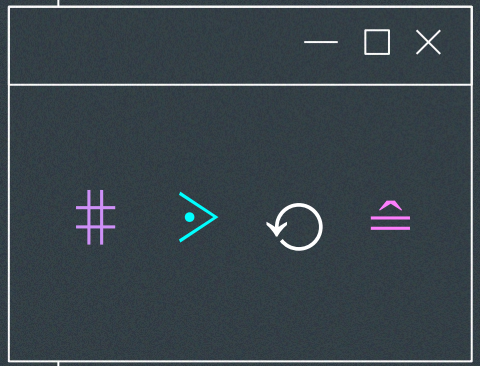
Fake News Detection using Machine learning(SDG-16)



Batch -11
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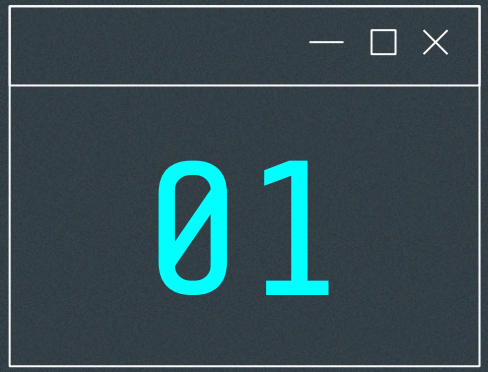
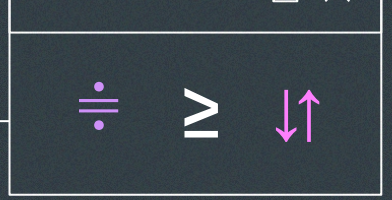


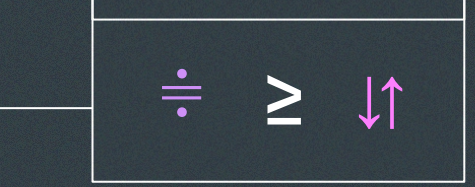
ABSTRACT



- In the digital era, the spread of fake news poses a significant threat to information credibility. This project addresses this challenge by developing a sophisticated fake news detection system using a BERT-based model integrated with sentiment analysis. The process begins with collecting a comprehensive labeled dataset of news articles, which includes essential features such as titles, authors, and content.
- We perform detailed data preprocessing to prepare the text for analysis, which involves cleaning and converting it into BERT embeddings. The integration of sentiment analysis further enhances the model's ability to discern fake news by capturing the emotional tone of the content, providing an additional layer of interpretive insight.
- The BERT-based model, combined with sentiment analysis, is trained and evaluated rigorously to ensure high accuracy. The system is then deployed using Streamlit, offering a user-friendly interface for real-time fake news predictions. This approach provides a robust and practical solution for tackling misinformation in today's information landscape.

02

Existing model/Currently existing model



01

Naive Bayes

A probabilistic classifier that uses Bayes' theorem, assuming that features (words) are independent given the class (real or fake news).The assumption of feature independence often does not hold in real-world text, which can lead to reduced accuracy, especially in detecting nuanced patterns in fake news.

02

LSTM (Long Short-Term Memory)

A type of recurrent neural network (RNN) designed to capture long-term dependencies and context in sequential data. Can be computationally intensive and requires a large amount of data and training time. It may also struggle with very long sequences or very subtle contextual nuances in fake news.

03

Logistic Regression

Logistic regression in fake news detection uses a linear approach to classify news but may struggle with complex patterns, making it less effective compared to the BERT model combined with sentiment analysis, which captures nuanced context and emotional tone.

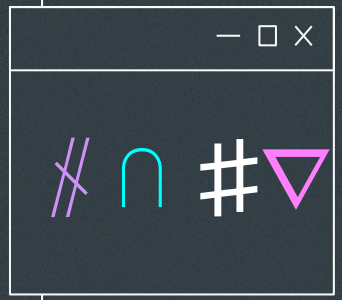
04

Random Forests

An ensemble learning method that combines multiple decision trees to improve classification accuracy and robustness by averaging their predictions. Can be less interpretable than single decision trees and may not handle very high-dimensional text data as effectively without additional feature engineering

03

Proposed Model & Deliverables



- The proposed model for the fake news detection project utilizes BERT and sentiment analysis. This approach is carefully chosen to leverage the strengths of both technologies.BERT is used to capture the contextual meaning of news articles by converting text into embeddings through its pre-trained model. These embeddings are enriched with sentiment analysis features, which are either added manually or generated using sentiment tools. This combination allows for a nuanced understanding of news content, enhancing classification accuracy.

- Preprocessing involves tokenizing the text with BERT and normalizing sentiment features to integrate with the BERT embeddings. This approach ensures that both contextual and sentiment information are effectively used for classification.Fine-tuning adjusts the model's classification layers and, if necessary, some of the BERT layers, with an option to freeze the pre-trained layers to preserve their knowledge. Performance is measured with metrics such as accuracy, precision, recall, and F1 score. For deployment, a Streamlit interface provides a user-friendly platform for real-time predictions.

- This model architecture combines the advanced contextual capabilities of BERT with sentiment analysis, resulting in a robust solution for detecting fake news.

1. **Trained Model:** The BERT-based model, trained to classify news articles as real or fake while incorporating sentiment analysis, is a key deliverable. This includes the saved model weights and configuration files necessary for deployment.

2. **Model Evaluation Metrics:** Performance metrics like accuracy, precision, recall, and F1 score will be provided to evaluate the BERT model's effectiveness in distinguishing between real and fake news.

3. **Output Predictions:** The system will generate predictions for new or test data, classifying news articles as real or fake, and include sentiment analysis results.

4. **Documentation:** Documentation will include data preprocessing, feature extraction, model architecture, sentiment analysis integration, and evaluation metrics, offering a complete project overview.

5. **Code and Implementation:** The source code and instructions will cover data preprocessing, model training, sentiment analysis, and evaluation for effective replication and use.

04

DATASETS

In today's digital age, the proliferation of fake news poses a significant challenge worldwide, impacting public opinion and trust. To tackle this issue effectively, we need robust tools and datasets for developing reliable fake news detection models.The "**Fake News Dataset by Kaggle** " offers a valuable resource for this purpose. This dataset provides a comprehensive collection of news articles, meticulously labeled to indicate their authenticity.

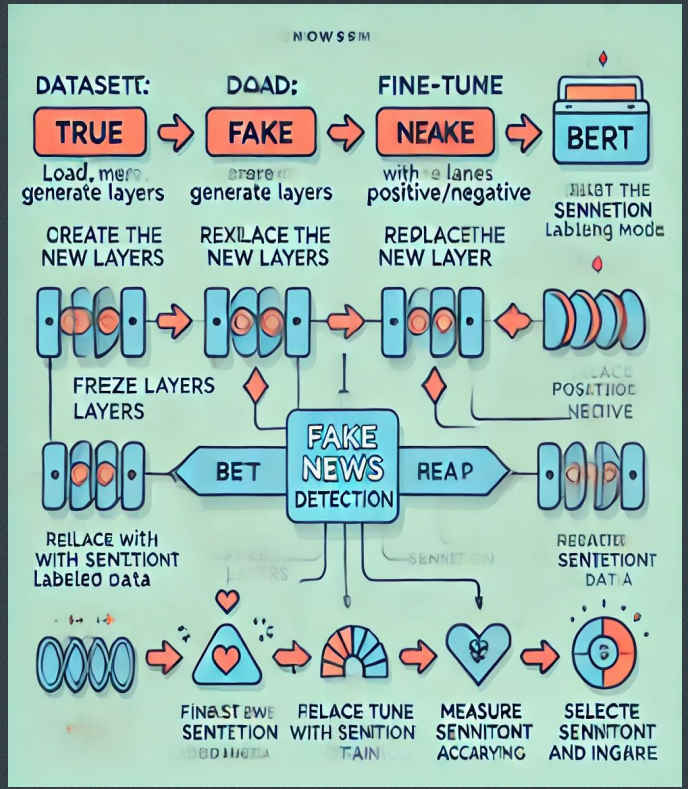
Key Features:

Diverse Content: Encompasses a wide range of news articles from various sources, ensuring comprehensive coverage.

Labeled Data: Articles are categorized as "real" or "fake," providing clear targets for model training.

Metadata: Includes additional details such as titles, authors, and publication dates to enrich the analysis.

The process of training a BERT model for both fake news detection and sentiment analysis involves several key steps. First, the dataset is prepared by loading and merging data, and generating labels for both fake news (true/fake) and sentiment analysis (positive/negative). A pre-trained BERT model is then obtained to serve as the base for both tasks. For fake news detection, a base model is created, where the initial layers are frozen to retain general features, and the last layer is replaced to specialize in fake news classification. The model is then trained further with the specific fake news dataset, after which its classification accuracy is measured to ensure performance. For sentiment analysis, a sentiment-specific base model is created, adjusted for polarity detection, and fine-tuned using sentiment-labeled data. Sentiment accuracy is then measured. Finally, the models for fake news detection and sentiment analysis are integrated, and the combined model is fine-tuned further to improve its performance before being used for making predictions. This integrated approach allows the BERT model to effectively handle both tasks.



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