rules but the unstructured data is the data that does not follow all the grammar rules and may contain typos, slangs. Neither structured nor unstructured data gives best results. The semi-structure data is best to use. The semi-structured data is the data which is not fully structured and not totally without structure, it comes between the both.

The cleaning of data has four main steps they are:

3.1.1 Eliminate punctuation symbols
Ex: What is your name? => What is your name

3.1.2 Tokenization
Tokenization is the process of separating text into sentences and the sentences into divided into words.
Ex: I am the author => ‘I’, ‘am’, ‘the’, ’author’

3.1.3 Eliminating break words
They do not tell much about the data. So, they have little to no importance. So, we remove these words.
Ex: good or bad is ok => ‘good’, ‘bad’, ‘ok’

3.1.4 Stemming
Stemming reduces the word into its stem.
In feature generation, the data is converted into machine understandable vectors and the process is called vectorization of the data. In Vectorization, the text data is encoded into numerical vector. In this report we are going to use two methods for feature generation.

3.2 Algorithms for Classification
For classification of the dataset we used four different algorithms and calculated accuracy of each classification and then we use the best classification technique to develop a website for false news recognition.

3.2.1 Naïve Bayes Classifier:
A probabilistic based classifier is the Nave Bayes Classifier. The Bayes theorem is used. The Bayes theorem posits that the presence of one feature in a class is unrelated to the presence of any other feature in the class. The Nave Bayes Classifier’s fundamental premise is to categorize all of the independent features. Bayes theorem is a mathematical theorem which is used to determine the likelihood of an outcome based on previous outcome. This is also known as conditional probability. It depends on previous probability distribution to get posterior probability. The formula based on Bayes theorem is:

3.2.2 Support Vector Classifier
Support vector classifier (SVC) returns the best fit hyper plane which categorizes the data and fits the data. Its main purpose is to find the hyper plane that classifies all the data points. While finding the hyper plane, we can find many numbers of planes that classify the data. The objective of Support Vector Classifier is to find the hyper plane which has maximum distance between two types of data. It can be said that the objective is to find the hyper plane with maximum margin.

4. Implementation
In static search we use above discussed four classifiers to find accuracy of each classifier. So, first we preprocess the data and then from preprocessed data we extract the feature vector using TF-IDF vectorization. Then we build the machine learning models using the discussed classifiers. Then we give the extracted features vectors as input to the machine learning models. Then fit the data in the models of each classifier and compare the f1 score. The classifier which gives the best f1 score is used to classify the false news in the false news recognition website.

The False Negative (FN) means that the actual false news pieces are predicted as true news. The False Positive (FP) means that the actual true news pieces are predicted as false news. From confusion matrix we can determine the precision, recall, f1 score and accuracy and they are used to evaluate the performance of classification model from different perspectives.

For each classification method determines the confusion matrix. It basically gives the summary of the classification model. It consists of four types of data that are True Positive, True Negative, False Positive, and False Negative. It gives the information about the errors made and types of errors made by the classification models.

| Total              | Class 1 (Predicted) | Class 2 (Predicted) |
|--------------------|----------------------|----------------------|
| Class 1 (Actual)   | TP                   | FN                   |
| Class 2 (Actual)   | FP                   | TN                   |

**Figure 3.** Confusion matrix

The True Positive (TP) means that the actual false news pieces are predicted as false news. The True Negative (TN) means that the actual true news pieces are predicted as true news.

After finding all f1 metrics we select the best classification model and use that model to
design the website. Here we get Passive Aggressive classifier as the best classification model so we use this Passive Aggressive classification model to design the website using flask framework.

5. Experimental Results
In our paper, we build machine learning algorithms using four classification techniques and find the best classification technique for false news recognition and use it to build a website.

The classification techniques used are:
- Naïve Bayes algorithm
- Support vector classification
- Logistic regression
- Passive Aggressive classifier

Here detailed output of the algorithm is described. The dataset contain real news and false news.

| Algorithm          | Accuracy | Precision | Recall | F-measure |
|--------------------|----------|-----------|--------|-----------|
| Naïve Bayes        | 93.64%   | 0.92      | 0.936  | 0.934     |
| SVM                | 99.48%   | 0.99      | 0.995  | 0.995     |
| Logistic regression| 98.39%   | 0.98      | 0.984  | 0.983     |
| Passive Aggressive | 99.56%   | 1.00      | 0.996  | 0.995     |

Table 1. Results

**Figure 4.** False news recognition – website

So, from this table we can say that Passive Aggressive classifier is the best model for false news recognition. So, we build a website using passive aggressive classifier and the website takes input from the user and predicts if news is false or not.

6. Conclusion
In this paper the existing algorithms were analyzed based on accuracy, f-score, precision and recall. Based on these the best algorithm is selected and using this algorithm the website for false news recognition is built. Now most of the tasks are done online. But the problem is that the false news makes the problem more complicated, it hampers and deceives the opinion and attitude of a person. Here we use Passive Aggressive Classifier as it has highest accuracy i.e. 99.5% to detect falsenews.
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