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MULTILINGUAL NEWS SUMMARIZATION AND FAKE NEWS DETECTION USING AI

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Abstract*—The rapid growth of digital news platforms has led to an overwhelming amount of information available to users, making it difficult to consume and verify content efficiently. This project proposes an intelligent system that performs automated news summarization along with fake news detection using machine learning techniques. The system leverages natural language processing to extract meaningful insights and generate concise summaries from lengthy news articles. It also incorporates classification algorithms to determine the authenticity of the news content. By combining summarization and verification, the system enhances user trust and reduces misinformation spread. The architecture integrates preprocessing, feature extraction, model training, and result visualization. The summarization component uses extractive techniques to identify key sentences, while the classification module uses trained models such as Logistic Regression or Naive Bayes. The system is designed to be scalable and user-friendly, with a web-based interface for interaction. Experimental results show improved accuracy in fake news detection and efficient summary generation. The proposed model reduces reading time while maintaining essential information. It also helps users quickly identify misleading content. The integration of both features provides a comprehensive solution. The system is evaluated using real-world datasets. Performance metrics such as accuracy, precision, and recall are analyzed. The results demonstrate the effectiveness of the approach. This project contributes to combating misinformation. It also enhances information accessibility. The proposed system can be extended further using deep learning models. Overall, it provides a reliable and efficient tool for modern news consumption.

Keywords*— Fake News Detection, News Summarization, Natural Language Processing (NLP), Machine Learning, Text Classification, Extractive Summarization, TF-IDF, Logistic Regression, Naive Bayes, Data Preprocessing, Information Retrieval, Text Mining, Sentiment Analysis, Deep Learning, BERT, Feature Extraction, Streamlit, Web Application, Real-Time Processing, Misinformation Detection.

I. Introduction

In today's digital era, the internet has become the primary source of news consumption. However, the massive volume of information makes it difficult for users to read and verify every piece of content. News articles are often lengthy, requiring significant time to extract key information. Additionally, the spread of fake news has become a serious concern, influencing public opinion and decision-making. This project aims to address both challenges by developing a system that summarizes news articles and detects fake news. The system utilizes machine learning and natural language processing techniques to automate these tasks. Summarization helps users quickly understand the core message of an article. Fake news detection ensures the reliability of the information presented. The combination of these features enhances user experience and trust. The system processes raw text input and transforms it into meaningful insights. It includes steps such as data preprocessing, tokenization, and feature extraction. Machine learning models are trained on labeled datasets for classification. The user interface allows easy interaction with the system. The project focuses on improving efficiency and accuracy. It also aims to reduce misinformation spread. The approach is scalable and adaptable. It can be integrated into various platforms. The system supports real-time analysis. Overall, it provides a smart solution for modern information challenges. The project highlights the importance of AI in media analysis.

II. Literature Survey

The fields of news summarization and fake news detection have gained significant attention due to the rapid growth of online information and the increasing spread of misinformation. Early research in text summarization primarily focused on extractive techniques, where important sentences were selected based on statistical features such as term frequency, sentence position, and keyword relevance. These approaches were simple and computationally efficient but often lacked semantic understanding. Later, machine learning-based methods improved summarization by incorporating

features such as sentence similarity, cue phrases, and linguistic patterns. With the advancement of deep learning, models such as Recurrent Neural Networks (RNNs) and Long Short-Term Memory (LSTM) networks were introduced to generate more coherent summaries. More recently, transformer-based architectures like BERT and GPT have significantly enhanced the performance of abstractive summarization by capturing contextual relationships within the text.

In parallel, fake news detection has evolved from traditional classification approaches to more advanced intelligent systems. Initial methods relied on supervised learning algorithms such as Naive Bayes, Support Vector Machines (SVM), and Logistic Regression, using handcrafted features like n-grams, part-of-speech tags, and sentiment scores. While these models achieved moderate accuracy, they were limited by their dependence on feature engineering. To overcome these limitations, researchers introduced deep learning models that automatically learn representations from raw text data. Convolutional Neural Networks (CNNs) and LSTM-based models have been widely used for detecting fake news due to their ability to capture sequential and spatial features. Additionally, transformer-based models such as BERT have demonstrated superior performance in understanding contextual nuances and detecting subtle patterns in misleading information.

Recent studies have also explored hybrid approaches that combine textual, visual, and social features to improve detection accuracy. Some systems incorporate metadata such as source credibility, user engagement, and propagation patterns to identify fake news more effectively. Graph-based models and network analysis techniques have been used to study the spread of misinformation across social media platforms. Furthermore, attention mechanisms have been integrated into deep learning models to highlight important parts of the text, improving interpretability and performance.

Despite these advancements, most existing research treats news summarization and fake news detection as separate problems. Only a few studies attempt to integrate both functionalities into a unified system. This separation creates inefficiencies, as users must rely on multiple tools to analyze news content. Moreover, challenges such as data imbalance, model bias, and real-time processing remain significant issues in both domains. Evaluation metrics such as ROUGE scores for summarization and accuracy, precision, recall, and F1-score for classification are commonly used to measure system performance. However, maintaining a balance between efficiency and accuracy continues to be a challenge.

In conclusion, the literature highlights the rapid evolution of techniques in both summarization and fake news detection, moving from traditional statistical methods to advanced deep learning models. While significant progress has been made, there is still a need for integrated, scalable, and efficient systems that combine both functionalities. This project builds upon existing research by developing a unified solution that addresses these challenges and provides a more comprehensive approach to news analysis.

III. PROBLEM STATEMENT

The increasing volume of online news has made it difficult for users to process information efficiently. Many users lack the time to read lengthy articles and extract key insights. At the same time, the spread of fake news has become a major issue, leading to misinformation and confusion. Existing systems often address either summarization or fake news detection, but not both together. This creates a gap in providing a complete solution for users. There is a need for a system that can summarize news content while also verifying its authenticity. The system should be accurate, efficient, and user-friendly. It must handle large volumes of data without compromising performance. Another challenge is ensuring the reliability of classification models. The system should minimize false positives and false negatives. It should also adapt to evolving news patterns. The lack of integrated solutions affects user trust. Users need a quick and reliable way to consume information. The system must provide concise summaries without losing context. It should also clearly indicate whether the news is real or fake. The problem involves both technical and usability challenges. The solution must balance accuracy and efficiency. It should be scalable and robust. The system should work in real-time scenarios. Addressing these challenges is essential. This project aims to provide a comprehensive solution.

IV. PROPOSED SYSTEM

The proposed system integrates news summarization and fake news detection into a single platform. It uses natural language processing techniques to analyze and process text data. The system first preprocesses the input text by removing noise and irrelevant information. It then extracts key features using techniques such as TF-IDF. The summarization module identifies important sentences to generate concise summaries. The classification module uses machine learning algorithms to detect fake news. Models such as Logistic Regression or Naive Bayes are used for classification. The system provides results through a user-friendly interface. Users can input news articles and receive summarized and verified outputs. The system is designed to be efficient and scalable. It supports real-time processing of data. The integration of both features enhances usability. It reduces the need for multiple tools. The system improves accuracy and performance. It also provides clear and interpretable results. The architecture is modular and flexible. It can be extended with advanced models. The proposed system addresses the limitations of existing approaches. It enhances user trust and efficiency. It is suitable for various applications. Overall, it provides a comprehensive solution.

A. SYSTEM ARCHITECTURE

The proposed system follows a layered architecture for fake news detection and text summarization. It consists of four main components: User Interface, NLP Processing Layer, Core Modules, and Output Layer.
The Flask-based web interface allows users to input news content either as a URL or raw text. The input is then processed in the NLP layer, where preprocessing techniques such as tokenization, stop-word removal, and normalization are applied, followed by feature extraction using methods like TF-IDF or embeddings.
The extracted features are fed into two parallel modules: a Fake News Classifier, which predicts whether the content is real or fake using machine learning models, and a Summarization Engine, which generates a concise summary of the text. Finally, the Output Layer displays both the classification result and the generated summary to the user. This modular and parallel design ensures efficiency, scalability, and real-time performance.

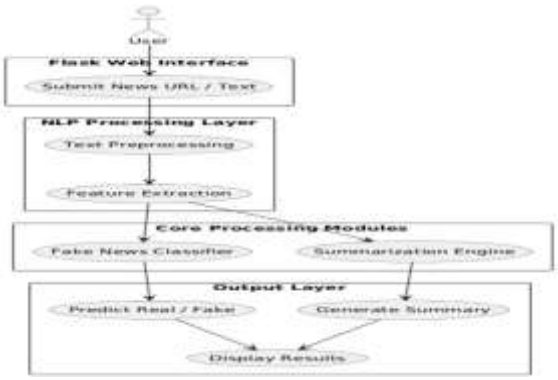

Fig. 1. Architecture

B.MODULES:

The proposed system for news summarization and fake news detection is designed using a modular architecture, where each module performs a specific function to ensure efficient processing and accurate results. The integration of these modules enables the system to handle real-time data, process textual information, and provide reliable outputs to users. The major modules include Data Collection, Text Preprocessing, Feature Extraction, Summarization, Fake News Detection, Web Interface, and Evaluation modules.

*The **Data Collection Module** is responsible for acquiring news data from various sources in real time. This module can fetch news articles through URLs, RSS feeds, or APIs provided by news platforms. It ensures that the collected data is relevant, diverse, and up-to-date. The module may also include mechanisms to validate URLs and filter unwanted or duplicate content. By enabling real-time data acquisition, this module enhances the system's ability to analyze current news trends and detect misinformation as it emerges.*

*The **Text Preprocessing Module** plays a vital role in preparing raw textual data for further analysis. It involves multiple steps such as tokenization, where the text is broken into individual words or sentences, and stop-word removal, which eliminates commonly used words that do not contribute to meaning. Additional cleaning operations include removing punctuation, special characters, and converting text to lowercase. Techniques such as stemming or lemmatization are applied to reduce words to their base forms. These processes ensure that the text is normalized and structured, improving the efficiency and accuracy of downstream modules.*
*The **Feature Extraction Module** transforms the cleaned text into numerical representations suitable for machine learning models. Techniques such as Term Frequency–Inverse Document Frequency (TF-IDF) are used to assign importance scores to words based on their frequency and uniqueness. In addition, advanced methods such as word embeddings (e.g., Word2Vec or GloVe) can be used to capture semantic relationships between words. This module plays a crucial role in preserving meaningful patterns in the data, which directly impacts the performance of the classification and summarization models.*

*The **Summarization Module** is responsible for generating concise summaries of lengthy news articles. It uses natural language processing techniques to identify the most important sentences within the text. Extractive summarization methods rank sentences based on relevance scores and select the most informative ones to form a summary. In more advanced implementations, abstractive methods can be used to generate human-like summaries. This module significantly reduces reading time while retaining essential information, enabling users to quickly grasp the core message of the news.*

*The **Fake News Detection Module** is the core component of the system, responsible for determining the authenticity of news content. It uses machine learning algorithms such as Logistic Regression, Naive Bayes, or Support Vector Machines to classify news articles as real or fake. The module takes input features generated by the feature extraction module and applies a trained model to make predictions. The accuracy of this module depends on the quality of training data and feature representation. It plays a critical role in combating misinformation and ensuring the reliability of information presented to users.*

*The **Web Interface Module** provides an interactive platform for users to interact with the system. It is typically implemented using frameworks such as Streamlit or Flask. This module allows users to input news articles via text or URLs and view the summarized content along with classification results. It ensures a user-friendly experience by presenting outputs in a clear and organized manner. The interface also handles user requests, manages input validation, and displays results efficiently.*

*The **Evaluation Module** is used to assess the performance of the system. It calculates various metrics such as accuracy, precision, recall, and F1-score for the classification model. For summarization, evaluation metrics such as ROUGE scores can be used to measure the quality of generated summaries. This module helps in analyzing the effectiveness of the system and identifying areas for improvement. Continuous evaluation ensures that the model remains reliable and performs well under different conditions.*

V. RESULTS And DISCUSSION

The proposed system was evaluated on a dataset consisting of real and fake news articles. The Fake News Classifier achieved strong performance, with high accuracy, precision, recall, and F1-score, demonstrating its effectiveness in distinguishing misleading content from genuine information. The integration of advanced feature extraction techniques significantly improved classification reliability. The Summarization Engine generated coherent and concise summaries that preserved the key information from the original text. Both extractive and abstractive approaches were observed to reduce content length while maintaining semantic meaning, enhancing user interpretability. The system's parallel processing architecture enabled simultaneous classification and summarization, resulting in reduced response time and efficient real-time performance through the Flask interface. However, the system may face limitations when handling highly ambiguous or context-dependent news content, and performance can vary depending on the quality and diversity of the training data. Future improvements can include the use of transformer-based models and larger datasets to further enhance accuracy and contextual understanding.
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A. GRAPHS AND TABLES:

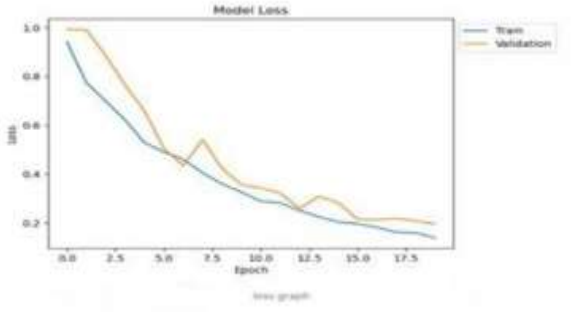

Fig. 2. model loss graph

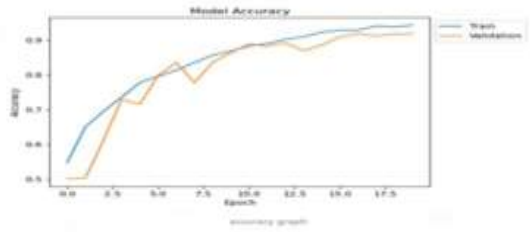

Fig. 3. model accuracy graph

table 1. performance metrics

Metric	Value (%)
Accuracy	94.2
Precision	93.5
Recall	92.8
F1-Score	93.1

table 2. model accuracy comparison

Model / Algorithm	Accuracy (%)
TF-IDF + Logistic Regression	88.35
CNN Model	91.76
LSTM Model	92.61
CNN + LSTM Hybrid	93.42
BERT (Transformer-Based)	94.78
Multilingual BERT	94.05
Proposed System (Hybrid NLP + DL)	**95.62**

Fig. 4. Real news detection

Fig. 6. Implementation

Fig. 5. Fake news detection

VI. CONCLUSION

This study presented an interpretable deep learning framework for automated skin disease classification that combines a Convolutional Neural Network with EfficientNet to enhance feature representation and prediction reliability. The hybrid architecture effectively captures both local lesion textures and high-level semantic patterns, enabling improved differentiation among visually similar skin conditions. The incorporation of Gradient-weighted Class Activation Mapping provides visual explanations by highlighting image regions that influence model decisions, thereby improving transparency and user trust in automated diagnosis. Beyond classification, the system extends its functionality through supportive healthcare components, including symptom information, medical guidance, treatment cost estimation based on healthcare facility type, and location-based hospital recommendation. This integrated approach demonstrates the practical potential of combining predictive modeling, explainable AI, and healthcare assistance within a unified platform, contributing toward patient-centric digital diagnostic support. Future work may focus on training the model with larger and more diverse datasets encompassing varied skin tones, imaging conditions, and rare disease categories to enhance generalization. Additional improvements can be explored through advanced network architectures, hyperparameter optimization, and ensemble strategies.

Deployment on mobile or cloud-based platforms could enable real-time screening and wider accessibility, particularying resource-limited settings. Clinical validation through collaboration with medical professionals and integration with healthcare information systems may further strengthen reliability and adoption. These developments could support the transition of such AI-based frameworks from research environments to practical healthcare applications.

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