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MODELING ONLINE SOCIAL NETWORKS FOR THE DEFENCE AGAINST FAKE NEWS

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Abstarct:The phenomenon of Fake news is experiencing a rapid and growing progress with the evolution of the means of communication and Social media. Fake news detection is an emerging research area which is gaining big interest. It faces however some challenges due to the limited resources such as datasets and processing and analyzing techniques. In this work, we propose a system for Fake news detection that uses machine learning techniques. We used term frequency inverse document frequency (TF-IDF) of bag of words and n-grams as feature extraction technique, and Support Vector Machine (SVM) as a classifier. We propose also a dataset of fake and true news to train the proposed system. Obtained results show the efficiency of the system. This work helps us to detect the accuracy of the fake news using different classification techniques. Fake news is significantly affecting our social life, in fact in every field mainly in politics, education. In this work, we have presented the solution for Fake news problem by implementing fake news detection model by using different classification techniques. Fake News Detection becomes complicated when it comes to resources. Resources like datasets are limited. In this model, we have used classification techniques like Support Vector Machine(SVM), Naïve Bayes, Passive Aggressive Classifier. Output of our model using feature extraction techniques as Term Frequency-Inverted Document Frequency (TF-IDF) and Support Vector Machine (SVM) as classifier, has accuracy of 95.05%.

Index Terms - (TF-IDF)-Term frequency inverse document FrequencySVM-Support Vector MechineNaïve Bayes.

I. INTRODUCTION

In the last decade, Fake News phenomenon has experienced a very significant spread, favored by social networks. This fake news can be broadcasted for different purposes. Some are made only to increase the number of clicks and visitors on a site. Others, to influence public opinion on political decisions or on financial markets. For example, by impacting the reputation of companies and institutions on the Web. Fake news concerning health on social media represents a risk to global health. The WHO warned in February 2020 that the COVID-19 outbreak had been accompanied by a massive 'infodemic', or an overabundance of information—some of which was accurate and some of which was not—which made it difficult for people to find reliable sources and trustworthy information when they

needed it. The consequences of disinformation overload are the spread of uncertainty, fear, anxiety and racism on a scale not seen in previous epidemics.

In the recent years, Social Media has been dominant in everyone's life. Fake news spreads mostly through social media. Fake news is threat to the politics, finance, education, democracy, business. Although fake news is not a new problem but today humans believe more in social media which leads to believe in fake news and then spread of the same fake news. It is becoming tough nowadays to distinguish between true and false news which creates problems, misunderstanding. It is difficult to manually identify fake news, its only possible when the person identifying the news has a vast knowledge on the topic of news.

2.LITERATURE SURVEY

Reference	Ground truth	Detection method	Accuracy
Adikari 2015	Known fake LinkedIn profiles, posted on special web sites	Number of languages spoken, education, skills, recommendations, interests, awards, etc. are used as features to train neural networks, SVMs, and principal component analysis.	84% TP, 2.44% FN
Chu et al. 2010	Manually labelled 3000x2 Twitter profiles as human, bots, or cyborgs.	1. Text classification via Bayesian classifier (Orthogonal Sparse Bigram); 2. Regularity of tweets; 3. Frequency and types of URLs; the use of APIs.	100%
Lee et al. 2010	Spam accounts registered by honeypots: 1500 in MySpace and 500 in Twitter	Over 60 classifiers available in Weka are tried. Features include: i) demographics, ii) content and iii) frequency of content generation, iv) number and type of connections. The Decorate meta-classifier provided the best results.	99,21% (MySpace), 88,98% (Twitter)
Stringhini et al. 2010	Spam accounts registered by honeypots: 173 spam accounts in Facebook and 361 in Twitter	Random forest was constructed based on the following features: ratio of accepted friend requests, URL ratio, message similarity, regularity in the choice of friends, messages sent, and number of friends.	2% FP, 1% FN (Facebook); 2.5% FP, 3.0% FN (Twitter)
Yang et al. 2011a	Spam Twitter accounts defined as the accounts containing malicious URLs: 2060 spam accounts	Graph based features (local clustering coefficient, betweenness centrality, and bi-directional links ratio), neighbor-based features (e.g., average neighbors' followers), automation-based features (API ratio, API URL ratio and API Tweet similarity), and timing-based features were used to construct different classifiers.	86% TP, 0,5% FP
Yang et al. 2011b	1000 legit and 1000 fake accounts provided by Renren	Invitation frequency, rate of accepted outgoing and incoming requests, and clustering coefficient were used as features for an SVM classifier.	99%

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3.MODULES

1. Gathering Data:

Data Gathering is the first step of the machine learning life cycle. The goal of this step is to identify and obtain all data-related problems.

In this step, we need to identify the different data sources, as data can be collected from various sources such as files, database, internet, or mobile devices. It is one of the most important steps of the life cycle. The quantity and quality of the collected data will determine the efficiency of the output. The more will be the data, the more accurate will be the prediction.

This step includes the below tasks:

- Identify various data sources
- Collect data
- Integrate the data obtained from different sources

By performing the above task, we get a coherent set of data, also called as a dataset. It will be used in further steps.

2. Data preparation

After collecting the data, we need to prepare it for further steps. Data preparation is a step where we put our data into a suitable place and prepare it to use in our machine learning training.

In this step, first, we put all data together, and then randomize the ordering of data.

This step can be further divided into two processes:

- Data exploration:

It is used to understand the nature of data that we have to work with. We need to understand the characteristics, format, and quality of data.

A better understanding of data leads to an effective outcome. In this, we find Correlations, general trends, and outliers.

- Data pre-processing:

Now the next step is preprocessing of data for its analysis.

3. Data Wrangling

Data wrangling is the process of cleaning and converting raw data into a useable format. It is the process of cleaning the data, selecting the variable to use, and transforming the data in a proper format to make it more suitable for analysis in the next step. It is one of the most important steps of the complete process. Cleaning of data is required to address the quality issues.

It is not necessary that data we have collected is always of our use as some of the data may not be useful. In real-world applications, collected data may have various issues, including:

- Missing Values
- Duplicate data
- Invalid data
- Noise

So, we use various filtering techniques to clean the data.

It is mandatory to detect and remove the above issues because it can negatively affect the quality of the outcome.

4. Data Analysis

Now the cleaned and prepared data is passed on to the analysis step. This step involves:

- Selection of analytical techniques
- Building models
- Review the result

The aim of this step is to build a machine learning model to analyze the data using various analytical techniques and review the outcome. It starts with the determination of the type of the problems, where we select the machine learning techniques such as Classification, Regression, Cluster analysis, Association, etc. then build the model using prepared data, and evaluate the model.

Hence, in this step, we take the data and use machine learning algorithms to build the model.

5. Train Model

Now the next step is to train the model, in this step we train our model to improve its performance for better outcome of the problem.

We use datasets to train the model using various machine learning algorithms. Training a model is required so that it can understand the various patterns, rules, and, features

6. Test Model

Once our machine learning model has been trained on a given dataset, then we test the model. In this step, we check for the accuracy of our model by providing a test dataset to it.

Testing the model determines the percentage accuracy of the model as per the requirement of project or problem.

7. Deployment

The last step of machine learning life cycle is deployment, where we deploy the model in the real-world system.

If the above-prepared model is producing an accurate result as per our requirement with acceptable speed, then we deploy the model in the real system. But before deploying the project, we will check whether it is improving its performance using available data or not. The deployment phase is similar to making the final report for a project.

4. LIBRARIES

Numpy:

NumPy is a Python package which stands for 'Numerical Python'. It is the core library for scientific computing, which contains a powerful n-dimensional array object, provide tools for integrating C, C++ etc. It is also useful in linear algebra, random number capability etc. NumPy array can also be used as an efficient multi-dimensional container for generic data. Now, let me tell you what exactly is a python numpy array.

To install Python NumPy, go to your command prompt and type "pip install numpy". Once the installation is completed, go to your IDE (For example: PyCharm) and simply import it by typing: "import numpy as np".

Pandas:

Pandas are an open-source Python Library providing high-performance data manipulation and analysis tool using its powerful data structures. The name Pandas is derived from the word Panel Data – an Econometrics from Multidimensional data.

In 2008, developer Wes McKinney started developing pandas when in need of high performance, flexible tool for analysis of data.

Prior to Pandas, Python was majorly used for data munging and preparation. It had very little contribution towards data analysis. Pandas solved this problem. Using Pandas, we can accomplish five typical steps in the processing and analysis of data, regardless of the origin of data — load, prepare, manipulate, model, and analyze.

Python with Pandas is used in a wide range of fields including academic and commercial domains including finance, economics, Statistics, analytics, etc.

Standard Python distribution doesn't come bundled with Pandas module. A lightweight alternative is to install NumPy using popular Python package installer.

5. IMPLEMENTATION

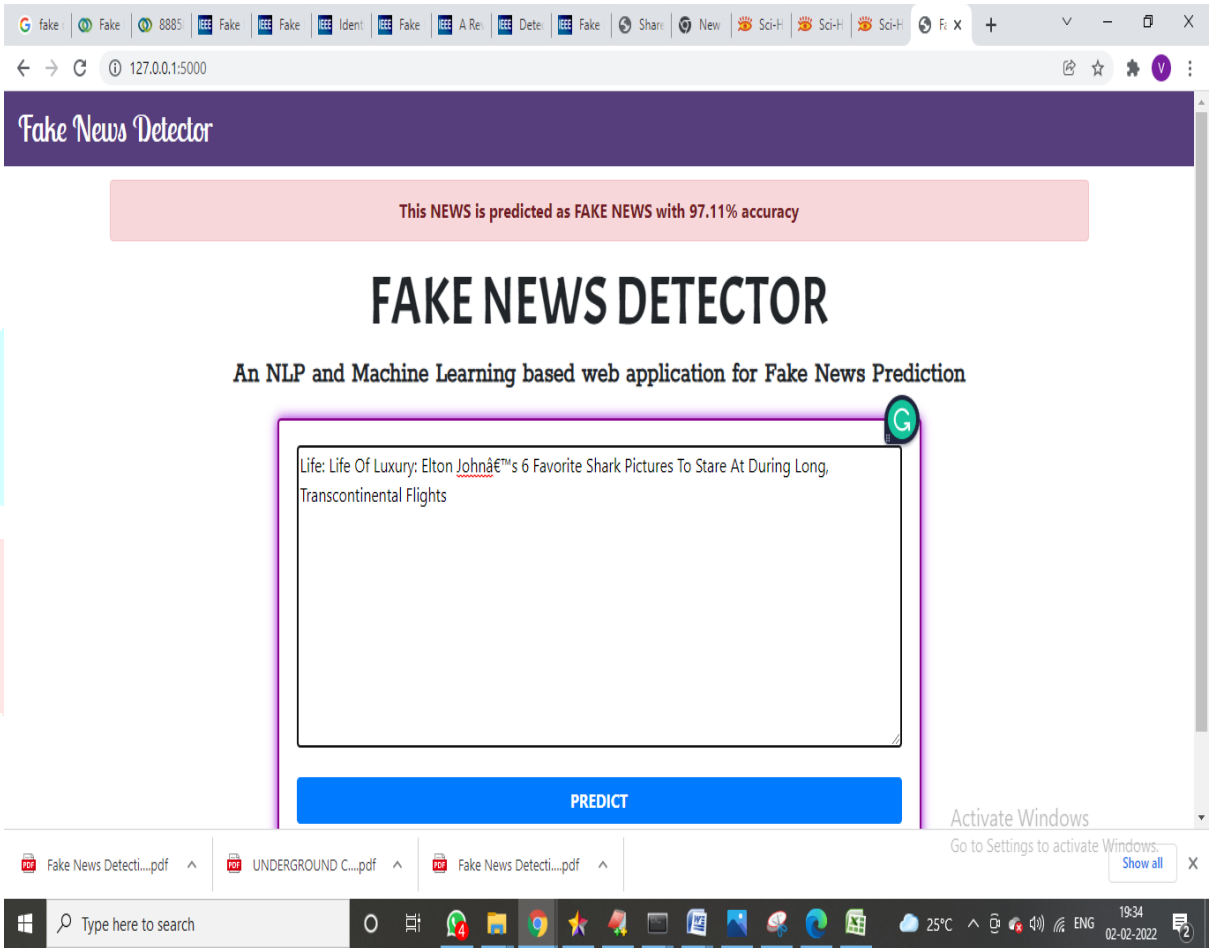
We studied two different features selection methods of NLP Term Frequency (TF) and Term Frequency-Inverted Document Frequency (TF-IDF).

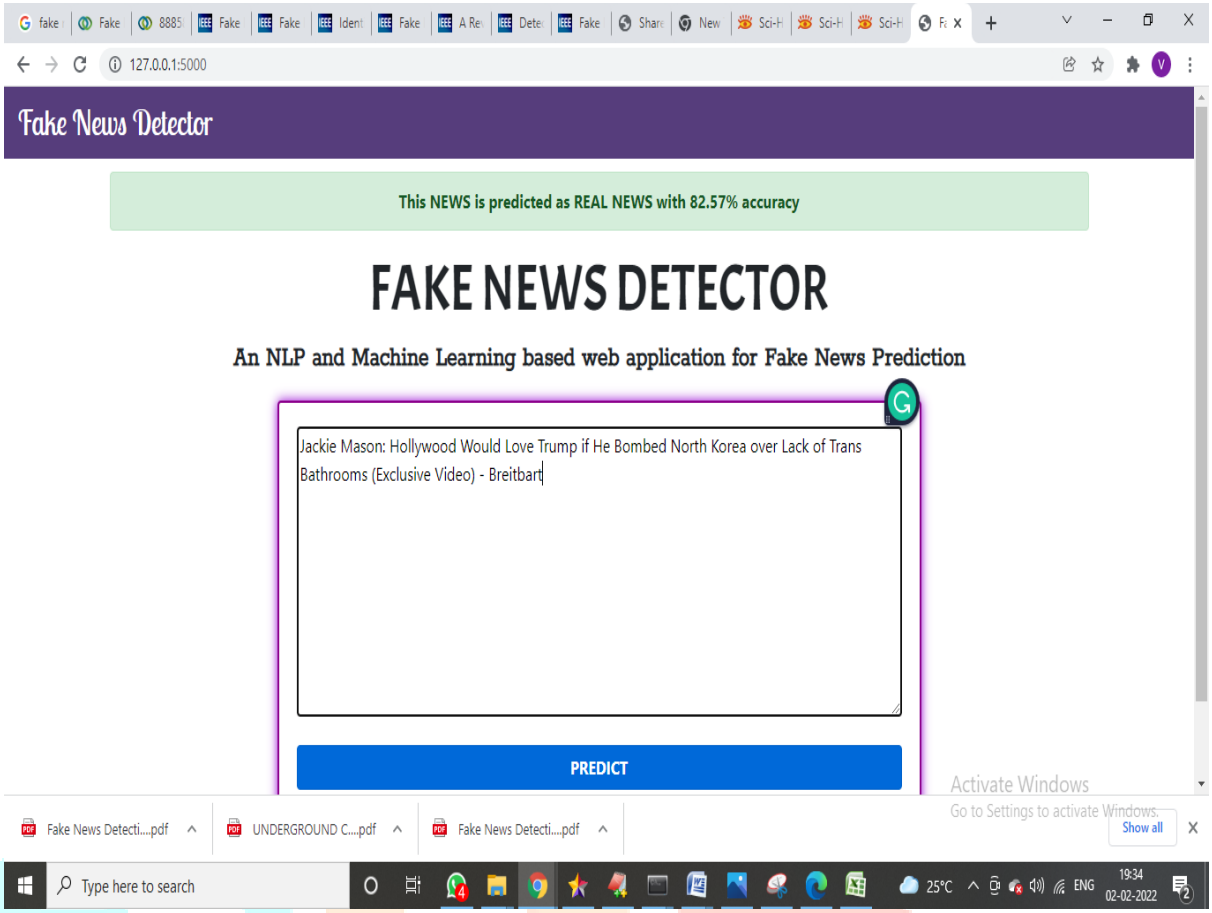
The Term Frequency-Inverted Document Frequency (TF-IDF) is a method that finds the importance of word in a document. A word importance increases with its frequency of appearance in the document, however, this is counteracted by the frequency of the word in the corpus. Word with a high TF-IDF score is important for the document.

Firstly, we started preprocessing of the data set, by removing unnecessary and insignificant words and characters from the data. The next step is feature Extraction using Term Frequency-Inverse Document Frequency.

We investigated three different algorithms, namely, Support Vector Machines (SVM), Naïve Bayes, Random Forest Classifier and XGBoost Classifier.

We implemented these classifiers using Python Natural Language Toolkit (NLTK)





6.CONCLUSIONS

This paper presents a method of detecting fake news using support vector machine, trying to determine the best features and techniques to detect fake news. We started by studying the field of fake news, its impact and its detection methods. We then designed and implemented a solution that uses a dataset of news preprocessed using cleaning techniques, steaming, Ngram encoding, bag of words and TF-IDF to extract a set of features allowing to detect fake news. We applied then Support Vector Machine algorithm on our features dataset to build a model allowing the classification of the new information.

Through the research carried out during this study, we obtained the following results:

- The best features to detect fake news are in order: text, author, source, date and sentiment.
- The followed process resulted in a recognition rate of 100%.
- The analysis of the sentiment given by the text is interesting, however it would be more influential in the case of opinion mining.
- The N-gram method gives a better result than the bag of words with bulky datasets and with large texts.
- The support vector machine seems the best algorithm to detect fake news, because it gave a better recognition rate, and allowed to give for each information a degree of confidence for its classification.
- The parameters influencing the support vector machine are in order: Cost, gamma and epsilon.

The work we have done could be completed and continued in different aspects. It would be relevant to extend this study with a larger dataset, and to evolve its supervised learning by another online for a continuous update and automatic integration of new fake news.

Most of the fake news were shared on Twitter. Social Media is the major source of Fake news. In this work, we have introduced a discovery model for counterfeit news utilizing highlights extraction procedures and three diverse AI

methods. The proposed model accomplishes its most noteworthy precision with SVM classifier. The most noteworthy precision score is 95.05%.

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