Fake News Detection Using Machine Learning

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Abstract **- The automation of fake news detection is the focus of a great deal of scientific research. With the rise of social media over the years, there has been a strong preference for users to be informed using their social media account, leading to a proliferation of fake news through them. Nowadays fake news spread very fast. The credibility of social media networks is also at stake where the spreading of fake information is prevalent. Thus, fake news detection has become a challenging topic nowadays. In this work we use the dataset which is collected from the kaggle.com for fake news detection and it is publicly available for use, which provides links to source documents for each case. As such, the goal of this project was to create a tool for detecting the language pattern that characterize fake and real news through the use of Machine Learning techniques. The result of this project demonstrates the ability for machine learning to be useful in this task. We have built built a model that catches many intuitive indications of real and fake news.**

Index Terms **- Deep learning (DL), Machine Learning (ML), Naive Bayes Models, Classification.**

I.INTRODUCTION

The internet is become the essential part of our day-to-day life. There is no doubt that many of us prefer the internet to get their news rather than the newspaper, radio, etc. [1]. As nowadays we all are become habitual to use internet to clear our doubts and for many more purpose also. Simply saying, we can't imagine our life without internet. As many of us get most of their information content through it. As because the news circulates through internet very rapidly. As it is seen the rise of fake news during the election period. It is necessary to classify any of news item into real or fake because the fake news is spreading by a group of people (individual) intentionally so that reader start believing in something that doesn't have any connections from reality. Fake news has been caused many incidences where riot or many innocent people get hurt [2] or getting killed. A research [3] by the BBC resulted that more than 70% of Indian citizens are able to differentiate the real facts from man made-up ones.

The current project involves utilizing machine learning and some other techniques to create a model that can expose documents that are high probability, fake news articles. But how this model classify? In these cases it is necessary to rely simply on the content of the news article. By training this model by a mixture of news (real and fake news) it should be able to classify news articles.

Classification of any news item /post / blog into fake or real one has generated great interest from researchers around the globe. Several research studies have been carried out to find effect of falsified and fabricated news on masses and reactions of people upon coming through such news items. Falsified news or fabricated post, news is any textual or non-textual content that is fake and is generated so the readers will start believing in something which is not true.

There are some cases where this model fails or succeed for some cases. Instead of being a perfect solution,this project is intended to be helpful for those who try to classify fake news.

II. LITERATURE REVIEW

In this paper by Macro L. Delia Vedov et al[4]. They say that "we propose a novel ML fake news detection method which, by combining news content and social context features, outperforms existing methods in the literature, increasing their already high accuracy by upto 4.8%. the proposed model achieved the accuracy of more than 80%.

In [5] paper, it incorporates a discussion on how the writing style of a paper can also impact on its classification. They had looked into the semantic analysis of the text for classification by using naïve Bayes classifier and support vector machines methods.

In this paper [6], they have explored simple approach to detect fake news using Naïve Bayes classifier. They achieve accuracy of about 75% in classification of

Facebook news post. It also went on to state that Naïve Bayes models can achieve a moderate accuracy and in future, more artificial intelligence techniques can be used to classify Fake news.

III. METHODOLOGY

In this project, we are using Naïve Bayes Classifier to classify the Real-facts and Fake-news using kaggle fake news dataset[7]. Naïve Bayes algorithm is a supervised learning algorithm, which is based on Bayes theorem and used for solving classification problems. It is mainly used in text classification that includes a high dimensional training dataset.

Naïve Bayes Classifier is one of the simple and most effective classification algorithms which helps in building the fast machine learning models that can make quick prediction. It'sused to training the machine learning models by using dataset to make them able to predict the outcome of other data.

A. Dataset Description

The corpus of data implemented in this project had around 33000 articles of data. These articles mainly constituted news about US politics. The dataset obtained on Kaggle was noisy and required cleaning. The main features included in each row of the data were id, heading, author, content, classification of being fake or true. The dataset has the following features:

Table 1: Dataset Description

ID
HEADING
AUTHOR
CONTENT/TEXT
FAKE OR REAL CLASSIFIFCATION

B. Feature Extraction and Pre-Processing

To start off with the implementation, the data is obtained in raw format which is part of the dataset. This data needs to be pre-processed before we can implement it in the project. The process includes stop-word removal followed by making the entire document in lower case for uniformity. Also, any of the special characters that can cause an anomaly in the document are removed in this process. Stop words are words that are not relevant and have little meaning lexically. These words are most often ignored to not cause any discrepancies to the process of classification. In a sentence like "There is a Bengal tiger.", the first three words „there", „is" and „an" are stop words and have no significant meaning. These are the words that are usually excluded and some of the examples are: who, of, a, what, etc. Doc2Vec model was introduced in the year 2014 and adds upon the previous Word2VecModel. In Doc2Vec, a feature vector is used to represent a single "document". Whereas, in the Word2Vec model, a feature vector is used to represent a single "word". Doc2vec is superior and works better when we have a corpus of documents, this justifies the choice of this particular feature extraction model.

C. Models

1) Naïve Bayes

Naïve Bayes is a conditional probability model which can be used for labeling. The goal is to find a way to predict the class variable (B) using a vector of independent variables (A), i.e., finding the function f: A-->B. In probability terms, the goal is to find P(B|A), i.e., the probability of B belonging to a certain class A. B is generally assumed to be a categorical variable with two or more discrete values. It is a mathematically simple way to include contributions of many factors in predicting the class of the next data instance in the testing set. The limitation of Naïve Bayes is that they assume that all features are not dependent on each other. The Naïve Bayes rule is based on the theorem formulated by Bayes.

2) Support Vector Machine

A support vector machine (SVM), which can be used interchangeably with a support vector network (SVN), is also considered to be a supervised learning algorithm. SVMs work by being trained with specific data already organized into two different categories. Hence, the model is constructed after it has already been trained.

Furthermore, the goal of the SVM method is to distinguish which category any new data falls under, in addition, it must also maximize the margin between the two classes. The optimal goal is that the SVM will find a hyperplane that divides the dataset into two groups. The kernel used in this application is RBF as it is best suited for large applications like a corpus of news articles.

3) Long Short-Term Memory

LSTM, which stands for Long short term memory is an extension of the previously famous RNN (Recurrent Neural Network). In addition to RNN, LSTM‟s also have memory over the long run. It comprises of three gates namely input, gate, output gate and forget gate. The forget gate is used to forget features that have little value or weight. As the algorithm keeps running, it learns what is important and what is not by assigning weights accordingly. This characteristic made it the best fit for this paper and will help in making relationships on the large corpus of data as the news dataset keep increasing in real-world scenarios. The LSTM is inherently nothing but a neural network.

4) Neural Network

Artificial Neural Networks in which the association between the units do not form a cycle are called Feed forward neural networks. Feed forward neural networks were the first type of artificial neural network invented and are simpler than recurrent neural networks. These networks are named so because the information moves linearly in the network through the input layer, then the hidden layer and ultimately through the output layer. The paper
implements one feed-forward neural network models using Keras. The papers neural network implementation uses three hidden layers. In the Keras implementation layers of size 256, 256, and 90 are selected along with dropout layers. The ReLU, which is also known as Rectified Linear Unit is used or the “activation function” as it is the most suited for challenges that this paper tries to solve.

D. Classification Process

Fig 1 is a schematic representation of the classification process. The first step of the process is to pre-process the data which include stop word removal and lower casing of the entire characters. Also, special characters are removed from the corpus. The Doc2Vec process is used, and a vector is formed representing the documents involved. The ultimate step of the classifier is to predict the class of the given news article into real or fake. There is a total of 4 machine learning models being tested here to arrive at the best choice. The data is partitioned into train and test. The testing data has 26000 corpus of news articles and the training data has 7000 corpus of news articles.

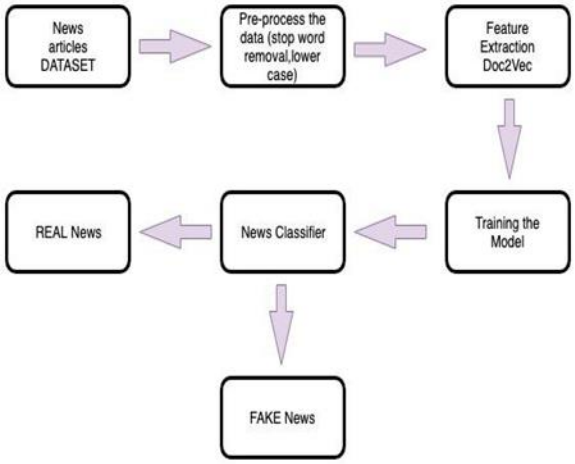

FIG. 1: Classification Process

IV. CONCLUSION

We represent the model which can able to classify automatically fake news. By using a dataset to train our model to be able to distinguish the fake news or the real facts with an accuracy upto human ability by using Naïve Bayes Classifier algorithm to training the dataset.

Fake news detection is an emerging research area which has a scarce number of datasets. There are no data on real-time news or regarding the current affairs. The current model is run against the existing dataset, showing that the model performs well against it.

In our future work, news article data can be considered related to recent incidents in the corpus of data. The next step then would be to train the model and analyze how the accuracies vary with the new data to further improve it.

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