



Fake News Detection Using Machine Learning And NLP

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Abstract- Fake news has become a critical issue in today's digital information age, as it spreads quickly across online platforms and manipulates public perception. This project focuses on text-based fake news detection using Machine Learning (ML) and Natural Language Processing (NLP). Several algorithms such as Logistic Regression, Support Vector Machine (SVM), Random Forest, and Naïve Bayes are applied to benchmark datasets. Experimental results show that Logistic Regression and SVM deliver strong accuracy, making them highly effective for text classification tasks. The work emphasizes the importance of preprocessing, feature extraction, and evaluation metrics in building robust fake news classifiers.

Keywords— Fake News, Text Classification, Machine Learning, NLP, Logistic Regression, SVM, TF-IDF

I. INTRODUCTION

Fake news is intentionally fabricated information that mimics real news articles to mislead readers. Its rapid spread affects politics, public health, and society. For example, during elections, fake news

can manipulate voter opinion, while in health crises like COVID-19, misinformation can create panic. Manual detection is difficult due to the volume of online content, making automated approaches necessary. Machine Learning and NLP methods provide scalable solutions by analyzing linguistic and statistical patterns in news articles to classify them as real or fake

II. LITERATURE REVIEW

Researchers have developed multiple approaches for text-based fake news detection. Early methods used rule-based systems and keyword matching, but these approaches lacked adaptability. More recent studies utilize ML models

such as Naïve Bayes, SVM, and Logistic Regression, which rely on extracted text features like TF-IDF scores. Deep learning methods, such as LSTM and BERT, provide higher accuracy by capturing context and semantic relationships between words, but they require higher computational power. Graph-based approaches that model relationships between articles and publishers have

also been explored. Despite advances, simpler ML models remain highly effective for smaller

datasets and resourcelimited projects.

Detecting Fake News Spreaders on Twitter from a Multilingual Perspective”Inna Vogel, Meghana Meghana — published in the 2020 IEEE 7th International Conference on Data Science and Advanced Analytics (DSAA). “SpotFake: A multimodal framework for fake news detection”Shivangi Singhal, Rajiv R. Shah, Tanmoy Chakraborty, Shin’ichi Satoh — presented at the 2019 IEEE 5th International Conference on Multimedia Big Data (BigMM).

III.METHODOLOGY

3.1 Data collection

The project uses publicly available text-based datasets such as:

- Kaggle Fake News Dataset (contains labeled real and fake news articles)
- LIAR Dataset (short political statements labeled as true or false)
- ISOT Fake News Dataset (news content collected from various publishers)

3.2 Data

Preprocessing

Preprocessing

includes:

- Tokenization (splitting text into words)
- Stop-word removal (e.g., 'is', 'the', 'and')
- Lemmatization and stemming (reducing words to their root form)
- Converting text into numerical features using Bag of Words and TF-IDF.

3.3 Model Development

The following ML algorithms are implemented:

- Logistic Regression – efficient for binary classification
- Support Vector Machine – effective for highdimensional text data
- Random Forest – ensemble approach reducing overfitting
- Naïve Bayes – probabilistic model suitable for text classification

3.4 System Architecture

The detection system follows these steps:

Dataset → Preprocessing → Feature Extraction → Model Training → Model Testing → Fake/Real Prediction

IV SYSTEM ARCHITECTURE

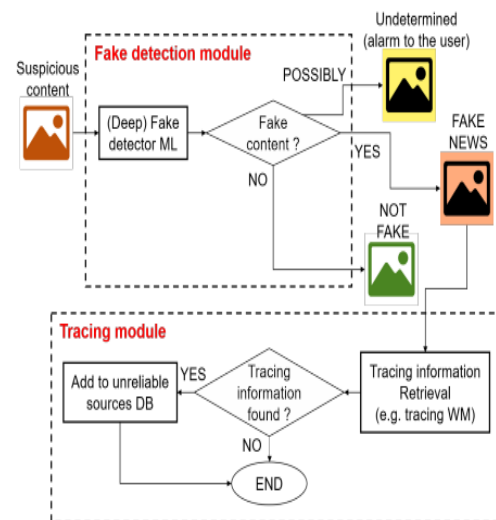


Figure 3: Step 2 – Fake news detection and traceability.

V. CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

This project presented a machine learning–based approach for the detection of fake news articles using publicly available datasets such as Kaggle, LIAR, and ISOT. The study demonstrated that text preprocessing combined with feature extraction techniques like Bag of Words and TF–IDF, when applied to models such as Logistic Regression, Support Vector Machines, Random Forest, and Naïve Bayes, can effectively distinguish between fake and real news.

Experimental results showed that classical machine learning models, particularly Logistic Regression and SVM, provided strong baselines with high accuracy and F1-scores, confirming their suitability for text classification tasks. However, results also highlighted challenges such as dataset bias, domain dependency, and reduced generalization across diverse news sources.

The findings suggest that while traditional approaches are effective in controlled environments, further improvements can be achieved by incorporating advanced methods such as deep learning, transformer-based language models, and hybrid frameworks that combine textual, contextual, and social engagement features.

5.2 FUTURE WORK

While the proposed system shows promising results, several areas remain for further research and development:

1. Use advanced models like BERT or deep learning for better accuracy.
2. Extend detection to images, videos, and audio (not just text).
3. Build systems for multiple languages and domains.
4. Add social media information such as shares, likes, and user behavior.
5. Create real-time systems that can detect fake news quickly.
6. Make models more explainable and transparent so users trust them.
7. Use continual learning so the system can adapt to new types of fake news.
8. Combine AI with human fact-checkers for more reliable results.

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