News Analyzer: A System for Combating Fake News on Facebook

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Abstract. This paper presents News Analyzer, a system leveraging keyword extraction and user reporting to combat fake news on Facebook. The browser extension facilitates source comparison and keyword analysis, empowering users to evaluate news credibility. A transparent user reporting system fosters community-driven efforts to flag misinformation. News Analyzer promotes a more informed online environment.

Keywords: Fake news, Facebook, news analysis, keyword extraction, user reporting

1 Introduction

The explosion of social media has undoubtedly revolutionized access to information. However, it has also created a breeding ground for misinformation masquerading as legitimate news. This phenomenon, commonly known as "fake news," poses a significant threat to informed public discourse, decision-making, and even societal stability. Fake news articles often manipulate emotions, exploit confirmation bias, and lack factual accuracy. This can lead to confusion, distrust, and potentially harmful consequences. Identifying fake news can be a continuous challenge. While the nature of these articles constantly evolves, there's no single foolproof method. However, valuable tools exist to help. Regularly updated databases of fact-checked news and websites like Check Your Fact can provide valuable resources.

This paper acknowledges the difficulty of definitively labeling news as "fake" or "not fake." Instead, it proposes an extension that analyzes news reliability from various aspects. This includes user reviews, related news coverage, and the domain name of the source. By providing this information, the extension aims to empower users to make more informed judgments about the information they encounter online.

1.1 Chinese Fake News Impacts

In recent times, Taiwan has witnessed a surge in the spread of fake news, particularly through popular social media platforms such as PTT (a forum-based platform) and LINE (a messaging app). This phenomenon is primarily driven by political motivations, with actors likely affiliated with China seeking to shape public opinion within Taiwan.

However, the landscape of fact-checking websites in the Chinese language remains limited. Specifically, when considering traditional Chinese, the availability of reliable fact-checking sources is even scarcer. Analyzing the credibility of news becomes a critical task, especially given the current prevalence of misinformation in Taiwanese and Traditional Chinese news.

Moreover, fact-checking efforts face additional challenges within China due to strict censorship measures. As the "information war" intensifies, accurate analysis becomes essential for the discerning audience.

These dynamics underscore the importance of robust fact-checking mechanisms and reliable information sources in countering the spread of fake news and ensuring informed decision-making.

1.2 Fake News in Taiwanese Social Network

Misinformation about a Teacher's Video: In June, a video of a teacher cursing in Hoklo (commonly known as Taiwanese) began circulating on various social media platforms. The post accompanying the video claimed that the content was low-class, vulgar, and shameless, and blamed the government for such teaching material. However, the Taiwan Fact Check Center (TFCC)[1] debunked this misinformation, explaining that the video was filmed at a university, not a government institution, and the emotional outburst was part of a literary work[2].

1.3 Chrome Extension Experience

The use of Chrome extensions to aid users in interacting with website information has become commonplace. There are numerous popular extensions, such as Google Translate and Avast Web Security, among others.[3]

A Chrome extension is a compact software program designed to enhance the functionality of the Google Chrome browser. These extensions are developed using web technologies like HTML, CSS, and JavaScript. Each extension is designed to serve a specific purpose, forming the core around which the entire program is built. Extensions can introduce a variety of features to the browser, including new toolbars, a new tab page, and integration with other web services.

2 Related Works

2.1 Facebook Fact-checking Tool

According to the official website on Meta, it is said that the Facebook Fact-checking tool is mainly targeted to combat the fake news and misleading information. **This tool consists of three steps: Identify, Review, and act.**

Identify: Fact-checkers and Meta's technology work together to identify potential misinformation. This process uses various signals, including community feedback and similarity detection. During significant events or trending topics, keyword detection is used to aggregate related content for easy access by fact-checkers.[4]

Review: Fact-checkers assess the accuracy of stories through original reporting, which can include interviewing sources, consulting public data, and analyzing media. Content removal is separate from this process and is based on violation of Community Standards.

Act: When content is rated as false, its distribution is significantly reduced. Users who shared or attempted to share the content are notified, and a warning label is applied. AI is used to scale the work of fact-checkers by applying warning labels to duplicates of false claims.

Surveys indicate that 74% of users find the warning screens valuable and believe they are applied fairly.

Fig. 1. An example of Facebook Fact-checking results, which shows "Lack of background information"

3 Methodology

This study aims to develop a software system that can display the veracity of Chinese news on Facebook in real-time. This system will be connected through a front-end Chrome extension and a back-end service. To achieve this goal, several steps are necessary: keyword extraction, sentence segmentation, news feature

extraction, and news classification. The algorithms for these steps must be at least functional for the system to operate.

Building on past pilot results, this project will focus on analyzing news features and applying them to the identification framework. It will also collect sufficient data for training and testing. Therefore, this research will explore several aspects in sequence.

3.1 Chinese Keyword Extraction

Unlike Western languages separated by spaces, Chinese text presents a unique challenge in Natural Language Processing (NLP) tasks like keyword extraction. The continuous stream of characters necessitates specialized techniques to identify meaningful keywords.

Jieba, a popular segmentation tool, tackles this challenge. It utilizes a prebuilt lexicon and a combination of algorithms to break down the text into individual words. This process is crucial for understanding the content, as relying solely on character sequences would be akin to analyzing a single, long word in English. Jieba's flexibility allows for customization with user-defined dictionaries, making it particularly valuable for technical documents or specialized fields.[5]

Once segmentation is complete, individual words are stored within a "bag-of-words" structure. However, simply counting word occurrences isn't enough to identify the most relevant keywords. Here, various techniques come into play – assigning weights to each word based on its significance in capturing the document's essence. Traditional methods like TF-IDF can be used, but advancements in deep learning offer more powerful solutions.[6]

Enter BERT, a pre-trained language model from Google AI, which has revolutionized various NLP tasks, including keyword extraction. BERT's strength lies in its ability to capture the contextual relationships between words, providing a deeper understanding of the text's content. By integrating BERT through libraries like KeyBERT[7], we can leverage its pre-trained knowledge to compute more accurate keyword weightings.

In conclusion, Jieba's segmentation prowess combined with BERT's contextual understanding creates a robust and effective approach to Chinese keyword extraction. This approach empowers researchers and practitioners to unlock the hidden meaning within Chinese text data, facilitating information retrieval, text summarization, and a wide range of NLP applications.

3.2 Chrome Extension Design

To enhance user convenience, we've made our extension available on the Chrome Web Store.

Our unique feedback system simplifies reliability assessment. Users can quickly rate the overall trustworthiness of Facebook posts, sources, and domains using a star rating system. We then assign weights to these ratings, similar to the concept shown in the right image, to calculate a comprehensive reliability score displayed in the analysis output (left image).

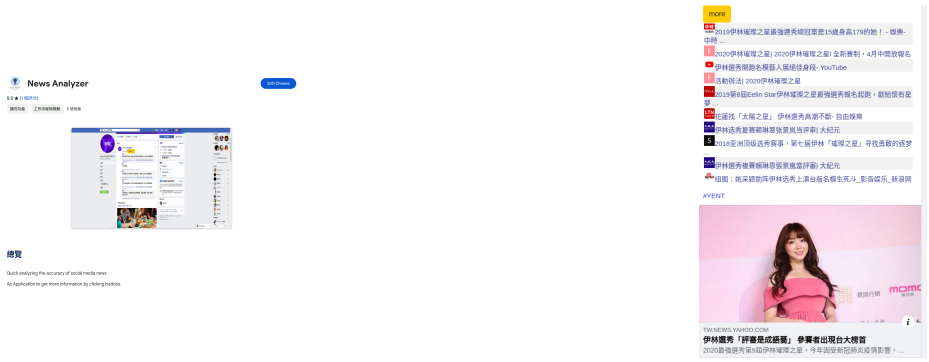

Fig. 2. The screenshot of the Chrome Web Store page, and actual demonstration.

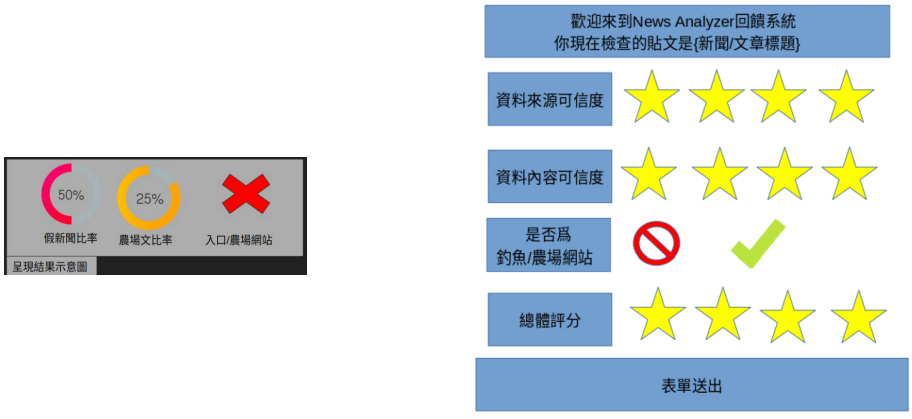

Fig. 3. The feedback system and analysis results

3.3 Server Side Design

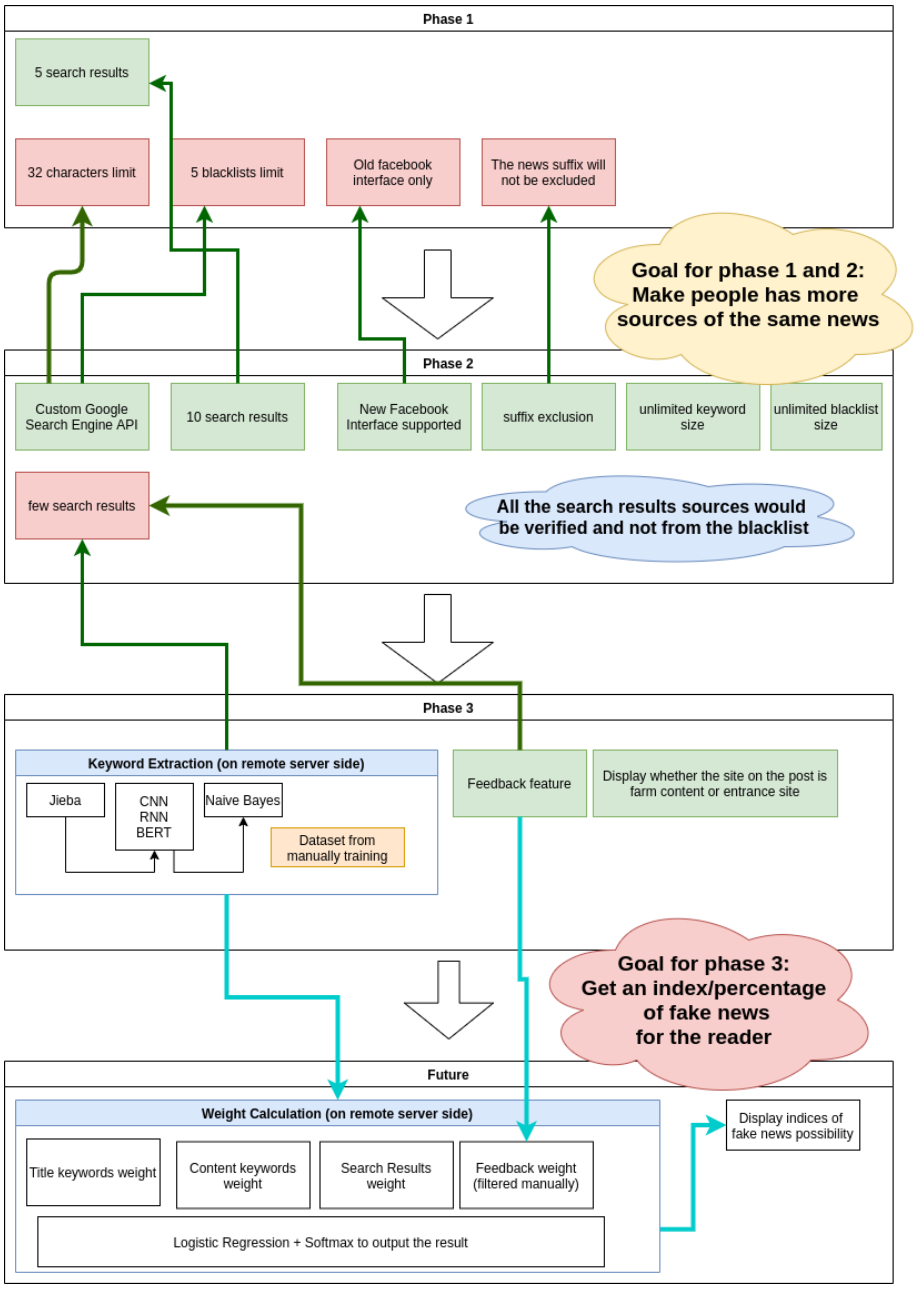

Fig. 4. Flowchart of extension design

4 Conclusion and Future Works

This paper proposes a system to identify the authenticity of news articles on Facebook. A Chrome extension displays key information alongside news posts, including credibility scores, plagiarism ratios, and verified search results. The system leverages deep learning algorithms (BERT, CNN, RNN) to analyze content and structure, calculating credibility scores. User feedback refines the model over time, fostering collaboration in combating misinformation.

By empowering users with credibility scores and a collaborative environment, this system tackles the challenge of fake news on social media. It allows individuals to make more informed judgments about the information they encounter online.

Future research directions include exploring unsupervised learning methods, integrating reinforcement learning, and deepening the understanding of BERT's Attention Layer to improve keyword extraction accuracy.

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