Fake News, Misinformation and Privacy: How the COVID-19 Pandemic Changes our Society and How Blockchain and Distributed Ledger Technologies Reduce Their Effects?

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This position paper summarizes the panelists' presentations and discussions at the Panel "Fake News, Misinformation and Privacy: How COVID-19 Pandemic Changed our Society," held at the 15th International Conference on Information Resources Management (Conf-IRM 2022) on October 18, 2022. The Panel discussed their views on (i) how to stop the spreading of health misinformation, (ii) how information sources affect online health information behavior, (iii) how news literacy increases people's to seek out information by increasing their skepticism, and (iv) how political beliefs, trust, and privacy concerns affect people's decision during COVID-19. The paper discusses how blockchain and distributed ledger technologies (DLT) can help tackle the fake news and misinformation problem.

CCS CONCEPTS • Security and Privacy →Social aspects of security and privacy • Security and Privacy → Privacy protections • Information Systems → Social networks

Additional Keywords and Phrases: COVID-19 Pandemic, Fake news, Misinformation, Privacy

The COVID-19 pandemic changed the paradigm of our world [17][18]. We all went through a series of lockdowns, travel restrictions, and arguments on mandates related to vaccination and the installation of contact tracing apps on our mobile devices [31][52]. We even see people arguing whether the pandemic really exists! Some of these arguments are grounded on people's distrust in the governments and their political stances, the spreading of fake news and misinformation fueled by social media, and people's (over) worry about their privacy. With this background, we hold a panel discussion, "Fake News, Misinformation and Privacy: How COVID-19 Pandemic Changed our Society," at the 15th International Conference on Information Resources Management (Conf-IRM 2022) on October 18, 2022. The Panel was chaired by Prof. Kevin K.W. Ho (University of Tsukuba, Japan) and Dr.

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Dickson K.W. Chiu (The University of Hong Kong, Hong Kong), with four panelists (in alphabetical orders), Dr. C.H. (Allen) Au (National Chung Cheng University, Taiwan), Dr. Francis Dalisay (University of Guam, Guam), Dr. Stuart So (University of Exeter, United Kingdom), and Dr. Masahiro Yamamoto (University of Albany, United States). This position paper summarizes the gist of the presentations and discussions of the Panel.

1 OBJECTIVES OF THE PANEL

People worldwide have lived through outbreaks of infectious diseases in the 21st Century, including severe acute respiratory syndrome (SARS) from 2002 to 2004, Middle East respiratory syndrome coronavirus (MERS) since 2012, and various waves of avian flu in the past two decades [14][27][29][36]. Yet, none can be compared with the impact of the COVID-19 pandemic, resulting in massive lockdowns and interruption of public services [31][52]. While avian flu did not bring partial or complete lockdown of a country, SARS and avian flu could be relatively easy to contain and "less" contagious than COVID-19. Though we use the term "less contagious" to describe avian flu, SARS, and MERS compared with COVID-19, we do not intend to tone down their negative impacts on society.

The infamous Spanish flu was the previous significant contagious disease that shut down society more than a century ago. With advancing modern medical technologies, the average human lifespan has increased roughly from 50 before World War I to 80. People today may hardly believe that a newly found virus can infect and kill so extensively. Particularly, when COVID-19 broke out, we did not have vaccinations or contact tracing apps, and the only remedy was to lock down the country with mask mandates.

While millions have inflected with COVID-19 and some had friends and relatives with severe symptoms, many others disbelieved pandemic-related news for various reasons. First, people have various difficulties in fact-checking (mis)information and (fake) news related to health, particularly because professional knowledge is often involved [4]. In addition, many people "fact-check" based solely on their own beliefs to justify their stances [3][5]. Such beliefs are usually natural extensions of their political beliefs, extending political belief polarization to health polarization. This situation is reflected through the significant differences in the COVID-19 vaccination rates between the Republicans and the Democrats in the US [15].

Political beliefs have also influenced the trust and distrust of a government. Many people distrusted their governments even before the pandemic and considered vaccination, mask mandates, and many preventive measures tools for controlling people [15]. For example, they tend to believe that contact tracing apps are paving the way to authoritarian rule [16]. Even though other people trust their governments, the potential risk of leaking personal information through these contact tracing apps would trigger legitimate privacy concerns, causing adoption reluctance. Therefore, the objective of this Panel is to discuss the latest research related to the following topics:

1. How do we stop the spread of health misinformation?
2. How do information sources affect online health information behavior?
3. How does news literacy increase people's intention to seek information by increasing their skepticism?
4. How do political beliefs, trust, and privacy concerns affect people's decisions during COVID-19?

2 PANEL PRESENTATION DETAILS

2.1 How do we stop the spread of health misinformation?

Health misinformation is a severe problem in modern society. One of the reasons is that most people can only use their common sense to judge whether the health (mis)information they received is accurate. However, as most people do not have sufficient medical science and statistical knowledge, they may misinterpret the information and create misinformation [15]. Health misinformation may trigger people to make wrong health decisions, which can have serious consequences. With the help of the Internet and social media, such health information and misinformation will spread virally [6][44]. Therefore, many recent research studies focus on methods to stop people from sharing health (mis)information. One stream of health misinformation research related to the COVID-19 pandemic focuses on social media's role in spreading antivaccination heresy about the COVID-19 vaccines [31].

The first presentation discussed the role of providing financial incentives for spreading health (mis)information and whether legislation can help reduce the spreading of health misinformation. While Au, Ho, and Chiu [4] observed that providing financial incentives would encourage people to share both perceived health and misinformation, imposing a fine for sharing incorrect or fake health information would have a counter-intuitive effect, i.e., encouraging people from sharing perceived health misinformation and discouraging people from sharing perceived correct health information.

2.2 How do information sources affect online health information behavior?

Apart from understanding how misinformation is spread on the Internet, researchers are also interested in understanding how people receive and share health information there [24], as well as the abnormal behavior related to social media search, such as cyberchondria [28]. During the COVID-19 pandemic, more research has been conducted to understand people's online search behavior [41] and how it relates to their ability to distinguish between accurate and fake information [13][33] and how the COVID-19 conspiracy theory made people less engaging in health-protective behavior [1].

The second presentation presented a study of online health information behavior on social media in China during the COVID-19 outbreak. Using Wilson's 2nd model of information behavior [49] as the theoretical lens, it is noted that Chinese social media users were actively searching for health information, particularly real-time information from government departments and professional institutions they trusted, which can provide speedy communication and reliable information management [39]. This trust is crucial during a crisis like COVID.

2.3 How does news literacy increase people's intention to seek information by increasing their skepticism?

Prior research suggested that information and media literacy [3][5] can help people identify fake news and misinformation. One way to help people avoid being tricked by fake news and misinformation disseminated on social media is to flag a warning about that information [30]. Computer algorithms [51] and deep learning technologies [38] are necessary to analyze online news to identify fake news and misinformation.

Researchers have recently explored news literacy as an emerging topic [45][48]. In particular, they investigate factors that can make people apply critical thinking to analyze the news [19] and maintain

a reasonable skepticism of the information they receive [47]. In the third presentation, the presenters discussed a study exploring relationships among news literacy, news literacy efficacy, news credibility, and skepticism. After analyzing survey data, the study's findings revealed associations between news literacy, skepticism, news literacy efficacy, and news credibility. Implications were also discussed.

2.4   How do political beliefs, trust, and privacy concerns affect people's decisions during COVID-19?

Political polarization often causes people to believe in fake news [15][16], making people disbelieve pieces of advice and even facts from the opposite side of the political spectrum. During the COVID-19 pandemic, some people think that all the mandates required by the governments were excuses for imposing controls on their citizens due to the low distrust of people in their government. These situations have worsened the general situation of various societies, such as making the virus spread more rapidly. In our last presentation, our panelists discussed the situation during the COVID-19 pandemic, and people observed how political misinformation and health misinformation are entangled [15]. With this background, the echo chamber effect and the hostile medium effect fuel the "info-demic" by making people believe in what their political agenda draws them. On the other hand, privacy concerns about COVID-19 contact tracing apps, distrust in governments, and misinformation affect people's perception of COVID-19 contact tracing technology, making them refuse to believe in the available tools to slow down the spread of the pandemic [16].

3   DISCUSSION/THOUGHTS: BLOCKCHAIN, DISTRIBUTED LEDGER TECHNOLOGY, AND THEIR APPLICATION IN FAKE NEWS PREVENTION

Instead of centralizing data as in a traditional ledger, distributed ledgers use independent computers (network nodes) to record, share, and synchronize transactions in their respective electronic ledgers [45]. A particular kind of distributed ledger is the blockchain, in which data is divided into blocks in a blockchain and chained together in an append-only fashion [21]. Data can be distributed among network nodes and/or servers using distributed ledger technology (DLT) or blockchain. On the other hand, blockchain is a subset of DLT that offers characteristics not seen in conventional DLT with additional features beyond the traditional DLT's scope [1][8]. Some of these features are proof of work, which makes blockchain less scalable than DLT [8], and the use of immutable blocks to store data, which limits the operations to create and retrieve [11][33].

Blockchain was initially created for cryptocurrencies, while DLT can serve purposes like record management and process automation [1] and can thus help uphold the authenticity of health records. Besides financial applications, blockchain technology and DLT influence other segments, such as pharmaceutical industries, to develop a secure drug supply chain [34], thus helping maintain the authenticity of drugs. For construction industries, blockchain technology and DLT help build a fully autonomous operation without human interaction [23], thus speeding up the construction of temporary emergency healthcare facilities in case of future pandemics. For health education and information dissemination, these technologies help send and share information securely and tamper-resistantly [19].

Another important application of blockchain and DLT is for detecting and preventing fake news [7][10][19] because the authenticity of the news messages and their spreading paths can thus be

traced. Fake news raises concerns about how social media and the Internet are used in contemporary democratic societies. Digital deception bears a cost to society and individuals because of its rapid and widespread diffusion. It can also result in significant financial losses or pose a risk to the safety of national security. To tackle the issue of fake news in society, recent research suggests the possibility of using a blockchain-based framework to prevent and tackle fake news [35], reducing fake news from spreading on media and messaging platforms [9]. By offering a visible, immutable, and verifiable record of transactions and developing a secure peer-to-peer platform for storing and sharing data, blockchains and other DLTs can ensure the provenance and traceability of the news data [10] and particularly the originality of information [19].

The transformational benefits of Artificial Intelligence (AI) and related innovations have been seen in finance, healthcare, and retailing [42]. Another innovative application of AI is deep fakes [25][49]. The capacity of AI to produce digital deception where fake videos, articles, or social media messages can be quickly and massively produced is greater than its capacity to detect it in media completely [7][39], while a DLT-based system by itself is unable to assess a content's authenticity [10]. Using DLT and AI can create a better fake news prevention system that helps resist data falsification attacks by inserting forged data into the DLT [10]. Also, blockchain and natural language processing (NLP) can be used together to detect fake news, for example, on social media [40]. On the other hand, adopting a blockchain network can help provide seamless authentication, effective and secure data processing and sharing, robustness against network attacks, scalability, accountability, and transparency [7][10]. In the long run, we hope that the blended use of AI, NLP, and blockchain technologies can help safeguard our media and social media and prevent the generation and spread of fake news related to health issues.

4 CONCLUSION

Through this panel discussion, the panelists presented their ideas and up-to-date research on fake news and misinformation, particularly their impacts on and relationships with health (mis)information. They also discussed the use and implication of contact tracing apps for COVID-19. Yet, as a new and possibly disruptive technology, contact tracing apps could be possible tools for our society to prepare for future pandemics. On the other hand, using artificial intelligence and Big Data analytics may help detect fake news to alleviate the problems [11][23]. Furthermore, they discussed the importance of information and media literacies. People with better information and media literacies would be more likely to identify fake news and misinformation through better information search and seeking behavior and with a critical mind and sufficient skepticism on suspicious news circulated in social media. In addition, public health authorities and governments should also find ways to improve trust and reduce the distrust between them and their citizens. The panelists hoped that the COVID-19 situation would improve and that our understanding of the various factors (technological, public administrative, societal, and social-psychological) involved could help us walk through the pandemic with minimal adverse outcomes with the help of state-of-art technologies, including blockchain, DLT, and AI.

ACKNOWLEDGMENTS

5 HISTORY DATES

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A   APPENDIX: DETAILS OF PRESENTERS

The Panel Chair, Kevin K.W. Ho, has been the Professor of Management Information Systems at the MBA in International Business (MBA-IB) Program, University of Tsukuba, Japan, since April 2022. He was the Professor of Management Information Systems and Business Division Chair of the School of Business and Public Administration at the University of Guam. His research interests include electronic services, information systems strategy, social media, and fake news and misinformation. He is currently the Co-Editor of *Library Hi Tech*, an SSCI journal in Information Management. Since the summer of 2020, he and his guest editorial team have organized a series of special issues on the COVID-19 Pandemic and Health Informatics for *Library Hi Tech* and have published more than 30 peer-reviewed papers on COVID-19 issues [17][18]. He also published a series of articles related to misinformation, fake news, and the impact of COVID-19 on social media and society in *Government Information Quarterly*, *Heath Policy*, *IEEE Internet Computing*, *Information Systems Frontier*, *IT Professional*, and *Library Hi Tech*. He also published in *BMC Public Health*, *Behaviour & Information Technology*, *Computers in Human Behavior*, *Communication of the Association for Information Systems*, *Decision Support Systems*, *Information & Management*, *Internet Research*, *Journal of Retailing and Consumer Services*, and *Online Information Review*. Prof. Ho is a senior member of IEEE, a member of the ACM and the SAME, and a Certified Management & Business Educator.

Dickson K.W. Chiu received his Ph.D. (2000) in Computer Science from the Hong Kong University of Science and Technology (HKUST). His teaching and research interests are in Library & Information Management, Service Computing, and E-learning with a cross-disciplinary approach involving library and information management, e-learning, e-business, service sciences, and databases. His research findings have been widely published in around 300 international publications (most of them have been indexed by SCI/-E, SSCI, and EI, such as top journals *MIS Quarterly*, *Computer & Education*, *Government Information Quarterly*, *Decision Support Systems*, *Information Sciences*, *Knowledge-Based Systems*, *Expert Systems with Application*, *Information Systems Frontiers*, *IEEE Transactions*, including many taught master and undergraduate project results and around 20 edited books. He received the best paper award at the 37th Hawaii International Conference on System Sciences in 2004. He is an Editor(-in-chief) of *Library Hi Tech*, a prestigious journal indexed by SSCI. He is the Editor-in-chief Emeritus of the *International Journal on Systems and Service-Oriented Engineering* (founding) and the *International Journal of Organizational and Collective Intelligence*. He serves on the editorial boards of several international journals. He co-founded several international workshops and co-edited several

journal special issues. He also served as a program committee member for over 300 international conferences and workshops. Dr. Chiu is a Senior Member of the ACM and the IEEE and a life member of the Hong Kong Computer Society. According to Google Scholar, he has over 6,700 citations, h-index 42, i-10 index 151, and ranked worldwide first in "LIS," "m-learning," and "e-services."

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