

Design and Development of an AI-Powered Fake News Detection Platform Using Transformer-Based Language Models

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Introduction:

In today's digital world, false information spreads quickly across social media and news websites. Fake news can shape public opinion in harmful ways, affect elections, and even put public health at risk. Because of this, it is important to create smart tools that can spot fake news accurately and automatically.

Thanks to recent progress in Natural Language Processing (NLP), especially the use of powerful models called transformers (like BERT, RoBERTa, and XLNet), we now have better ways to understand and analyze text. These models have shown strong results in tasks like detecting fake news.

According to Saadi et al. (2025), “the integration of summarization techniques enhances transformer performance by eliminating irrelevant content and highlighting the core message of news articles,” which helps the model focus on what’s important. Huang et al. (2025) also introduced a helpful approach, combining transformer models with BiGRUs and Bayesian optimization. They found that “the hybrid model effectively captures both long-term dependencies and contextual semantics, leading to improved fake news detection.”

Li et al. (2022) pointed out that fake news comes in many different styles and topics, and “heterogeneous transformers can better model diverse textual characteristics across domains.” Sallami et al. (2023) warned that while many models work well in lab tests, “many transformer-based models show inflated performance on benchmarks but struggle under real-world conditions.” This shows the importance of testing models in real situations.

Kuntur et al. (2024) compared transformers with Graph Neural Networks (GNNs) and found that “transformers outperform GNNs in both accuracy and robustness, especially when fine-tuned on large-scale fake news datasets.”

Based on these findings, this project aims to build a smart platform that uses advanced transformer models to detect fake news. The platform will be able to work in real time, handle large amounts of data, and give users helpful results they can trust.

Problem Statement:

The widespread dissemination of fake news has become a significant societal challenge, impacting political landscapes, public trust, and individual decision-making. Traditional detection methods rely heavily on manual verification or surface-level textual cues, which are insufficient in dealing with modern, context-aware misinformation strategies. There is a need for an intelligent system that can automatically detect fake news using advanced deep learning models, particularly transformer-based architectures, to improve both accuracy and efficiency.

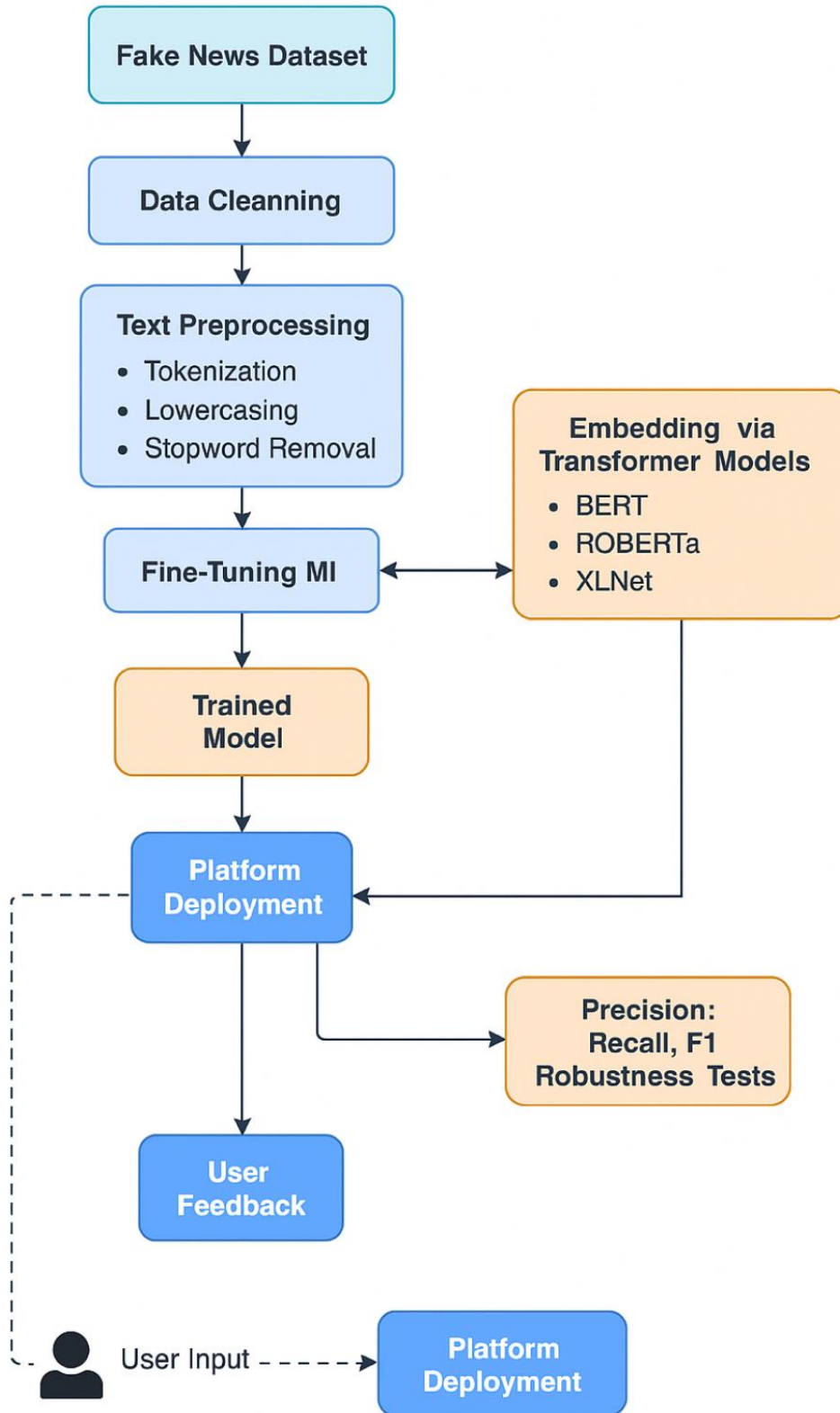
Research Objectives:

- To study and analyze the capabilities of state-of-the-art transformer-based language models for fake news detection.
- To design and develop a scalable AI-powered platform capable of identifying and classifying fake news in real-time.
- To evaluate the performance of various transformer architectures (e.g., BERT, RoBERTa, XLNet) on benchmark fake news datasets.
- To integrate visualization and user feedback features for enhanced user interaction and model improvement.

Methodology:

1. Literature Review: Conduct a comprehensive review of recent studies leveraging transformer-based models for fake news detection, including HetTransformer, hybrid Transformer-BiGRU systems, and models incorporating summarization and network propagation.
2. Dataset Preparation: Utilize the datasets provided by the professor, including the ISOT and COVID-19 Fake News Dataset, for model training and evaluation. These datasets contain a variety of news texts labeled as real or fake, making them suitable for supervised learning.
3. Model Selection & Training: Fine-tune multiple transformer models (BERT, RoBERTa, XLNet) using supervised learning approaches. Hyperparameters will be optimized using Bayesian search.
4. System Design: Develop a web-based platform integrating the trained model for real-time prediction and feedback collection.
5. Evaluation: Assess models using precision, recall, F1-score, and adversarial robustness metrics.

Fig 1:



References:

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