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Fake News Detection with Web App Interface

Thanmaya L[1], Trupthi V[2], Vaishnavi[3], Asst.Prof.Raghavendra T K[4]
Student, Computer Science and Engineering[1-3]
Associate Professor, Department of Computer Science and Engineering[4]
Kalpataru Institute of Technology, Tiptur, India

Abstract: *The rapid growth of digital media and online social platforms has significantly increased the spread of fake news, posing serious threats to public trust, social stability, and informed decision- making. Manual verification of news content is time-consuming and impractical given the massive volume of information generated daily. This paper presents an automated fake news detection system integrated with a user-friendly web application interface to accurately classify news articles as fake or genuine. The proposed system employs natural language processing techniques for text preprocessing, including tokenization, stop-word removal, and vectorization using Term Frequency–Inverse Document Frequency (TF-IDF). Multiple machine learning classifiers, such as Logistic Regression, Decision Tree, Random Forest, and Gradient Boosting, are trained and evaluated to enhance prediction accuracy. The web application enables users to input news content in real time and receive instant classification results, making the system practical and accessible for public use. Experimental results demonstrate that the proposed model achieves high accuracy and reliability in detecting fake news, highlighting its effectiveness as a decision-support tool. The system contributes to combating misinformation by providing a scalable, efficient, and interpretable solution for real-time fake news identification.*

Keywords: Fake News Detection, Machine Learning, Natural Language Processing, Text Classification, Web Application, TF-IDF, Misinformation Detection, Data Analytics

I. INTRODUCTION

The rapid growth of the internet and the social media platforms as drastically changed the way information is shared and consumed, making news instantly accessible to a global audience.However,this ease of distibution also facilitated the widespread of fake new --false or misleading information presented as factual news-which can influence public opinion, create social unrest, and lead to economic and political consequences. Traditional methods of verifying news, such as manual fact - checking, are slow, labor-intensive, and unable to cope with the massive volume of content generated daily, highlighting the urgent need for automated solutions. Recent advances in machine learning (ML) and natural language processing (NLP) provide effective tools for analyzing textual patterns, linguistic features, and semantic context, enabling the accurate classification of news articles as fake or genuine. This paper proposes a machine learning-based fake news detection system integrated with a web application interface, which preprocesses news text using techniques such as tokenization, stop-word removal, and TF-IDF vectorization, and applies multiple classification algorithms to enhance prediction accuracy. The web application allows users to input news content ,and receive instant classification results, making the system practical, accessible and user-friendly. By combining accurate ML models with an interactive interface, the proposed system aims to combat misinformation efficiently, promote responsible information consumption, and provide a scalable solution for real-time news verification in the digital ecosystem.

II. PROBLEM STATEMENT

In today's digital era, the rapid spread of information through social media and online platforms has made it increasingly difficult to distinguish between authentic and misleading news. Fake news—intentionally or unintentionally false information presented as factual—poses significant threats to society, including the manipulation

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of public opinion, social unrest, and the dissemination of misinformation that can affect economic and political decisions. Manual verification methods, such as traditional fact-checking, are inefficient and cannot cope with the massive volume of news content generated daily. There is a critical need for an automated, reliable, and scalable system that can analyze textual content, identify fake news accurately, and provide users with real-time feedback. The challenge lies in designing a solution that combines advanced machine learning techniques and natural language processing with a user-friendly web interface, ensuring both high prediction accuracy and accessibility for the general public.

III. METHODOLOGY

The proposed fake news detection system is designed to automatically classify news articles as fake or genuine using machine learning and natural language processing techniques, integrated with a web application for real-time user interaction. The methodology consists of the following key steps:

Data Collection

News datasets containing labeled fake and real news articles are collected from publicly available sources. The dataset is cleaned to remove duplicates, irrelevant content, and inconsistencies to ensure high-quality input for model training.

Data Preprocessing

Preprocessing is performed to convert raw text into a structured format suitable for machine learning algorithms. This includes tokenization, lowercasing, removal of stop words, punctuation, and special characters, as well as stemming or lemmatization. The text is then transformed into numerical features using TF-IDF (Term Frequency–Inverse Document Frequency) vectorization, which captures the importance of words in the corpus.

Model Selection and Training

Multiple machine learning classifiers, such as Logistic Regression, Decision Tree, Random Forest, and Gradient Boosting, are trained on the preprocessed dataset. The models are evaluated using metrics like accuracy, precision, recall, and F1-score to select the best-performing algorithm for fake news classification.

Web Application Development

A web-based interface is developed to allow users to input news content and receive real-time classification results. The web app communicates with the trained model, processes the input text using the same preprocessing steps, and outputs whether the news is fake or genuine.

Evaluation and Testing

The system is tested on unseen data to validate its performance and robustness. Comparative analysis of different models is performed to determine the most accurate and reliable classifier. User experience and interface usability are also evaluated to ensure practical applicability.

The integration of machine learning models with a web interface ensures that the proposed system is not only accurate in detecting fake news but also accessible and user-friendly, providing a scalable solution for combating misinformation.

IV. RESULTS AND DISCUSSION

The proposed fake news detection system was evaluated using a labeled dataset consisting of real and fake news articles. After preprocessing and feature extraction using TF-IDF, multiple machine learning models—including Logistic Regression, Decision Tree, Random Forest, and Gradient Boosting—were trained and tested. The models were evaluated based on standard performance metrics: accuracy, precision, recall, and F1-score.

Among the models, Random Forest achieved the highest overall accuracy, followed closely by Gradient Boosting and Logistic Regression. The Decision Tree classifier, while faster to train, showed lower accuracy due to overfitting on the training data. The experimental results demonstrate that ensemble methods, such as Random Forest and Gradient Boosting, are more effective in capturing complex patterns in textual data for fake news detection.

The web application interface successfully integrated the trained models, allowing users to input news text and receive real- time classification results. Testing with unseen news articles indicated that the system provides reliable

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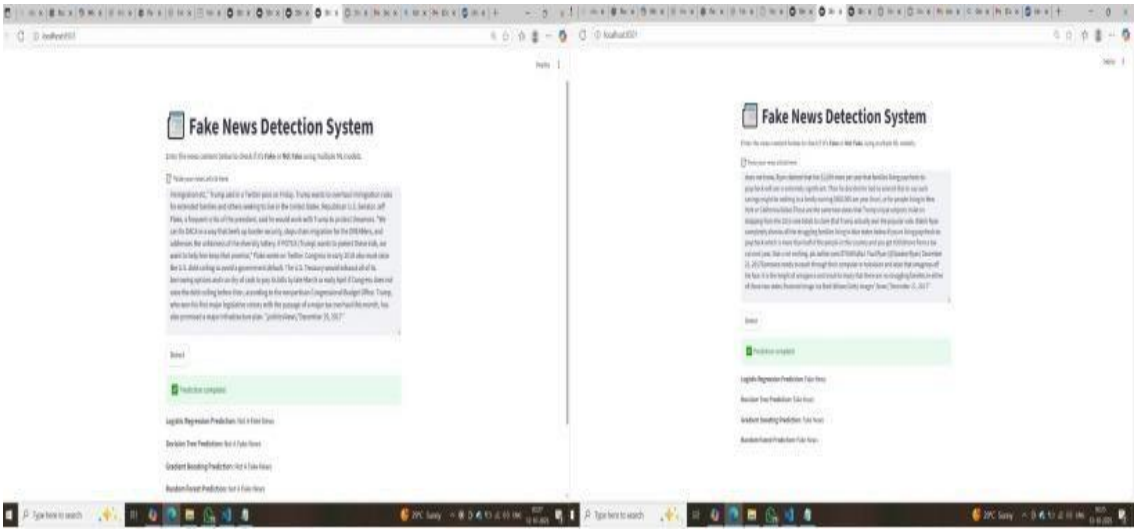
predictions, accurately identifying fake news with minimal delay. This highlights the practical applicability of the proposed system in real-world scenarios, where timely verification of information is critical.

Overall, the results confirm that combining machine learning techniques with natural language processing and a web-based interface offers a scalable and effective solution for detecting misinformation. The system not only provides high accuracy in classification but also enhances user accessibility, demonstrating its potential as a decision-support tool in combating fake news.



V. CONCLUSION

The rapid proliferation of fake news on digital platforms poses serious challenges to society, requiring efficient and scalable solutions for real-time verification. This paper presented a machine learning–based fake news detection system integrated with a web application interface. By leveraging natural language processing techniques for text preprocessing and employing multiple classification algorithms, the system effectively distinguishes between fake and genuine news articles. Experimental results demonstrate that ensemble methods, such as Random Forest and Gradient Boosting, provide high accuracy and reliability in detection. The web-based interface allows users to easily input news content and receive instant classification results, making the system practical and user-friendly.The proposed solution not only improves the speed and accuracy of fake news identification but also enhances accessibility for the general public, contributing to the reduction of misinformation in the digital ecosystem. Future work can focus on incorporating deep learning models, multilingual suppo rt, and social context analysis to further improve detection performance and adapt the system for global use.

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