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HCI that Makes and Breaks Online Fake: An Introduction to the Special Issue

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Abstract:

In this editorial, we introduce the special issue on online fake in human-computer interaction. The special issue comprises five papers, including one literature review paper. We propose a conceptual framework that specifies the processes involved in generating, as well as circumventing, online fake and highlights significant aspects of future HCI-related issues to prevent, detect, and correct online fake. In particular, based on the five papers, we note the importance of HCI research in delegating the prevention, detection, and correction of online fake to artificial intelligence.

Keywords: Fake News, Misinformation, Disinformation, Delegation, Artificial Intelligence, Online Fake

Fiona Nah was the accepting senior editor for this paper.

1 Introduction

This special issue of *the AIS Transactions on Human-Computer Interaction* (*THCI*) focuses on fake news and deception in the hope that it can inspire new ideas for useful research on a phenomenon that threatens to devoid the value of online information. With the advent of social media and its unprecedented deployment (particularly in conflicts and crises), online fake content has become a menace. Examples include fake news and "alternative truths" in recent American politics, disinformation about the coronavirus disease of 2019 (COVID-19), and state-led fake news and unprecedented crowdsourced documentation about the Russian-Ukrainian war. These incidents not only inflate the consequences of online fake content but also point at new ways of dealing with it. Apart from news, online fake content includes but is not limited to social media posts, consumer reviews, and deep fake videos. It also exists in various forms such as written text, image, audio, and video. Hereafter, we refer to online fake content simply as *online fake*. Researchers in human-computer interaction (HCI) have the necessary skills to study not only how technology affects online fake generation and how online fake affects technology use but also how technology can circumvent online fake. In this editorial, we take a socio-technical perspective, which can serve as a basis for designing useful HCI that supports a more truthful and safer online environment.

As an introduction to this special issue, we view the processes involved in generating and circumventing online fake at a high level—a view informed by the five papers in this special issue. Taking this high-level view and based on the contributions that the individual papers have made, we note the need to consider not only individual HCI but also collaborative HCI in generating and circumventing online fake, to consider delegating detection, prevention, and correction of online fake to human and to intelligent machines, and to consider the need for advanced HCI technologies that can spot and integrate diverse and big data. We assume throughout this paper that robots may play a role but humans remain in the loop, affecting and being affected by online fake.

We focus on two processes relevant to online fake when examining interactions between humans and computers, their consequences, and HCI design implications. One process includes generating, propagating, interpreting, and reacting to online fake. These four subprocesses involve message senders and receivers, who have different motives and intentions, play different roles, and interact with computers individually or collectively in small groups or large (mass) communities. For instance, Joe generates and sends to Jill a message that contains disinformation about some political candidate. Jill, a social media influencer, propagates the message with a post on a Facebook network that contains her like-minded friends. A small group of Facebook friends participates in a chat-like group discussion to jointly interpret the disinformation in the message. All but two friends believe the lie and form a negative attitude against the candidate. One friend concludes the message is fake but uses Twitter to float the question to several hundred individuals hoping to obtain evidence that the disinformation cannot be true. The other friend submits the message to an intelligent machine that classifies text messages automatically as true or false. With this example, we mean to illustrate that users play different roles, work individually or collectively, perform manually or with machines, and react differently to the same message. Thus, we can conclude that HCI designs will depend on individuals and situations to effectively support the process of content generation, propagation, interpretation, and automatic replies and follow-ups. The upper part of Figure 1 shows the first set of processes.

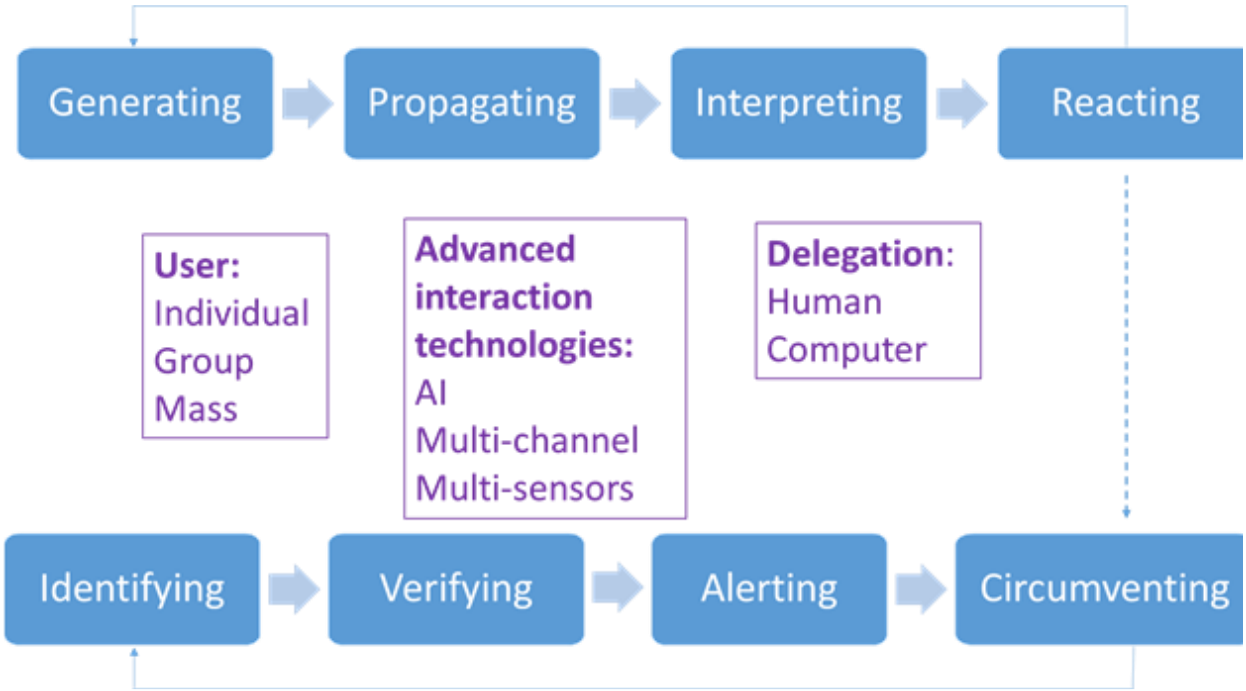

Figure 1. Conceptual Framework of Online Fake

Similarly, the lower part shows the second process, which includes identifying, verifying, alerting, and circumventing fake content with the intention of making the Internet a source of truthful and reliable information. These four subprocesses can initiate with agents (i.e., humans or robots) dedicated to detecting and following up fake content. Humans and machines can collaborate in many ways to detect and circumvent online fake. The preferred form of collaboration will depend on the context and audience. For instance, Bellingcat (Higgins, 2021), a not-for-profit agency devoted to verifying disinformation, relies on both human experts and intelligent machines to triangulate information derived from analyzing text messages, voice messages, annotated videos, and images. In such cases, HCI must be designed to delegate tasks between the human and computer, and integrate the results that emerge from the diverse information sources. Furthermore, the behavior of the actors when generating and propagating online fake can be analyzed to verify that the information is fake.

We use Figure 1 as our point of reference in this editorial to discuss each paper in the special issue. First, in their paper “Health Misinformation on Social Media: A Systematic Literature Review and Future Research Directions”, Yang-Jun Li, Jens Joachim Marga, Christy M. K. Cheung, Xiao-Liang Shen, and Matthew K. O. Lee take some first steps towards a high-level view of health misinformation based on the Shannon-Weaver communication model. This model includes three stages with a feedback loop: originating stage, transmitting stage, and consuming stage. For each stage, the authors determine a list of key variables that researchers should study. Figure 1 extends this approach by articulating the main subprocesses of two related processes, which are performed by different types of actors with different motivations and skills. Figure 1 also highlights three HCI-related issues that hold promise for new research and design and perhaps HCI more generally: catering for both individual and collective work; employing intelligent HCI tools and techniques that build on AI, multi-sensor and multi-channel interfaces that rely on and affect cognition, affect, and behavior; and, consequently, new delegation issues between humans and robots. On the one hand, these three issues shape the HCI design of systems that support generating and circumventing online fake; on the other hand, they change significantly and rapidly as new information technologies emerge. All three issues offer relevant and impactful research opportunities.

Additionally, the authors sort out the many terms used in connection with online fake. The continual changes in the social practices and norms of online behavior and the rapid advancement in the functionality afforded by new information technology generate a new linguistic context for research. Terms such as misinformation, disinformation, and synthetic (fabricated) information have different meanings, and they must be chosen carefully within the context of a particular study. (In our abstract overview, we loosely refer to “online fake” that may be associated with any one of these terms.)

Second, in their paper “Rumor Correction in Social Media Crisis Communication: A Case of Connective Sense-Breaking”, Milad Mirbabaie, Julian Marx, and Annette Reimann explore whether and how one can squelch rumor propagation. The authors look at users who work collectively to interpret messages and slow the propagation yet interact with technology individually. Looking beyond the social media discussed in this paper, new modes of collective action may generate fake content in different ways. In the near future, new robot and augmented reality technologies may introduce new collaborations between human and autonomous agents to interpret and slow down rumor propagation, which, in turn, may surface new ethical dilemmas. (We did not explicitly discuss ethics in this special issue but nevertheless find it worth pondering what is online fake in the metaverse.)

Third, in their paper “Health-related Misinformation Harm during the COVID-19 Pandemic: An Investigation of Non-comparative and Comparative Harm Perceptions”, Thi Tran, Rohit Valecha, and Raghav Rao focus on the circumventing process. In particular, they investigate whether corrective actions can change how individuals perceive misinformation. For instance, if individuals or states create harmful disinformation, it may affect the extent to which someone perceives a corrective action as effective and, thereby, affect human behavior. Like any technology, HCI can be put to good or bad use. Advanced but easy-to-use software allows individuals to create fake content at home, which cannot be tracked easily. For example, consider deep fakes. Today, one can produce high-quality fake videos of celebrities saying and acting something they never said or did.

Fourth and fifth, “Understanding the Message and Formulation of Fake Online Reviews: A Language-production Model Perspective” by Boran Wang and Kevin Kuan as well as “The Reasoning behind Fake News Assessments: A Linguistic Analysis” by Lydia Manikonda, Dorit Nevo, Benjamin Horne, Clare Arrington, and Sibel Adali exemplify how one can harness AI applications to scrutinize online fake. We require new machine learning classification algorithms to deal with big data that include fake content. However, if we seek to keep humans in the loop and rely on human insights as well, we will need to explore HCI designs that help humans understand the rationale behind machine classifications and integrate human insights into machine learning. The case of emerging news versus everyday news highlights the need to delegate tasks according to human limitations or a priori biases versus machine learning that rely on intensive data processing. It appears that when human agents process emerging news, they tend to rely less on data and more on their pre-existing beliefs, which makes it all the more important to get the machine’s input before finalizing judgement on authenticity.

Seen together, the five papers in this special issue draw attention to critical HCI aspects that relate to making and breaking online fake. New technologies change how humans use technology, how humans use their body and mind when interacting with technology, and how they do so as individuals or as small, big, or huge collectives. In time, new technologies also change the norms and regulations around enabling, spreading, prohibiting, and sanctioning online fake. Moreover, advances in technology, particularly smart technologies, provide new options for delegating tasks, responsibilities, and rights from humans to computers. Recent papers (e.g., Baird & Maruping, 2021) expand the discussion about delegation to machines and point to new possibilities for a delegation that goes beyond traditional task allocations from operator to tool. One can design machines today not only to monitor conversations for fake rumors but also to take responsibility for deciding which conversations to monitor, what is considered fake, and, perhaps, how dangerous a specific instance of online fake is. Furthermore, even if we assume as we did in this editorial that the human remains in the loop and that human-machine interaction should serve humans’ (rather than machines’) goals and preferences, the new possibilities of delegation to smart machines must become part of future HCI research on online fake. Indeed, we strongly endorse HCI research that examines the implications of delegating responsibilities and rights to machines when monitoring and circumventing online fake.

We can extend the idea of humans and machines jointly uncovering online fake to other dimensions. Human agents know how to integrate multiple sources of information and go beyond particular psycholinguistic properties of text messages. Advanced multi-channel interfaces can help them analyze online fake that comes in diverse forms found in natural interaction methods, such as voice, facial expressions, eye movements, and hand gestures. Consider the example that we mention above about how Bellingcat integrates text, image, and metadata overlaid on video. It demonstrates the need for multi-sensor interfaces that will only grow as organizations increasingly deploy Internet of things (IoT) devices and advanced robots learn how to synchronize and integrate diverse sources of information. In parallel, new human-computer interfaces that help humans analyze integrated information sources (e.g., with image and text layers one on top of the other in a similar vein to Photoshop’s semi-transparent layers) will enable fusion across sensors, attributes, domains, locations, and time in order to get to the truth.

To conclude, this special issue presents a wide gamut of research possibilities on online fake. Figure 1 shows the processes and subprocesses that generate and circumvent online fake, and the papers in this issue demonstrate different HCI aspects of these processes that are worth investigating. In particular, we emphasize the need to address three upcoming issues of HCI design: 1) collective and individual work in these processes online, 2) advanced interactive technologies that will soon become pervasive and, therefore, instrumental in generating and circumventing online fake, and 3) the delegation of tasks to humans or autonomous agents. We take a socio-technical design perspective that necessarily emphasizes some research aspects while glossing over others that also have significant importance (e.g., ethical considerations and organizational effects on circumventing online fake). Enjoy the special issue!

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Dov Te'eni obtained his PhD from Tel Aviv University in 1987 and returned as faculty after serving at Case Western Reserve University and Bar Ilan University. He currently studies visualization, feedback and knowledge sharing, combining human and machine intelligence. He has co-authored with Ping Zhang and Jane Carey on "Human-computer interaction for developing effective organizational systems" and co-edited the "Encyclopedia of Knowledge Management". Dov served as President of the *Association for Information Systems* (AIS) and Editor-in-Chief of the *European Journal of Information Systems*. He serves today as Senior Editor for the *AIS Transactions of Human-Computer Interaction*. Dov was awarded the AIS Fellowship (2008) and LEO Lifetime Exceptional Achievement award (2015), as well as the AIS Vision award (2016) and the ILAIS over-the-years award (2021).

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