

Employing Detection Techniques to Confront the Rapid Spread of Fake News

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Abstract: Today, the use of social networks such as Facebook, Twitter, and Instagram has become a key part of continuous human engagement in the sense that these platforms are available for users to share personal messages, pictures, videos, and other forms of multimedia. However, these changing trends have become catalysts for creating misleading activities including misinformation, disinformation, and fake news. For example, the spread of false news on social media has adversely impacted mainstream news media, politics, public trust, and healthcare needs. Therefore, the desire to confront the spread of misinformation, disinformation, and false or misleading news remains a challenge for these social media platforms, policymakers, and law enforcement agencies. Several solutions have been suggested by the research community such as the application of machine intelligence, crowd technologies, and social media ranking algorithms with the aim of addressing this ever-evolving infodemic menace.

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Summary: “The explosive spread of false news on social media has severely affected many areas such as news ecosystems, politics, economics, and public trust, especially amid the COVID-19 infodemic. Machine intelligence has met with limited success in detecting and curbing false news. Human knowledge and intelligence hold great potential to complement machine-based methods. Yet they are largely underexplored in current false news detection research, especially in terms of how to efficiently utilize such information. We observe that the crowd contributes to the challenging task of assessing the veracity of news by posting responses or reporting. We propose combining these two types of scalable crowd judgments with machine intelligence to tackle the false news crisis. Specifically, we design a novel framework called CAND, which first extracts relevant human and machine judgments from data sources including news features and scalable crowd intelligence. The extracted information is then aggregated by an unsupervised Bayesian aggregation model. Evaluation based on Weibo and Twitter datasets demonstrates the effectiveness of crowd intelligence and the superior performance of the proposed framework in comparison with the benchmark methods. The results also generate many valuable insights, such as the complementary value of human and machine intelligence, the possibility of using human intelligence for early detection, and the robustness of our approach to intentional manipulation. This research significantly contributes to relevant literature on false news detection and crowd intelligence. In practice, our proposed framework serves as a feasible and effective approach for false news detection.”

Keywords: *Crowd intelligence, collective intelligence, crowdsourcing, misinformation, fake news, social media analytics, machine learning, and deep learning.*

With the rapid growth of social media, the ease of access, sharing, and transfer of information by numerous users on various platforms have in part necessitated the rapid spread of misinformation and disinformation in all spheres of our life. Misleading information has been known to negatively impact our social lives, financial situations, and even political affiliations around the world. Today, the use of social media has become a key part of continuous human engagement in the sense that these platforms are available for users to share personal messages, pictures, videos, and other forms of multimedia. However, these changing trends have become catalysts for creating misleading activities including misinformation and disinformation such as fake news that can quickly spread through social networks. Therefore, the desire

to confront the spread of false or misleading news remains a challenge for these social media platforms, policymakers, and law enforcement agencies. In other words, detecting and combating fake news has become imperative in today's world. Consequently, several solutions have been proposed by the research community and professionals in the field including the application of machine intelligence, crowd technologies, and social media ranking algorithms to confront this infodemic menace.

According to Wei et al. [1], while human knowledge and machine intelligence have great potential to complement machine-based strategies in this direction, both of these entities still exhibit limited success in detecting and thwarting false news permeating through social media. The authors were of the view that crowd contributes to the challenging task of assessing the veracity of news and proposed combining the capabilities of crowd judgments with machine intelligence to tackle persistent false news. The research generated valuable insights based on synergy savings involving crowd techniques, and human and machine intelligence, which not only be useful for early detection but also for the intentional manipulation of information. Additionally, a recent stream of developments suggests that the proliferation of social media platforms promotes the prevalence of false news from generation to consumption of information with consequential effects on individuals and organizations in particular and society in general [1] - [4]. The authors of this baseline paper were able to achieve this in several folds. First, they surveyed several streams of relevant literature that serves as the theoretical foundations of their work. Second, they summarize existing studies about false news detection on social media. Third, they reviewed false news studies that are related to crowd intelligence. This approach was the basis of their proposed framework designed to aggregate the extracted judgments.

Even though social media platforms and tech giants such as Facebook, Amazon, Google, and others have started taking action to address the false news epidemic, they seem to lag behind the alarming and continuous spread of misinformation. In addition, the research community has also devoted much effort to address the prevalence of false news based on two types of data sources including news content and social context [1]. According to this baseline research, the authors acknowledged other major challenges noting that in real-world applications, the number of responses and reports usually increases daily while in the development of false news events, debunking information often happens at a later stage [1]. The fake news (i.e. infodemic), propagated by social media and other mobile message-sharing platforms, has progressed from causing a nuisance to seriously impacting law and order through deliberate and large-scale manipulation of public sentiments [4,14]. A typical example is a COVID-19 pandemic. The global uncertainty due to the pandemic has manifested in a breeding ground for fake news resulting in widespread panic and hindering the efforts of governments around the world to disseminate credible information to their citizens [4]. What makes the spread of false news terrifying is its distinctive characteristic of information sharing as a result of many of the users of social media hastily sharing every piece of news content they come across regardless of its source [7].

In the recent past, several studies [1] – [4], [8] – [14] have used machine intelligence related methods to detect false news and other forms of misinformation via various means such as in social media news articles crowd intelligence, and surveys. For example, one study noted that fake news has shown adverse effects of propagation on social media, and to mitigate these effects, it is required to detect fake news at an early stage when limited information about the news is available [13]. On another note, information sharing is the most important thing among human beings; however, the shared information needs to be authentic and realistic [6]. As well, it is a fact that the ability to distinguish truth from fake is a knowledge that people acquire through experience and age [7]. Furthermore, the proposed framework is a demonstration of the complementary value of human and machine intelligence in aiding false news detection, which could also be attributed to the broader literature on hybrid human-machine intelligence

and other crowd intelligence applications [1]. The authors revealed that their research has several practical implications and actionable insights for relevant stakeholders. For social media platforms, the proposed CAND framework serves as a feasible and effective approach for false news detection on social media platforms. They believe that the practical implications translate into cost-effective measures, which can save social media platforms millions of dollars invested to thwart the spread of false news.

Other researchers have proposed state-of-the-art solutions to address the false news menace. In one paper, Chon and Kim proposed another excellent way to optimize social media analytics to manage crises by using the framework of attribution theory to analyze a bunch of tweets [2]. The authors indicated that social media analytics is a valid tool to monitor how the spread of COVID-19 evolved from an issue to a crisis. Others presented a novel collection of news articles originating from fake and real news media sources for the analysis and prediction of news virality [3]. Unlike existing fake news datasets, which contain news articles, the authors' article collection is supported by a Facebook engagement count. Yet, Gupta et al. [4] presented a survey on combating fake news and evaluates the challenges involved in its detection with the help of existing detection mechanisms and techniques to control its spread. Additionally, Sharma et al, discussed existing methods and techniques applicable to both identification and mitigation, with a focus on the significant advances in each method and their advantages and limitations [14]. Further, in one study, an ensemble classifier was developed for detecting fake news with better accuracy results using the LIAR dataset [6]. In their study, Mladenova and Valova examined the ability to detect fake news and clickbait in the use of social networks [7]. To help understand the current state of affairs, Hu et al, conducted a survey to review and analyze existing deep learning-based fake news detection methods that focus on various features such as news content, social context, and external knowledge [8]. Furthermore, to address the data scarcity problems, one study proposed an automated approach for labeling data using verified fact-checked statements on a Twitter dataset [9]. Li et al. [10] and Chen [11] described the concept of crowd intelligence and explain its relationship to crowdsourcing and human computation. The authors also introduced four categories of representative crowd intelligence platforms as a solution [10]. Despite these research studies, misinformation campaigns, with the spread of false news, can also divert users' attention from serious problems that need urgent attention.

In the final analysis, increased global access to emerging technologies and accompanying devices with the prevalence of social media has led to the exponential growth of information thereby creating an infodemic. In other words, we have a situation where a lot of information is being produced and shared in every corner of the world, thus reaching billions of users at once. the authors revealed that their research has several practical implications and actionable insights for relevant stakeholders. The information age enables people to obtain news online through various channels, yet in the meanwhile making false news spread at unprecedented speed and has detrimental effects on social stability and public trust [8]. Furthermore, given the role of popular social media platforms in recent political and economic climates, understanding such processes might enhance information and the impact of communication technology on living environments [11]. Ultimately, the unified CAND framework proposed by Wei et al. [1] for detecting fake news and halting its dissemination can further improve the usefulness of crowd and machine intelligence to mitigate the effect of false news propagated mostly by social media platforms.

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