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FAKE NEWS DETECTOR AI USING MACHINE LEARNING

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ABSTRACT
The swift rise of virtual media has caused more growth in the distribution of false information, or "fake news." With this rise, fake news has the ability to sway public sentiments, instigate panic among individuals, and even affect the ability of people to make decisions. Finding these types of content, especially on a large scale and automatically, is one of the main AI/NLP challenges today. The purpose of this research is to build a lightweight and explainable AI system that can identify fake news by reviewing numerous analytical aspects that contribute to its credibility, including; Natural Language Processing (NLP) analysis, rule-based techniques, checking the credibility of the source of the news, identifying clickbait, verifying the reputation of the domain. The system provides a "credibility score" based on a scale of 0-100 and classifies articles into Likely Credible and Fake News. It can accept an input of either text, PDF, or an image through OCR and produces a result very quickly. It also maintains transparency and user privacy.

1.INTRODUCTION

In the digital era, information spreads rapidly through online news platforms, blogs, and social media networks. Platforms such as Facebook, Twitter, and WhatsApp enable instant sharing of information across the world. While this connectivity improves information accessibility, it also increases the spread of misinformation and fake news.

Fake news refers to intentionally fabricated or misleading information presented as legitimate news. Such content can influence public opinion, create confusion, damage reputations, and even threaten national security. The growing volume of online content makes manual fact-checking difficult and time-consuming.

Several Artificial Intelligence methods have been proposed for fake news detection. Deep learning models such as transformer architectures achieve high accuracy but require extensive computational resources and large labeled datasets. Furthermore, many of these systems function as black-box models where users cannot understand the reasoning behind predictions.

To address these limitations, this paper proposes a lightweight and explainable Fake News Detector AI system. The system analyses news credibility using a structured six-factor evaluation model that combines Natural Language Processing techniques with rule-based analysis. Instead of relying solely on deep neural networks, the system evaluates emotional tone, source credibility, linguistic patterns, clickbait phrases, domain reputation, and factual evidence.

The proposed approach provides a transparent credibility score and explanation for each analysed article. This improves user trust while maintaining computational efficiency.

2. RELATED WORK

Fake news detection is an active area of research within Artificial Intelligence and Natural Language Processing and has gained importance over the last few years in the detection of misinformation. Platforms that provide manual fact-checking (e.g., Snopes and FactCheck.org) have experts verify claims and produce reports documenting these verifications. These fact-checking services can provide very accurate verification, but because they are performed by humans, they have limitations in terms of scalability.

Machine learning is another approach that has been extensively researched in this field. For example, the LIAR dataset and FakeNewsNet datasets have been created to support supervised learning algorithms in classifying news articles according to their textual characteristics as well as social media context.

Transformer-based models such as BERT have demonstrated that they can successfully perform text classification tasks, including misinformation detection; however, in order to build and make use of these models, large training data, high-performance GPUs, and a continuous retraining process must be utilized.

Finally, many existing systems only provide binary classification (fake or real) without providing any rationale for the prediction. This deficiency decreases trustworthiness for the user.

The proposed system addresses all of the deficiencies listed above due to its use of multiple credibility indicators and a transparent scoring mechanism.

3. IMPLEMENTED SYSTEM

The Fake News Detector AI system is built upon a multi-factor credibility assessment model in order to evaluate news articles for their authenticity, without relying on just one prediction model; analysing multiple characteristics of the news article.

The system is structured using a client-server architecture, where a user interacts with the web interface and communicates with the backend server (which is built using Flask a Python-

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based development framework). The backend processes the user's input with multiple analysis modules and returns the results back to the user in JSON format.

The system has 6 different components that perform different types of analysis on bogus news articles.

3.1 Tone/Emotion Analysis

Exaggerated emotional language is frequently used in fake news articles to manipulate the way a reader perceives the information. Tone and Emotion analysis is performed on the news article's text using TextBlob to calculate both polarity and subjectivity scores for the article.

3.2 Source Credibility Verification

The source of the information being presented is verified to ensure that credible institutions, research studies and/or expert opinions were referenced as sources of information in the respective article. If there are no credible references related to the source, then the article receives a lower score for its credibility as a function of the number of reliable references used as sources of information in the article.

3.3 Writing Quality Analysis

The number of punctuation marks, use of capitalisation, sentence structure and consistency in grammar is evaluated within the news article being analysed; articles that are poorly constructed with linguistic structure typically indicate that the alleged content has been written by an unreliable source.

3.4 Sensational Headline Analysis

Detecting the presence of sensationalised headlines in the article is accomplished through the use of pattern matching; e.g. words such as "Breaking News", "Shocking Truth", and "You Will Not Believe This" are commonly used in sensationalised headlines. Sensationalised headlines are a strong indicator of the presence of misleading articles.

4. Implementation of the System

The entire system is written in Python and takes advantage of a variety of natural language processing libraries and tools. Basic text manipulation operations such as tokenizing, removing stop words and splitting text into separate sentences are performed using the NLTK library. Performing numerical operations that are used in the scoring process are done using the NumPy library.

The application will accept multiple formats for input such as plain text, PDF documents and images. Text data can be extracted from PDF files using the PyPDF2 library and images containing text can be scanned and converted into readily usable text using an optical character recognition (OCR) application called Tesseract OCR.

When users submit requests to the backend server through REST APIs, the system uses JSON formats to reply with a credibility score, verdict and explanation.



Figure 1: Fake News Detection Process Flowchart

5. EXPERIMENTAL FINDINGS

The subject of writing this research paper has been explored by making use of different test scenarios for both valid/real news sources of information along with fabricated examples of false or misleading news stories. In one case, the tested route used to analyse false news was through an article that had large amounts of emotionally charged and click-bait type of wording within it. The detector gave the article a score of 25 out of 100 while classifying it as a falsehood. In contrast, articles written by well-respected professionals and from reputable reference points received over an 85 point score confirming them to probably be true using the detector.

Within the experiments that were being recorded the average length of time for the detector to be able to respond to a simple input such as standard text was less than one second.

The results suggest that the multi-factored approach chosen as part of the analysis process produces greater ease for human understanding or interpretation as opposed to past models which only produced binary scores of true or false, with no further usable data.

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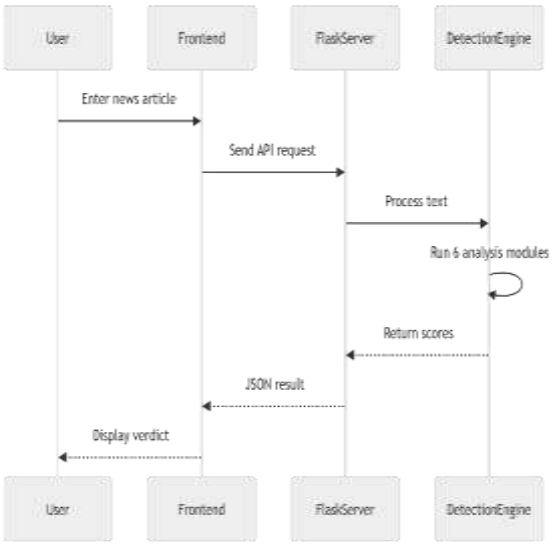


Figure 2: System Interaction Sequence Diagram

6. CONCLUSION

In conclusion, the study presented and analysed here produced an explainable and light weight form of Artificial Intelligence that can determine the credibility of a news source using a multi-factored analysis process. This analysis method as already discussed utilizes four distinct areas of research with the overall goal being to communicate to its users with transparency so that they have useful and accurate results that can be understood.

The current methodology will produce accurate results without requiring vast amounts of training examples or computing power as well as producing quick data processing results; additionally, the system of analysis is designed to protect its users privacy by utilizing local data processing and not permanently storing user input data.

7. FUTURE WORK

Future enhancements may enhance the overall accuracy and performance of the platform. One potential enhancement could be adding a transformer-based model (e.g. BERT) to assist with more accurate contextual understanding. Such enhancements could include multilingual capabilities, integration with real-time fact-checking API(s), deployment as a browser extension, and conducting social media based contextual analysis. Additionally, adding user feedback based on machine learning to keep domain reputation updated would further help the system adapt over time.

The overall result of these improvements would allow the platform to evolve and develop into a complete AI based platform for misinformation detection.

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