Fake Text News Detection System Using Machine Learning on Twitter

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Background

In recent decades, the prevalence of fake news in the media has gradually increased. The term "fake news" refers to news, information, or stories that are either wholly made up or inaccurate to some degree and are created to either influence people’s views, push a political agenda or cause confusion.

According to a survey carried out by Edelman Public Relations Firm, media trust has consistently dropped by 8% every year. There exists a general lack of confidence in whatever information is disseminated by the media with a percentage as high as 41% of people actively saying that they avoid the news.

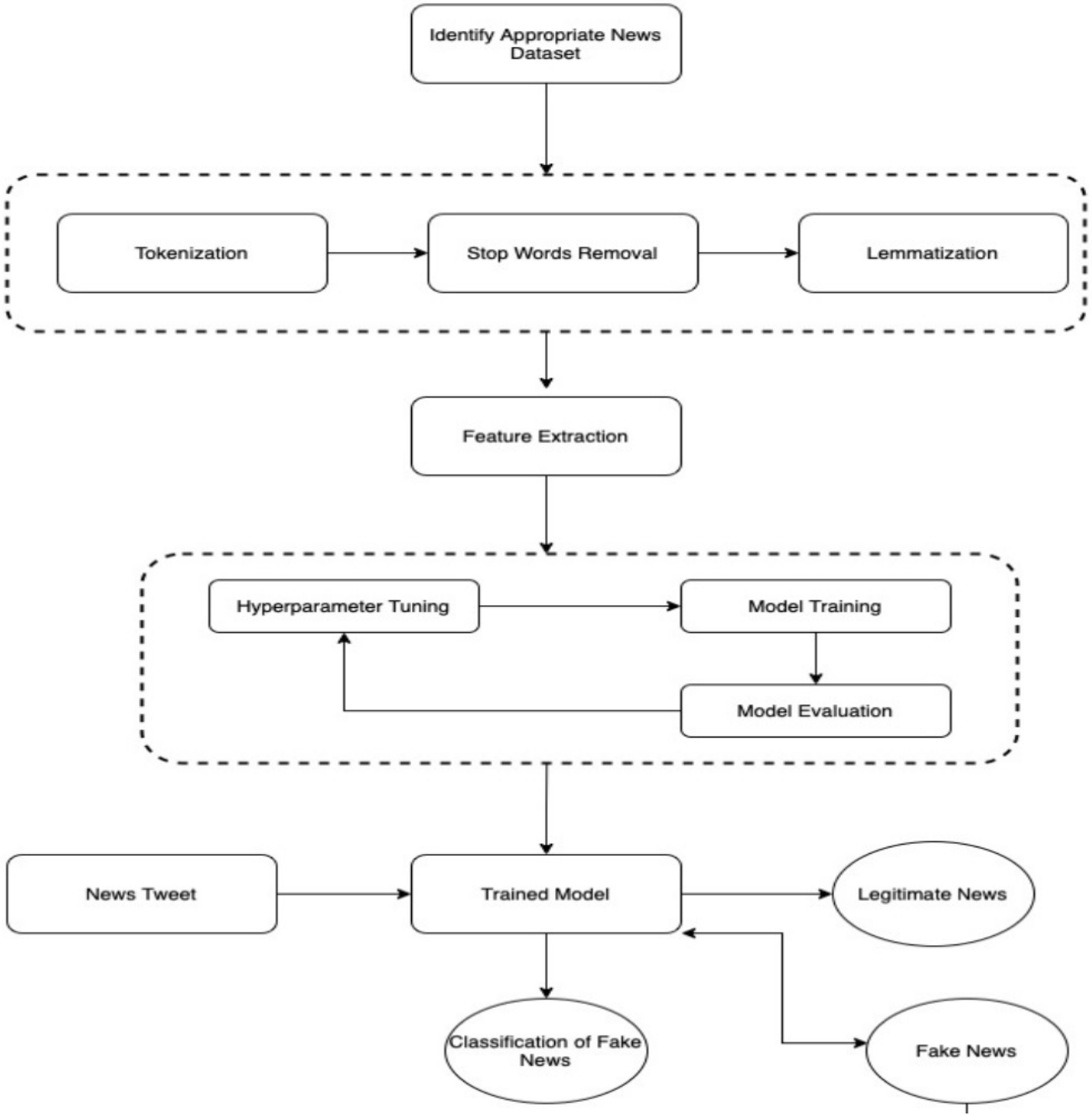
In the past, people relied on reliable journalists, media organizations, and sources who were bound by stringent ethical standards. However, the internet has made it possible to publish, exchange, and consume news and information in a completely new way with hardly any restrictions or editorial guidelines.

Nowadays, a lot of people obtain their news from social media networks and websites, and it can frequently be challenging to determine whether a story is legitimate or not. Any surge in false news or hoax stories has also been attributed to information overload and a general lack of understanding by individuals of how the internet functions. Hence the need for our project -the building of a machine learning based classifier that categorizes articles on whether they are real or fake.

Motivation

Mitigating	Mitigating the spread of Misinformation
Protecting	Protecting the public disourse
Promoting	Promoting digital literacy
Supporting	Supporting ethical journalism
Fostering	Fostering trust in online platforms

Conceptual Framework



Dataset Overview

- Title- contains news headlines
- Text- contains news content/article
- Subject- the type of news
- Date- the date the news was published

Dataset Overview

The dataset contains 44898 rows and spans 5 columns. The columns are: title, text, subject, date and category. The category column is the target variable and the rest are the features.

The dataset contains 4 object columns and 1 integer column. The object columns are: title, text, subject and date. The integer column is: category (target variable).

The dataset does not contain any missing values.

Data Preprocessing

It involves cleaning and transforming raw data into a format that is more suitable for analysis or model training. The purpose of data pre-processing is to enhance the quality of the data, address issues such as missing values or outliers, and make it compatible with the requirements of machine learning algorithms.

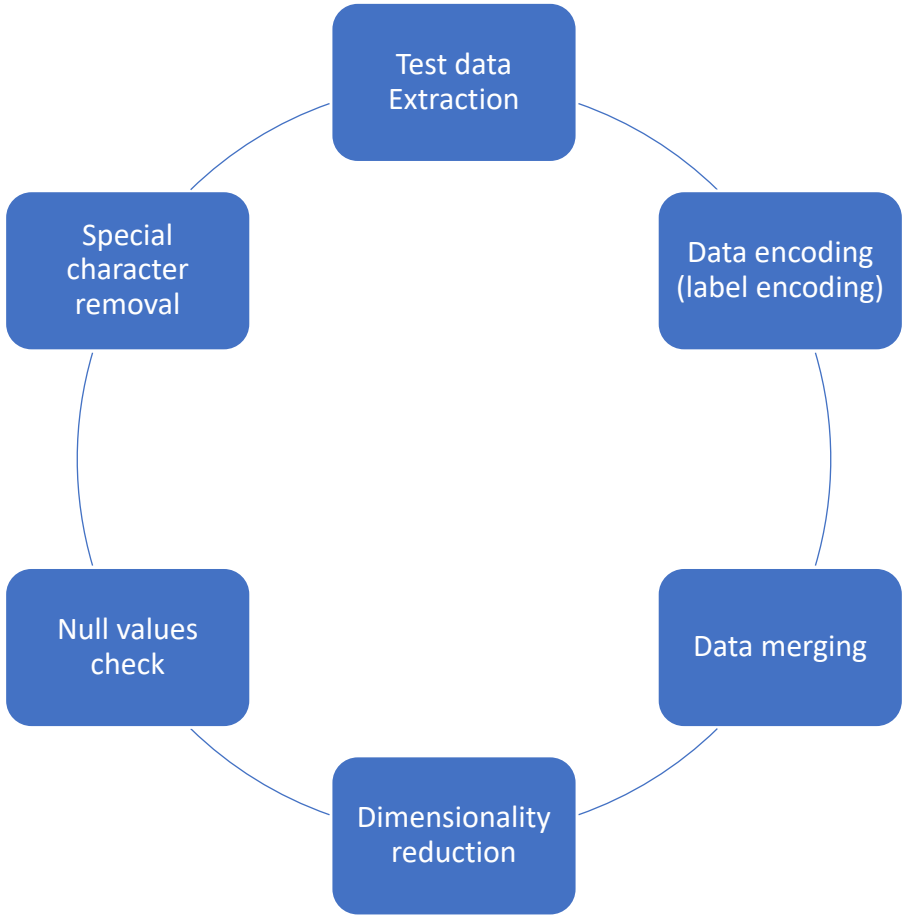
Data Preprocessing - Purpose

- Data Cleaning
- Feature Extraction (Vectorization)
- Encoding Labels
- Ensuring Model Compatibility

Data Vectorization

The goal of text vectorization was to convert raw text data into numerical format that the machine learning models could process. Term Frequency-Inverse Document Frequency(TF- IDF), a statistical measure, was useful in representing the importance of each word in the context of a text section.

Data Preprocessing



Model Training

Logistic regression - The Logistic Regression model, based on TF-IDF vectorized data, demonstrated high accuracy (98.59%) on the testing set. Precision, recall, and F1-score metrics were also impressive, indicating a well-performing model.

Decision Tree Classifier - The Decision Tree classification model demonstrated exceptionally high accuracy (99.62%) on the testing set. Precision, recall, and F1-score metrics were also perfect, indicating a highly effective model. However, the classification report suggested that the model had overfitted with the dataset.

Model Training

Gradient Boost Classifier - The Gradient Boosting Classifier demonstrated high accuracy (99.69%) on the testing set. Precision, recall, and F1-score metrics were also perfect, indicating a highly effective model.

Random Forest Classifier - The Random Forest Classifier demonstrated high accuracy (98.85%) on the testing set. Precision, recall, and F1-score metrics were also very high, indicating a highly effective model.

Model Validation

In the model validation phase of the Fake Text News Detection System, the dataset was initially split into training and testing sets. The model is then trained on the labeled training dataset. Following training, the model's performance is evaluated using metrics such as accuracy, precision, recall, and F1-score on the testing set, representing previously unseen data. This comprehensive validation process ensured the model's ability to generalize to real-world scenarios and provides insights for further refinement.

Model Evaluation

Logistic Regression

	precision	recall	f1-score	support
0	0.99	0.98	0.99	5895
1	0.98	0.99	0.98	5325
accuracy			0.99	11220
macro avg	0.99	0.99	0.99	11220
weighted avg	0.99	0.99	0.99	11220

Model Evaluation

Decision Tree Classification

	precision	recall	f1-score	support
0	1.00	1.00	1.00	5895
1	1.00	1.00	1.00	5325
accuracy			1.00	11220
macro avg	1.00	1.00	1.00	11220
weighted avg	1.00	1.00	1.00	11220

Model Evaluation

Random Forest Classifier

	precision	recall	f1-score	support
0	0.99	0.99	0.99	5895
1	0.99	0.99	0.99	5325
accuracy			0.99	11220
macro avg	0.99	0.99	0.99	11220
weighted avg	0.99	0.99	0.99	11220

THANK YOU