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Research Article

Fake News Detection - Detecting Fake News using AI and Transformer - Based Hybrid Systems

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ABSTRACT

The internet is a vital invention with a vast user base using it for various purposes. Social media platforms allow any user to post or spread news without verification, leading some to spread fake news as propaganda against individuals, organizations, or political parties. Since humans cannot detect all fake news, there is a need for machine learning classifiers to automate this process.

Keywords: Online fake news, Machine learning, Text Classification, social media

1. Introduction

While the digital world offers many advantages, it also facilitates the spread of fake news to harm reputations or spread propaganda. Online platforms like Facebook and Twitter are common grounds for this. Machine learning (ML), a part of artificial intelligence, enables systems to learn and perform tasks like prediction and detection through supervised, unsupervised, or reinforcement algorithms trained on datasets.

Detecting fake news is a significant challenge because users often believe and spread it without verification. This has real-world consequences, such as affecting opinions and decisions in the 2016 US election. Researchers are increasingly using ML algorithms to automate detection as the volume of fake news grows over time.

2. Methodology

This paper uses a Systematic Literature Review (SLR) methodology to answer specific research questions by collecting and citing papers from various databases.

Exclusion and Inclusion Criteria: To ensure relevance, the following criteria were applied:

Table 1: Exclusion and Inclusion Criteria.

Exclusion Criteria	Inclusion Criteria
Language is not English	Written in the English language
Complete paper is not accessible	Paper can be accessed completely
Not related to ML and fake news	Related to ML and fake news detection

Quality Assessment Papers were assessed based on their discussion of machine learning use for fake or false news detection. Out of 73 papers initially collected, 26 were selected for this review.

3. Research Questions

The SLR aims to answer:

- ***RQ1***: Why machine learning is required to detect the fake news?
- ***RQ2***: Which machine learning supervised classifiers can be used for detecting fake news?

• ***RQ3***: How classifiers of machine learning are trained to detect fake news?

4. Search Process

The search involved databases including Clarivate Analytics (WoS), ACM Digital Library, IEEE Xplore, and Elsevier (Scopus). The process followed these steps:

» Search Keywords

» Title & Abstract Exclusion

» Conclusion & Full Text Exclusion

» Selection of Primary Studies

5. Result and Discussion

***RQ1*: Why machine learning is required?**

Controlling fake news is mandatory because it can affect businesses, individuals, and political parties. Manual detection is difficult as most people do not know the full story behind a news item. ML allows for automatic and easy detection by checking post content against trained models.

***RQ2*: Which supervised classifiers can be used?**

Research indicates several effective classifiers:

Support Vector Machine (SVM): A supervised algorithm often cited for high accuracy in classification.

- **Naïve Bayes:** Used for checking authenticity; reported accuracies reach as high as 96.08%.
- **Logistic Regression:** Useful for categorical predictions (True/Fake).

Random Forests: Operates by using a "majority vote" from different random trees.

- **Neural Networks & RNNs:** Used for deep learning-based classification.
- **K-Nearest Neighbor (KNN):** Classifies news based on similarity to stored cases.
- **Decision Tree:** Breaks down datasets into smaller subsets for detection.

***RQ3*: How are classifiers trained?**

Training is crucial for accuracy. The process generally follows:

- **Dataset Collection:** Using labeled news data.
- **Preprocessing:** Removing "stop words" and performing "stemming" (transforming words to their single form).
- **Feature Extraction:** Using models like TF-IDF, N-Gram, or Bag of Words to extract valuable data.
- **Splitting Data:** Dividing into Training and Test datasets.
- **Experimental Results:** Evaluating the classifier's performance.

6. Conclusion

Fake news on social media can destroy reputations and manipulate political opinions. Because platforms do not restrict or verify posters, ML classifiers are necessary to detect these posts automatically after being trained on labeled datasets. Future research may focus on unsupervised machine learning since labeled data is often difficult to obtain.

7. References

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