

Fake News Classification: A Machine Learning Approach

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Abstract

The smooth access and the increasing spread of the knowledge available online on various platforms has made it complex to differentiate between faux and original facts. The uncomplicated circulation of facts has contributed to the augmented rise of its fabrication. The acceptability of the online platforms is also upright, where the distribution of fake facts is frequent. Hence, it becomes significant to validate the facts from the original source. Detecting faux news on online platforms is a task because of challenges faced, which in turn proves the usage of approaches from conventional media ineffective. Hence to find the solution, Machine Learning approaches are used. False information is written on purpose to delude or deceive the people, which makes it irrelevant to uncover primarily based on the information known. Hence, one requires to encompass the fact which is supplementary such as involvement made by the users to assist make a decision. Therefore, utilizing these additional facts is difficult because users' interaction with online platforms makes the facts indeterminate, rumpus, and massive. A vital purpose in refining the accuracy of records on online platforms is to recognize the hoaxes effectively and promptly. This paper aims at looking into the techniques, procedures, a breakthrough for discerning the faux news artifact, authors, topics from various online platforms and assessing the related articles. For user's feasibility we have created an online portal for them to check the articles and also additionally added the latest news information feature so that the user gets updated about the news.

1. INTRODUCTION

The obstacles between information manufacturing and information introduction is progressively obscuring inside the recent social media and news surrounding. Transient information becomes part of the fixed findable records domain. Major people benefit access to information through conventional seek engines, virtual forms of important information platforms. Fake news and hoaxes can be misleading, particularly once disconnected from the original sources. False news is described here as the probability of the precise article (report), etc being misleading or faux news. Textual content analytics can increase human competencies to know lies and creates awareness among the users to check the facts.[9]

As in recent times, the major time of our lives is dedicated to spending and interacting online through various platforms like Facebook, Twitter, various news applications like Inshorts, etc, more human beings tend to rely on that information. This thus becomes an alternative to the original news sources like newspapers, magazines, etc. The motives for this variation in a persons' functioning or attitude towards these online media are: Firstly, These platforms do not cost price which means they are not expensive to

gather information as compared to original news media and secondly, it provides so much feasibility for the users to share this information received with more people. The widespread of the faux news coming from various sources which are online based sources, they can surely have a poor influence on individuals. Firstly, faux news can ruin the legitimacy of the news cycle. Secondly, hoaxes deliberately lead users to believe in false news. Fake news is usually maneuvered by promoters to pass on political news. Thirdly, false news has altered the way people take in the information and answer to the original news. This thus created mayhem between the people regarding the actual news also neglecting the actual news. [4]

Even though the hassle of faux news isn't always a recently developed problem, detecting faux information is a difficult task since people have a tendency to believe in the wrong information, which is misleading and less power to dismiss faux news. The United States election, which was held in 2016, has led to more increase and attention on the unverified or false news. Hence, having immense and deep knowledge on that particular domain can help a little but this means the detection is totally manual, which can take a lot of time and effort and hence cannot be a solution. Even

with deep knowledge, it is really difficult to detect the news.

2. LITERATURE SURVEY

Aman Gautam, Sachin Yadav, Rishi Kataria, Mrunali Desai [1] aims to provide perception into the classification of the facts. Latent semantic analysis, which is a text-based approach, is used to identify false news. Further, percentage accuracy is implemented in the form of the result. Prabhjot Kaur, Rajdavinder Singh Boparai, and Dilbag Singh [2] use a hybrid text classification method that uses random forest and KNN to classify false news. Three phases, which are pre-processing, feature extraction and characterization, and evaluation is achieved using precision and recall. The paper by Syed Ishfaq Manzoor, Dr Jimmy Singla, Nikita [3] gives a systematic review on machine learning approaches for faux news detection. It not only reviews but also informs about the limitations of various approaches. Also deep learning is used and reviewed in this paper. Lot of research on algorithms like natural language processing, computer vision, information retrieval, etc is shown.

Kai Shu, Amy Sliva, Suhang Wang, Jiliang Tang, and Huan Liu [4] have shown a data mining perspective on fake news detection on social media platforms. The news was first characterized into psychological and social chambers and then detected into knowledge, style, stance and propagation-based. Further evaluation metrics were also used to calculate accuracy. There exists a massive frame of studies on this topic of detecting fake news, the maximum of which has been centered on detecting or classifying articles that are published online. Considering the United States election in 2016, detecting fake news has been considered as a situation of unique interest inside the literature. [5]. Hadeer Ahmed, Issa Traore, and Sherif Saad [6] detected fake news using N-gram and machine learning algorithms. Using various algorithms like TF-IDF, LSTM, an accuracy of 92% was achieved. Likewise, six different algorithms were used and compared. The most used dataset in faux news detection was The LIAR dataset, which was used in this paper.

Hadeer Ahmed, Issa Traore1, Sherif Saad [7] uses text classification methods to detect spam news. Content based detection model and reviewer based detection model is used in this paper and then eventually fake news is detected. After classification fake content and truthful content was classified. Mykhailo Granik, Volodymyr Mesyura [8] uses Naive Bayes classifiers for their fake news detection. This paper indicates an easy strategy for false information detection the use of Naive Bayes classifiers. Their method received an approximate 74% of accuracy. Using artificial intelligence helped them to detect the fake news problem. The commonality between fake news and spam messages helped them to detect the problem easily. Victoria L. Rubin,

Yimin Chen, and Niall J. Conroy [9] have characterized three types of fake articles for effective hoax detection. It checks previous defective news and gives the output. It discusses three types of fake news, each in contrast to each other with their advantages and disadvantages.

Jiawei Zhang, Bowen Dong, Philip S. Yu [10] uses a deep diffusive network to detect false news. This paper informs about the methods, algorithms used for evaluating false news from various social media platforms. It also discusses the challenges and difficulties faced while detecting the same. It also makes an inference model named a fake detector. Based on the textual analysis of the given article, a fake detector builds a network which is deeply diffused. To know the accuracy of the fake detector model experiments on real-world datasets have been conducted. Niall J. Conroy, Victoria L. Rubin, and Yimin Chen [11] provide a various typology of forms of false assessment methods emerging from two foremost categories, which are linguistic approaches and network evaluation approaches. Operational guidelines are proposed for feasible false information detection systems.

3. PROCESS FLOW OF THE SYSTEM

Figure 1 depicts the block diagram of the proposed system. The process flow of the system is divided into various components and their stages and explained in detail below.

3.1. Dataset Details

In this project, the dataset used is the LIAR dataset, which is collected from the website called PolitiFact through its API. It contains a huge amount of data, which consists of 12,836

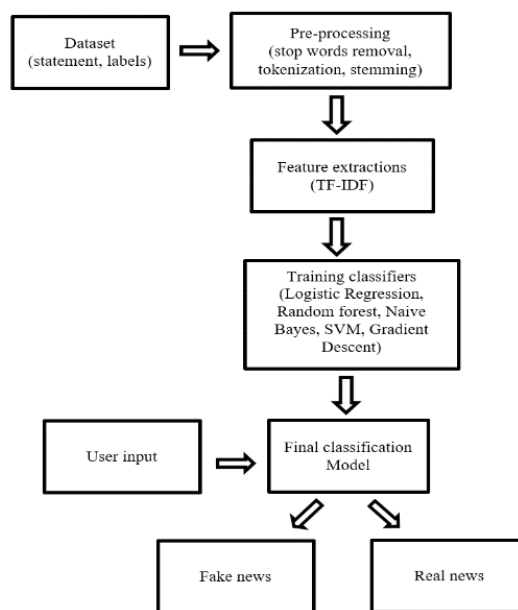


Figure 1: Block diagram

human-labeled short statements sampled from a number of sources like news releases, TV or radio interviews etc. The outcomes for the truthfulness are given classes, which are: pants-fire, false, barely-true, half-true, mostly true, and true. This dataset contains a total of 13 columns for training, testing, and validation sets. Some of the columns were: the ID of the statement, label, statement, subject, speaker, speaker's job title etc. However, in our project, to make the computation less complex, we have chosen only 2 variables from this original dataset for this classification. The other variables can be added later to add some more complexity and enhance the features. The classes get reduced to only two which are True and False. Further the process of data pre-processing takes place.

3.2. Data pre-processing

The method of translating data to something that a machine might comprehend is called pre-processing. Some of the main ways of pre-processing is filtering out unnecessary information. Data pre-processing is an important part of any project as we would not want unnecessary information and other unimportant features occupying space and affecting the performance of the Machine learning models. The data is supposed to go through various modifications like the elimination of the stop words, tokenization, discarding of punctuations, and sentence segmentation beforehand. Then it can be represented using the n-gram model. A function was defined to remove the punctuations as well as lowercasing the letters in the document, after which a word-based n-gram tokenizer was developed to slice the document depending upon the size that n contains. Stop words are those terms which assist in forming the structure of a statement or connect multiple sentences. These terms will create problems when the features are utilized in text classification. Some of the common examples of these terms can be a, for, from, the, how, etc. Also, if the user types "Can singing be difficult", the stop words removal technique will discard the terms 'can' and 'be' and the output will be 'singing' and 'difficult'. The next step is Stemming, which is used to reduce the words into its original form. For example, the words 'singing', 'sung', 'singer' when converted to its original form. We have used Porter Stemmer, which is a commonly used algorithm due its effectiveness for doing the required task. Some exploratory data analysis is also performed like response variable distribution and data quality checking, which includes checking of null and missing values in the data.

3.3. Feature Extraction

For feature extraction, the first part consists of using Bag of words, which is a technique that creates a set of vectors that consists of the frequencies of the word appearances in

the document. Further, for the process of feature selection, techniques like TF-IDF weighting and n-grams are utilized. TF-IDF is a technique which is used to identify the importance of a particular term to a document in the dataset. The importance of a term increases in direct proportion to the number of times it has its presence in the document but it is counteracted by the count of that word in the corpus. TF-IDF vectorizer is used to make a note of the top or the best fifty features and to know the frequent words used. It contains information about the words which are less important as well and performs supremely well in Machine learning models.

3.4. Algorithm used

The taken out characteristics are given to different classifiers. We have trained our model using various classifying algorithms. Naïve Bayes presumes that the existence of a specific characteristic in classification is independent of the existence of other classification. This model is uncomplicated to make and is functional for huge data too. One of the other algorithms used is Logistic Regression, which is a pertinent analysis to direct when the contingency of the variable is diploid. It is an auguring analysis. We have also implemented a Linear Support Vector Machine approach, which is one of the rapid approaches in mining the data, used for humongous datasets, resolving various different class characteristic issues. It finds the most favorable borderline in between practicable or feasible solution. SGD is a looping approach for efficiently retrieving various characteristics. Usage of the decision trees is bagged by the random forest approach. It makes single trees and randomly selects attributes to eventually make an unrelated group of trees. All of these approaches were compared and evaluated by measuring the F1 score and designing the confusion matrix. After retrieving the evaluation of all approaches, two of the best approaches amongst all was selected for detection of the false news. While, when the data gets increased, hence to evaluate it efficiently precision, recall is being used. After evaluating all the characterizing approaches, logistic regression was found to be the most accurate and feasible model to calculate the originality of the article. Any fact or a piece of news from any online platform is taken as an input and at the backend logistic model runs which in turn at the frontend made using flask, eventually gives a solution or an output to the user or the people coming to check any piece of article or news the probability of its originality by showing whether the fact is true or false.

3.5. Web scraping

Web scraping is an automated process by which vast quantities of data are collected from websites. The data

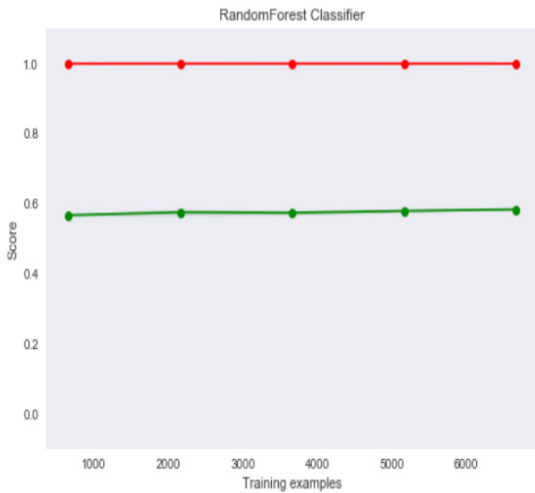


Figure 2: Learning curve for Random Forest classifier

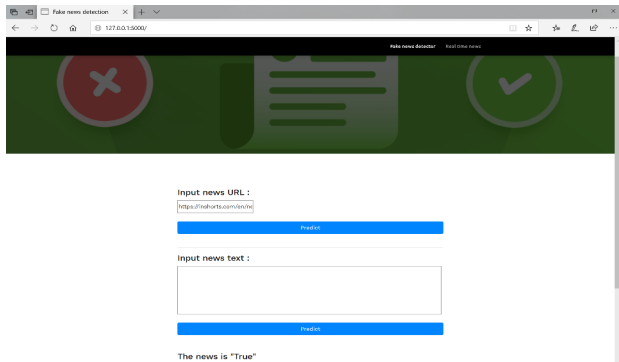


Figure 4: Fake news detection webpage

on the websites are unstructured. Web scraping assists in collecting these unstructured data and by storing it in a form that is structured and interpretable. In web scraping technique, when the python script is executed, a request is sent to the URL that the user has provided as an input. The server sends the data as a response to the request and allows access to the contents of the HTML or XML page. The code then, parses the HTML or XML page, finds the data and extracts it. In our project, we have used Python to scrape real-time headlines from popular news website called Inshorts. BeautifulSoup4, A Python library, has been utilized for extracting news headlines category-wise from the website. The output is displayed on the website deployed using Flask.

4. RESULTS

The above figures, Figure 2 and Figure 3 show the learning curve for the Logistic Regression classifier and Random Forest Classifier. Both our models have shown the f1 scores which are ranging till 70. This is due to less number of data used for the training purpose in order to increase the

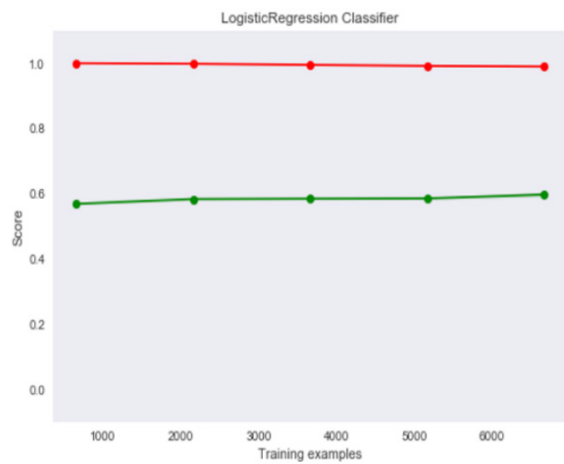


Figure 3: Learning curve for Logistic Regression classifier

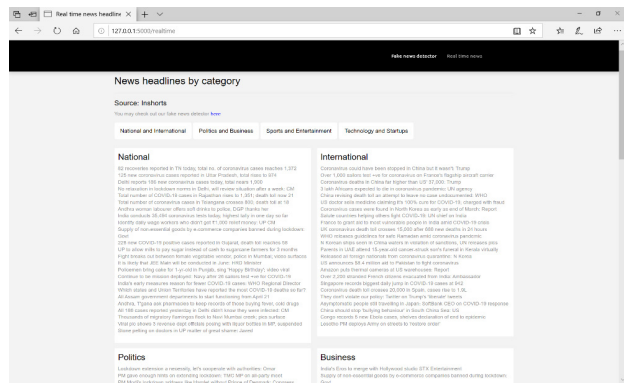


Figure 5: Real time news webpage

simplicity of the project. However, a number of additional steps can be taken to further improve this score.

The above figure, Figure 4 shows the output for the Fake news detection. The input can be obtained from the user in the form of URL as well as in the form of text. In case the user provides URL as an input, the newspaper library in python is used in order to extract the text from the provided URL. The text is then fed into the Machine learning model for classification, and the output is given as Fake or Real on the webpage.

The above figure, Figure 5 shows the output for real-time news scraping. The news headlines are scraped from news websites ‘Inshorts,’ and they are displayed category-wise on the webpage. Additionally, the narration functionality is provided for a better user experience.

5. CONCLUSION

In this paper, various approaches are applied to find out which classification approach in Machine learning works effectively to build a model for detecting faux news or hoaxes using the evaluation criterion and deployed the website using the Flask framework for Python. Techniques like Machine

learning and Natural Language processing were implemented using various libraries in Python. A model was created by comparing various classifiers, and a final model was selected based on the performance. User input can be provided to this model and the predictions can be made whether the news provided is true or false on the webpage. A webpage for scraping real-time news headlines was also created and deployed on Flask. For further enhancement of the project, more attribute selections approaches can be used like a word to vector, modeling of a topic, etc. The training data which was used in this project can be increased for further extension of this project to enhance the performance and for greater accuracy. Fake news classification is important to be implemented to stop the flow of misinformation, and therefore, machine learning approaches play a pertinent role in handling this kind of issues.

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