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## Fake News Detection using Label-Embedded LSTM in Healthcare

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**ABSTRACT:** Fake news poses a serious threat to society by spreading misinformation. Traditional machine learning methods struggle with accurate detection due to limited feature extraction. This project proposes a Lexicon-Enhanced LSTM (LE-LSTM) model that combines sentiment and content-based features to effectively identify fake news. The model achieves high accuracy and efficiency, making it suitable for real-world applications in detecting misleading content.

**KEYWORDS:** Fake News Detection, LE-LSTM, Sentiment Analysis, Deep Learning, Natural Language Processing (NLP), Lexicon-Based Features Text Classification, TF-IDF, Word Embeddings, Misinformation Detection.

#### I. INTRODUCTION

The rapid spread of fake news on digital platforms has become a major challenge for society, affecting journalism, politics, and public trust. Fake news refers to false or misleading content presented as legitimate information. Due to the massive volume of online content, manual detection is impractical. Traditional machine learning methods often rely on manual feature engineering and lack the depth needed for complex language understanding. Deep Learning, particularly Long Short-Term Memory (LSTM) networks, has shown promise in processing sequential text data. This project introduces a Lexicon-Enhanced LSTM (LE-LSTM) model, which integrates sentiment information with content features to improve the detection of fake news. The model aims to achieve high accuracy with minimal manual intervention, making it a robust solution for real-time misinformation filtering.

#### **II. LITERATURE SURVEY**

Numerous studies have explored the use of machine learning and deep learning for fake news detection. Traditional classifiers like Naive Bayes, Support Vector Machines (SVM), and K-Nearest Neighbors (K-NN) have been applied using manually extracted features such as bag-of-words and TF-IDF. However, these models often struggle with context understanding and fail to capture the semantic nuances in text, leading to limited accuracy and generalizability.Recent advancements in Natural Language Processing (NLP) have led to the adoption of Recurrent Neural Networks (RNNs), especially LSTM networks, which are effective for sequence modeling. Models such as BiLSTM, CNN-LSTM, and GRU have been used to learn deeper contextual information. Additionally, sentiment analysis has emerged as a helpful feature, as fake news often contains exaggerated or emotionally charged language.However, most models either focus purely on linguistic content or sentiment in isolation. This project



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addresses the gap by proposing a Lexicon-Enhanced LSTM (LE-LSTM) model that combines both sentiment lexicon features and text embeddings, improving both accuracy and convergence speed.

#### **III. METHODOLOGY**

The proposed system uses a Lexicon-Enhanced LSTM (LE-LSTM) model that combines word embeddings with sentiment lexicon features. News data is collected and preprocessed by cleaning and normalizing text. TF-IDF and sentiment scores are extracted to enrich input features. These are fed into an LSTM network that captures context and emotional tone. The model is trained and evaluated using standard metrics. A Flask-based web app enables real-time fake news detection

#### **IV. EXPERIMENTAL RESULTS**

The LE-LSTM model was trained on a labeled dataset of real and fake news articles. After preprocessing and feature extraction, the model achieved high performance in classification tasks. Key results include:

Accuracy: 96.45% Precision: 96.50% Recall: 96.40% F1-Score: 96.45% AUC (Area Under Curve): 0.98

These results demonstrate that the integration of sentiment features with LSTM significantly improves detection accuracy and reduces convergence time compared to traditional models.



#### V. CONCLUSION

The AI-Driven Healthcare System for Disease Prediction and Specialist Recommendation successfully integrates multi-modal analysis to enhance telehealth services. With high accuracy in disease prediction (92%) and emotional state analysis (85%), the system provides personalized care by combining facial expression, speech emotion detection, and NLP techniques. The specialist recommendation system ensures effective matching of patients with the right doctors. Overall, the project demonstrates the potential of AI to improve patient outcomes, emotional well-being, and healthcare efficiency, offering a more personalized telehealth experience.

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