FAKE NEWS DETECTION

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PROBLEM STATEMENT

2013 Muzaffarnagar riots
(started due to misinformation online)

In today's digital age, the rapid spread of misinformation and fake news poses significant threats to public trust, social harmony, and informed decision-making. With the rise of social media and online platforms, distinguishing credible news from fabricated content has become increasingly challenging.

2018 Myanmar Rohingya Crisis
(lot of fake news was spread online on platforms like faceook)

OUR SOLUTION

To combat the spread of fake news, we developed a machine learning-based detection system using Logistic Regression. By transforming textual data into numerical features (e.g., TF-IDF), logistic regression classifies news articles as real or fake based on patterns in the data. This solution is lightweight, interpretable, and computationally efficient for datasets of moderate size.

Transformer-based models like DistilBERT, which excel at understanding the contextual and semantic nuances of text, can also be used offering significantly better accuracy and generalization. Memory limitations during training constrained our ability to implement this solution fully.

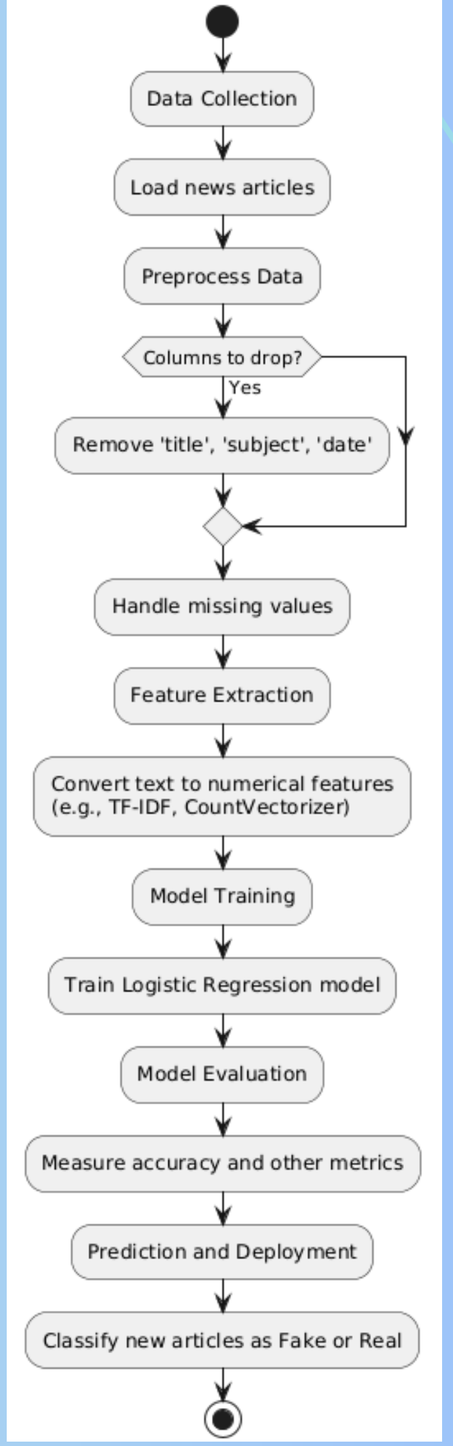
LOGISTIC REGRESSION

Logistic regression is a statistical method used in machine learning for binary classification problems, where the goal is to predict one of two possible outcomes (e.g., yes/no, true/false, 0/1). It predicts the probability that a given input belongs to a specific category.

TRANSFORMERS

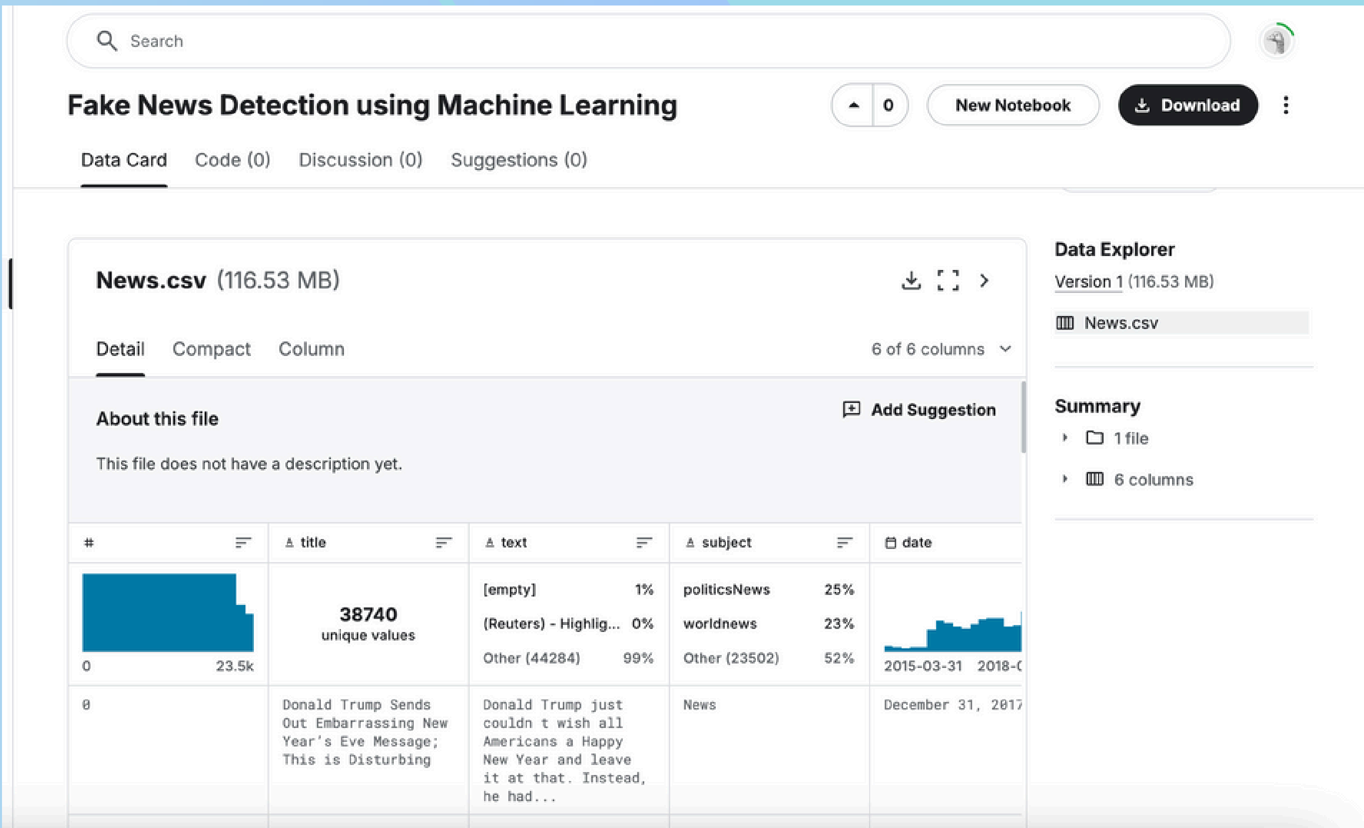
Transformers are a type of neural network architecture designed to handle sequential data, such as text, speech, or time-series, while addressing the limitations of traditional sequence models like RNNs and LSTMs.

DATA FLOW DIAGRAM

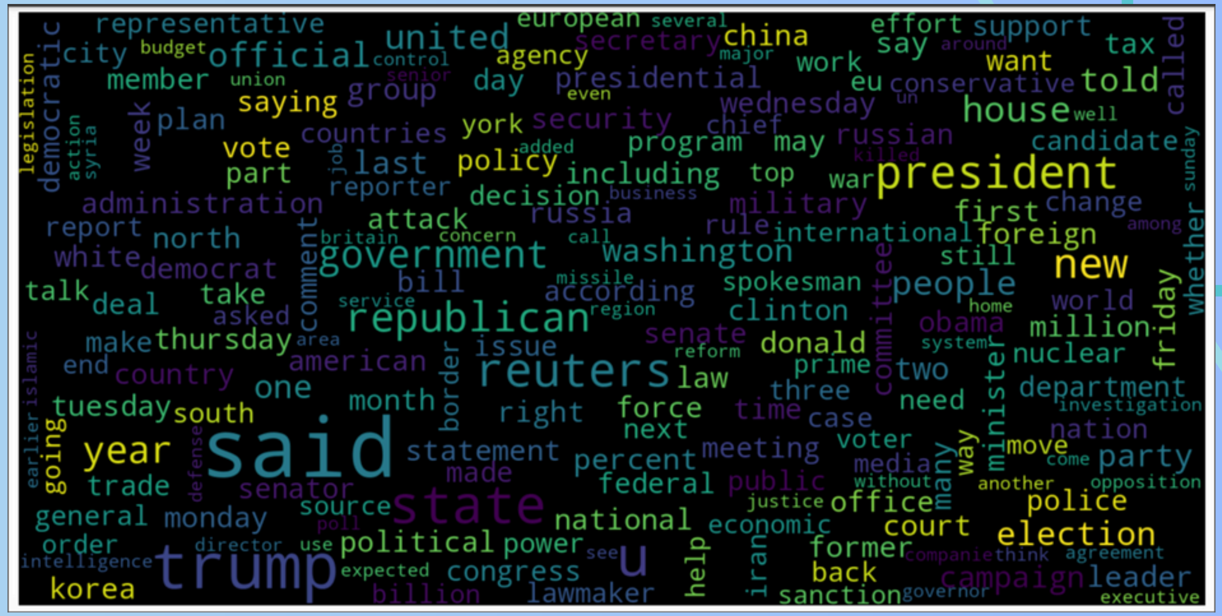


DATASET

- The dataset used for this project is a comprehensive news dataset consisting of 44,919 entries.
- Title: Provides the headline of the news article.
- Text: Represents the main body of the article, crucial for analyzing the substance and identifying patterns.
- Subject: Categorizing the news into topics which can influence the style and nature of the writing.
- Class: Serves as the label for fake news detection, where 0 indicates real news and 1 indicates fake news.



The dataset used , on kaggle



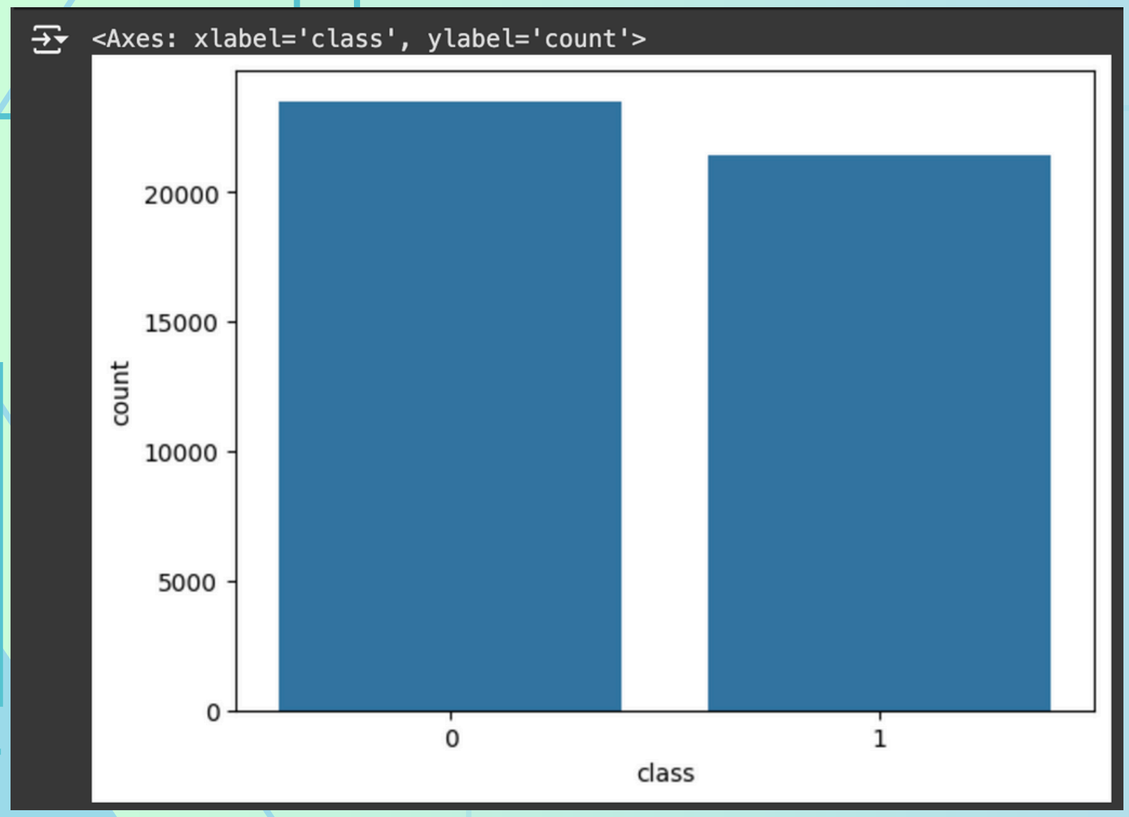
Word Cloud of dataset used

MODEL DESCRIPTION

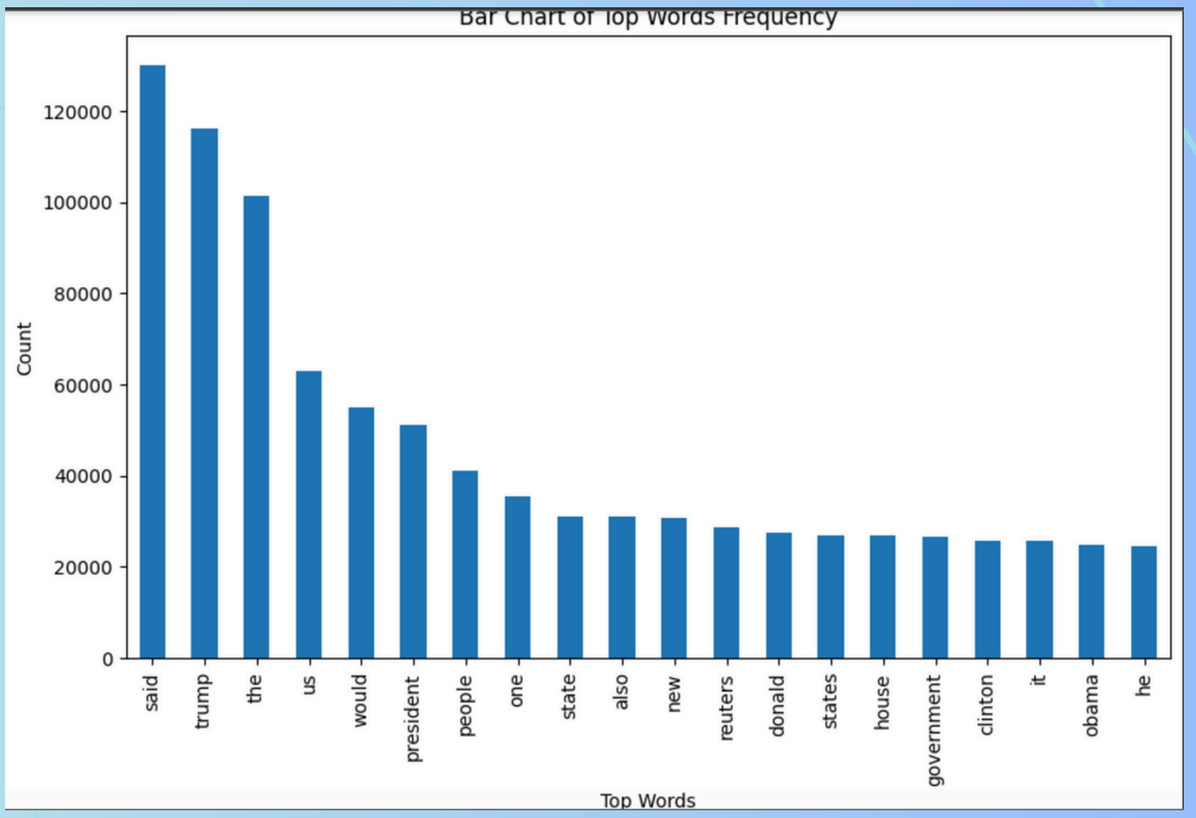
- **Preprocessing Steps:**
- The textual data is processed using tokenization, each article split into individual tokens (words or phrases)
- Stopwords were removed to focus on meaningful content.
- The cleaned data was then transformed into numerical features using TF-IDF (Term Frequency-Inverse Document Frequency) capturing the significance of words in the dataset.

- **Model Used:**
- Logistic Regression: A lightweight, binary classification algorithm suitable for moderately sized datasets which maps input features to probabilities, enabling effective classification of news articles as real (0) or fake (1).
- Alternate Solution: Transformer-based models, such as DistilBERT, which excel at understanding contextual and semantic nuances in text, can also be used.

MODEL GRAPHS



X Axis: 'class',
Y Axis: 'count'

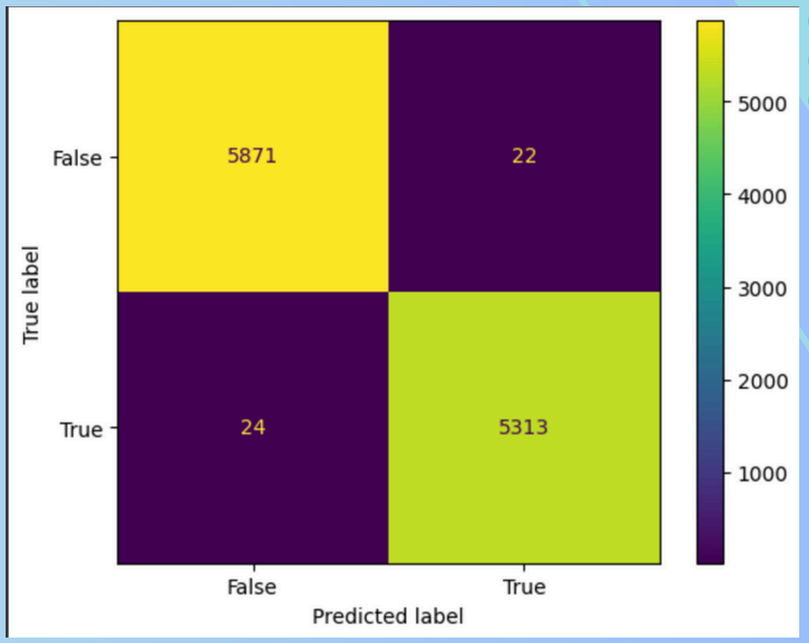


Bar Chart of Top words frequency
X Axis: words
Y Axis: Word Count

RESULTS

```
0.9999703167205913
0.9967052537845058
```

Accuracy
1. Training dataset
2. Test dataset



Confustion Matrix

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Classification Report:
              precision    recall  f1-score   support

           0       1.00      1.00      1.00      5809
           1       1.00      1.00      1.00      5421

    accuracy                           1.00     11230
   macro avg       1.00      1.00      1.00     11230
weighted avg       1.00      1.00      1.00     11230
```

Classification Report

[4976/6738 1:06:25 < 23:31, 1.25 it/s, Epoch 2.22/3]

Epoch	Training Loss	Validation Loss	Accuracy
1	0.000000	0.003259	0.999443
2	0.000000	0.001305	0.999889

Accuracy with Transformer

THANK YOU