"Covid-19 pandemic, delta variant, vaccines" the current need for the detection of infodemic false information in social media

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Abstract

False information exists in different forms: images, blogs, messages, stories, breaking news. Users of online social media sites such as Facebook, Twitter, and YouTube have fueled the propagation of information, the reasons are the fast response times and high communication speeds. The problem of false information has gained attention in presidential elections in 2016, Covid-19 in 2020, Delta Variant and vaccine in 2021. This paper summarizes the most important type of false information and approaches which is using recently by the community.

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1 Introduction

The Internet is replacing traditional media like television and print media as a source for obtaining news and information about current events [1]. According to the website Live Stats, there were 4.79 billion Internet users in the world in 2020, 5.5 % more than in 2019, more 5 billion internet users in July 2021 and the number of the active users is important too, represented in Figure 1. That's 166 % more than 10 years ago [1].

False information on the web and social media has affected the world during Covid-19 pandemic (Fake news, rumors, Misinformation, disinformation, Hoax, Satire).

[1] https://www.internetlivestats.com/

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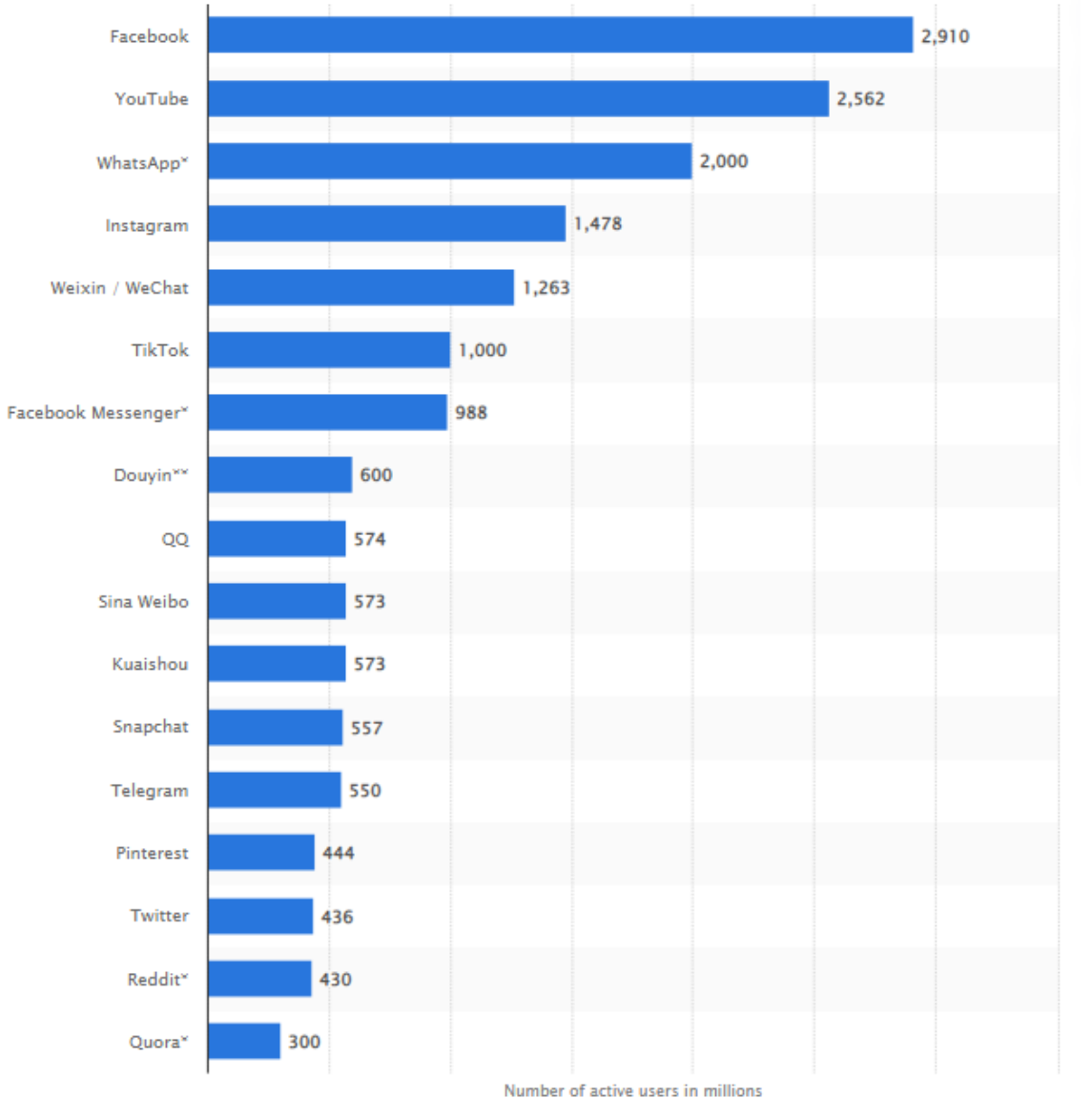

FIGURE 1. Most popular social networks worldwide as of July 2021, ranked by number of active users (in millions)

2 Types of false information in social media

Table 1 summarizes different types of content in internet.

Table 1. Types of false information in social media

Type	Definition	Reference
Fake news	To be news articles that are intentionally and verifiably false and could mislead readers.	[2]
Rumor	Sunstein (2007)[3] defines rumors as "claims of fact about people, groups, events, and institutions that have not been shown to be true, but that move from one person to another, and hence have credibility not because direct evidence is available to support them, but because other people seem to believe them."	Sunstein, Cass R. 2007. Republic.com 2.0. Princeton University Press.
Misinformation	Is false, inaccurate, or misleading information that is communicated regardless of an intention to decive. Examples of misinformation are false rumors, insults, and pranks.	https://en.wikipedia.org/wiki/COVID-19_misinformation
Disinformation	Is used to refer to false information shared deliberately.	[3]
Hoax	A hoax is a falsehood deliberately fabricated to masquerade as the truth. It is distinguishable from errors in observation or judgment.	https://en.wikipedia.org/wiki/Hoax
Satire	It is a type of deception that intentionally incorporates cues revealing its own deceptiveness.	[4]

3 Fake news

The word "fake news" has gained popularity in the aftermath of the "2016 US presidential elections" in which it is believed that false content distributed during the election had a significant impact on the election outcome. Figure 2, It lists about 12 conspiracy theories with political implications that have circulated over the past half-century. Using polling data compiled by the American Enterprise Institute (2013), this figure plots the share of people who believed that each statement is true, from polls conducted in the listed year. For example, Barack Obama was not born in USA but in another country [2]. Fake news relates to "false information" that was deliberately intended and intentionally misleading [5]. Research on fake news detection is still in the early stage as this is a relatively recent phenomenon, at least in the interest raised by society [6].

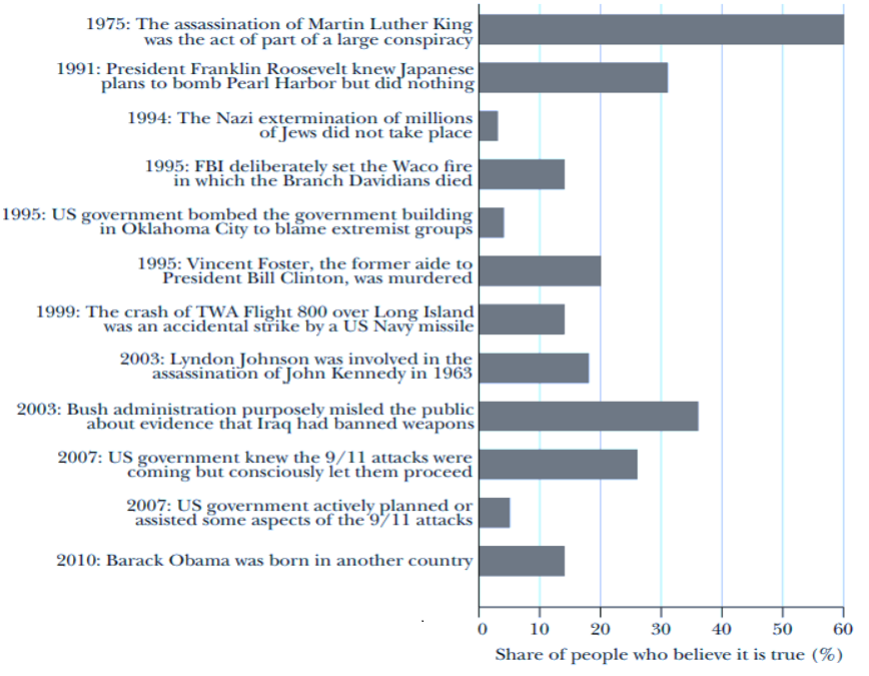

FIGURE 2. Few examples of false information [2]

The Economic Times[4] declared 2019 to be the "Year of Fake News. "The problem associated with the propagation of fake news continues to grow at an alarming scale. This trend has generated much interest from politics to academia and industry alike [7]. Gartner research[5] predicts that "By 2022, most people in mature economies will consume more false information than true information".

Since January 2020, the world population is worried about the Covid-19 pandemic, the fear has not stopped growing, moreover the Spanish flu of 1918-1919, the Asian flu of 1957-1958, the so-called Hong Kong flu of 1968, AIDS or the Ebola virus, although often much more deadly, had not caused such a scare ... Even the influenza A (H1N1) of 2009 Some researchers in social psychology say that this anxiety is common in the event of a new epidemic, but social media dramatically amplify the psychosis that accompanies the spread of the virus; they convey permanent misinformation that feeds stigmatization, resentment and division[6]. Misinformation about COVID-19 has proliferated widely on social media, ranging from the peddling of fake "cures," such as gargling with lemon or salt water and injecting yourself with bleach[7].

[4]2019 - The year of fake news - The Economic Times (indiatimes.com)

[5]Titcomb, J., Carson, J.: www.telegraph.co.uk. Fake news: What exactly is it – and how can you spot it?

[6]https:// https://www.frstrategie.org/publications/notes/coronavirus-reseaux-sociaux-premieres-reflexions-strategiques-sur- une-infodemie-2020

[7]https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200202-sitrep-13-ncov-v3.pdf (accessed February 2, 2020).

Death can be the tragic outcome of what the World Health Organization (WHO) has termed the infodemic, an overabundance of information, "Acting on the wrong information can kill". Approximately 6,000 people were hospitalized around the world in the first three months of 2020 because of coronavirus misinformation. Researchers say at least 800 people may have died due to misinformation about COVID-19[8]. During the months of May and June 2020, represented in Figure 3, "Stop the Spread" rolled out on BBC World television, website and apps. Its goal was to raise public awareness of the large amount of misinformation around COVID-19 and encourage people to double-check information, hence decreasing the harm and spread of false information[9]. In 2021, a new Delta variant and covid-19 vaccine fake news spread.

4 Related work

Fake news is a term that is commonly used to refer to a variety of false information that does not necessarily adhere to any one type of disinformation [8]. Fake news detection is defined as the prediction of the chances of a particular news article (news report, editorial, expose, etc.) being intentionally deceptive [9]. The three main tools and methodologies which have prime importance in fake news detection are Machine learning, deep learning and NLP.

The following categories can be used to categorize related work : **Machine learning-based detection**, **Deep learning-based detection**, and **Natural language processing**.

4.1 Machine learning-based detection

Many researchers have defined several tasks and proposed machine learning algorithms to address fake news problem. The authors of [10] showed that automated classification techniques can be used to detect news topics from conversational topics and assessed their credibility based on various Twitter features. The achieved a precision and recall of 70-80 % using J48 decision tree classification algorithms. [4] proposed a model to identify satire and humor news articles. They proposed an SVM classification model mainly using 5 features developed based on their analysis of the satirical news. The 5 features are Absurdity, Humor, Grammar, Negative Affect, and Punctuation. They obtained 90% was achieved using only 3 combinations of features, Absurdity, Grammar, and Punctuation. [6] investigated 6 different machine learning algorithms, namely, stochastic gradient descent (SGD), support vector machine (SVM), linear support vector machines (LSVM), K-nearest neighbor (KNN), logistic regression (LR), and decision trees (DT) to predict the class of the documents, they obtained 90% accuracy.

4.2 Deep learning-based detection

In deep learning-based detection [11] presented the first novel work that suggests the use of deep learning techniques for identifying fake news, The proposed model is based on recurrent neural networks (RNN) for learning the hidden representations that capture the variation of contextual information of relevant posts over time. [7] proposed work using deep learning approach achieves 82% accuracy using hybrid of convolutional neural networks and long-short term recurrent neural network models to detect and classify fake news messages from Twitter posts. The authors of [12]

[8]Fighting misinformation in the time of COVID-19, one click at a time (who.int)

[9](17) World Health Organization (WHO) on Twitter: "False information on #COVID19 is spreading & putting people in danger. Make sure to double-check everything you hear against trusted sources. For accurate information on #coronavirus find official advice from your country's public health authority & WHO: https://t.co/CeF5m9xIdN https://t.co/u8K68oLv9W" / Twitter

FIGURE 3. "Stop the Spread" rolled out on BBC World television, website and apps

developed different models to detect fake news assembled Convolutional Neural Network (CNN), Long Short-Term Memory network (LSTM) and Bidirectional LSTM (Bi-LSTM). The experiments achieved 71.2% accuracy.
Recent study (2021) [13] introduced a novel fake news detection architecture named TGNF for temporal news propagation graphs, the model can capture dynamic evolution patterns of news propagation from the perspective of continuous time.

4.3 Natural language processing

Detecting fake news is an important application in the world that NLP can help with, as it also creates broader impacts on how technologies can facilitate the verification of the veracity of claims while educating the general public [14], the authors analyzed how fake news detection is aligned with existing NLP tasks. They used machine learning algorithms Naïve bayes (NB), Support Vector Machine (SVM) and Passive Aggressive (PA) classifiers, the best performing classifier is PA, achieved an accuracy level of up to 93%. PA classifier is one of the few "online-learning algorithms" it would be ideal for fake news detection on online social media, there will be a huge amount of data coming in every second and this classifier will be able to handle data of this size[10].

5 Conclusion

False information detection in social media is a relatively recent phenomenon, that false information research has an important contribution to make the new challenges, it's a very timely study on false information on the Covid-19 Pandemic, the propagation of false information will have a bad impact in the future. Although research is underway in the hopes of finding more reliable ways to identify false information in this burgeoning, it is important that we have some mechanism for detecting fake-news-infested domain. In this paper, we present a brief new several open avenues of research, Machine learning, Natural language processing and Deep learning, for detecting and preventing false information on the web and social media.

[10]Passive Aggressive Classifiers - GeeksforGeek

References

[1] H. Kwak, C. Lee, H. Park, and S. Moon, *What is Twitter, a social network or a news media?.*, Proceedings of the 19th international conference on World wide web (2010), 591-600.

[2] H. Allcott and M. Gentzkow, *Social Media and Fake News in the 2016 Election.*, Journal of Economic Perspectives **31(2)** (2017), 211-236.

[3] P. Hernon, *Disinformation and misinformation through the internet: Findings of an exploratory study.*, Government Information Quarterly-Elsevier **12(2)** (1995), 133-139.

[4] V.L. Rubin, N. Conroy, Y. Chen, and S. Cornwell, *Fake news or truth? using satirical cues to detect potentially misleading news.*, Proceedings of the second workshop on computational approaches to deception detection (2016), 7-17.

[5] J.P. Baptista and A. Gradim, *Understanding fake news consumption: A review.*, Social Sciences **9(10)** (2020), 185.

[6] H. Ahmed, I. Traore, and S. Saad, *Detecting opinion spams and fake news using text classification.*, Security and Privacy-Wiley Online Library **1(1)** (2018), e9.

[7] O. Ajao, D. Bhowmik, and S. Zargari, *Fake news identification on twitter with hybrid cnn and rnn models.*, Proceedings of the 9th international conference on social media and society (2018), 226-230.

[8] A. Zubiaga, A. Aker, K. Bontcheva, M. Liakata, and R. Procter, *Detection and Resolution of rumours in social media: A survey.*, ACM Computing Surveys (CSUR) **51(2)** (2018), 1-36.

[9] V.L. Rubin, Y. Chen, and N.K Conroy, *Deception detection for news: three types of fakes.*, Proceedings of the Association for Information Science and Technology-Wiley Online Library **51(1)** (2015), 1-4.

[10] C. Castillo, M. Mendoza, and B. Poblete, *Information Credibility on Twitter.*, Proceedings of the 20th international conference on World wide web WWW'11 (2011), 675-684.

[11] J. Ma, W. Gao, P. Mitra, S. Kwon, B. J. Jansen, K. F. Wong, and M. Cha, *Detecting rumors from microblogs with recurrent neural networks.*, AAAI Press (2016), 3818-3824.

[12] A. Abedalla, A. Al-Sadi, and M. Abdullah, *A closer look at fake news detection: A deep learning perspective.*, Proceedings of the 2019 3rd international conference on advances in artificial intelligence (2019), 24-28.

[13] C. Song, K. Shu, and B. Wu, *Temporally evolving graph neural network for fake news detection.*, Information Processing & Management-Elsevier **58(6)** (2021), 102712.

[14] R. Oshikawa, J. Qian, and W.Y. Wang, *A survey on natural language processing for fake news detection.*, Proceedings of the 12th Language Resources and Evaluation Conference-European Language Resources Association (2020), 6086-6093.