

# A Systematic Review of Social Media for Intelligent Human-Computer Interaction Research

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## ABSTRACT

*With the aid of Big Data and artificial intelligence, social media is increasingly influencing human behaviour and social relationships, making it a crucial area for policy and design initiatives. In light of the lack of a systematic review on social media research for intelligent HCI, this paper gives preliminary results from a scient metric analysis of the literature pertaining to the intersections of AI and social media. The results demonstrate that, although Twitter and Facebook have been the primary study platforms, Chinese social media platforms emerge as new sites of research with the COVID-19. These findings are based on the identification and discussion of the main and emerging disciplines, the related keywords, and 2,443 articles with more than 18,000 citations. Additionally, sentiment analysis seems to be the most well-known study.*

**Keywords:** Human-Computer Interaction, Social media, Artificial intelligence, Interaction design, Service design, Socio-technical systems

### 1. Introduction

Social media, also known as social networking sites (SNSs), give users the ability to customise their personal profiles, communicate with friends and strangers, and access news and information. The potential for these sites to alter user conduct has been investigated and evaluated, with examples focusing on mental health and addiction. For example, false information has been disseminated mostly through social media with the aid of Big Data and artificial intelligence (AI). Organising a strong reaction to combat the dissemination of harmful misinformation that frequently encourages racism, xenophobia, and prejudice has recently been deemed a major priority by UN officials, particularly in the context of COVID-19 and elections. Another is that AI can be used for social good, particularly on social media, to solve issues of

inclusion and equality.

As social networking sites (SNSs), or social media, allow their users to curate their individual profiles, interact with friends and strangers, and receive news and information, the behaviour-changing outcomes has been tested and examined, for example on the topics of addictions and mental health [1]. For instance, misinformation has been spread, with the help of Big Data and artificial intelligence (AI), mostly via social media. Recently the United Nations leaders have made it as one of the top priorities to organize an effective response to fight against the spread of dangerous misinformation that often fuels discrimination, xenophobia and racism, especially in the contexts of COVID-19 and elections [2]. For another, AI can be applied for social good, especially on social media, to address challenges to equality, inclusion and self-

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efficacy [3]. Social media matters for digital cooperation [2] and common goods [3]. Indeed, mostly generated by individual users, data has enabled social media platforms to automate and recommend interactions regarding what to read, what to buy, what to share, whom to like, etc. Such data includes users' curated content, interactions, and usage data, and then smart and intelligent applications can be developed. It is both the amount and diversity of such data that enable social media platforms for designing and implementing intelligent interaction designs. Indeed, algorithms have been developed for targeted interaction design in social media campaigns [4], and the implications of Big Data and AI in shaping our wider socio-technical systems have been discussed [5]. Thus, social media, as arguably one of the most important user technology interface systems, should be a fruitful site for Human-Computer Interaction (HCI) research. Because HCI professionals have contributed to the study and design of social media, it is important to understand the ways in which social media users share information, ideas and personal data can be improved with Big Data, AI and cognitive technologies. The importance of social media also reflects on the fact that user research has been conducted on social media platforms. Thus, intelligent interaction [6] or data-driven design can learn from the literature at the intersections of social media and AI. There is, however, no systematic review of the theoretical and empirical work. A systematic review of social media and AI literature is expected to provide an overall picture regarding the ways in which AI has been used and misused on social media platforms and data, revealing relevant social media knowledge for better HCI.

## 2. Research Method and Data

The research has gathered and analysed literature data from major journal and book sources, including SCI-EXPANDED, SSCI, A&HCI, BKCI-S, BKCI-SSH, and ESCI, at the intersection of AI and social media from the Web of Science (WOS) Collection in order to identify the key issues and research directions. The subsequent advanced

**The following search query was used in October 2020:**

**TS = (("social network\*" OR "social media") Facebook, the social web, or both OR "WeChat," "Weibo," "twitter," AND "artificial intelligence" OR "cognitive machine learning" OR "cognitive technology" OR "computer science").** Using Python data visualisation packages and VOS viewer, a total of 2,443 articles and more than 18,000 citations were gathered. The research design began with the main and emerging disciplines and the related keywords, then used co-citation and co-word analyses to generate an overview and highlight important research issues and directions based on close reading of selected work. A thesaurus and simple taxonomy were developed through the iterative examination of keywords. Particular attention is given to the discussions on the future of humans and human conditions on social media, with issues like ownership and stakes of social media data and algorithms, AI for good (equality, fairness, progress, etc.) and open artificial intelligence models and standards for artificial intelligence work. Special attention is given to the discussions on the future of humans and human conditions on social media, with issues such as ownership and stakes of social media data and algorithms, AI for good (equality, fairness, progress, etc.) [7], and open artificial intelligence models and



concerns of personality, privacy, and security, surrounding the outcomes of prediction and predictive models. The cluster in yellow color indicates the prominence of technical methods of link prediction and clustering for social network analysis. The cluster in purple color reveals the emergence of research concerns of COVID19 and public health, using technical methods of topic modelling. The cluster at the upper-left reveals the emergence of research topics of mental health and depression. No specific research on intelligent HCI is found in the literature data at the intersection of AI and social media, pointing to a research gap for future research. Nevertheless, research work exists on intelligent systems for and surrounding social media, such as identifying rumor spreaders [11], early risk detection (e.g. depression, rumor or sexual predators) [12], etc., all of which can be seen or further developed as part of the intelligent HCI systems. With the aim to explore the possibilities of social media for intelligent HCI research.

### 3.3 Main and Emerging Work

Twitter is shown to be the most studied social media site and sentiment analysis the most prominent research method.

Main sentiment analysis work has conducted on platforms such as Twitter and Facebook. For instance, sentiment analysis can be implemented in a Facebook elearning application with interactive interface, with the aim to consider user's emotional state for adaptive and personalized learning. In addition, a survey on survey on opinion mining and sentiment analysis based on more than one hundred articles during 2002–2015 summarizes the sub-tasks, techniques and applications, as part of the efforts to understand the

concept of electronic Word of Mouth (eWOM). Such development on sentiment analysis leads to the notion of “sentic computing” to better understand online social data on the Web.

The sentiment analysis requires personal and social data, with implications on privacy and data governance. Private traits and attributes are found to be predictable on digital records of behavior, including expressing sentiment such as “like” buttons, leading to issues such as privacy surrounding self-curation on social media. The possibilities of automatic summarizing data streams result in the notion of social curation, using social media as sensors to put human in the loop of often automatic methods of information processing and filtering. Related issues such as social manipulation [20], political manipulation, improvisational manipulations of meaning can be amplified by intelligent agents or detected by machine learning forensics techniques. In short, automation of such curation process may have implications on how interactions, along with attention, are structured and distributed, including the design and policies to ensure a fair and inclusive settings.

Social media has been studied or been integrated as part of the research process in relation to the psychological impacts and (mis)information. For instance, a study on psychological stress of medical staffs during the outbreak has been conducted using main Chinese social media platforms to conduct online surveys. For another, an online survey has been conducted to examine the trust of social media and nonreviewed preprints. Social media platforms in China have been implemented as part of health information technologies for epidemic monitoring and

control, suggesting that health informatics knowledge and practices have played an important role in COVID-19 response.

Altogether, the main work relates to the social, spatial, psychological, and organizational features of social media, and the importance of sentiment analysis based on social media data, including the most recent COVID-19 response. Social media can provide spatial and mobile big data to track and understand the pandemic, predict case counts, spread misinformation, assess psychological conditions of people, and coordinate responses.

### 3.4 Emerging Work Related to Interaction Design

Such main and emerging work points to the need for better interaction design at the intersection of social media and AI. Though little work has been conducted in this area, there is still some work on the interaction design of AI on or about social media.

Putting user interface design in a wider context of the socio-technical systems, social media can be seen as one of the developing technologies, along with artificial intelligence, pervasive systems and information integration, that will reshape organizations with multiple user roles, automated work processes and workflows, etc., and thus interaction designers must consider the trends such as more mobile and flexible working patterns, the use of social media in the workplace, and the practice of the virtual organization. Understanding and doing interaction design, from this wider perspective that takes social media, AI, pervasive systems, and information integration into accounts, suggests the need for new skillsets for workers, and possibly higher level of design knowledge such as service design.

Interaction design at the level of the organization thus can be made more intelligent. For instance, a simulation study suggests that organizations can apply a data-oriented method for tailored interactions on social media as part of the social outreach campaigns. Interaction design researchers and practitioners should also pay attention to a critique proposed by Rainer Mühlfhoff, that AI technologies such as deep learning have “captured” human cognitive abilities, resulting in AI apparatuses that are likely to involve digital labor exploitation, social control and subjectivation. Overall, social media can be seen as part of the socio-technical systems that require conscious reflections on how interactions are shaped by new technologies.

### 4. Conclusion

Given the significance of social media in influencing interpersonal relationships, a number of problems, such as mental health, potential manipulation, unfair and exclusive characteristics, and data governance issues, have surfaced when Big Data and AI applications have magnified the problems already present in social media. While sentiment analysis appears to be the most common research methodology and the primary platforms, according to scient metric results research has expanded to include Chinese social media sites outside of Twitter and Facebook; nonetheless, concerns about privacy, false information, depression, and mental health still need to be addressed wellness, etc. This study's scope is restricted to the literature included in the Web of Science database, but it nonetheless offers a methodical summary of what has been done and what still needs to be done. It seems that social media has become less

inclusive and fair as a result of its general data- and AI-driven practises. That's when vital to the advancement of intelligent HCI research and smart interaction design, to comprehend and resolve these problems, with the goal of advancing social media research intelligent and welcoming. Creating a workable concept is one potential avenue for future research of design inclusivity for HCI, enabling us to methodically and imaginatively integrate social and emotional intelligence from people into the data and AI-driven social media practises have diminished social media's inclusivity and fairness. Therefore, understanding and addressing these problems is crucial for the advancement of intelligent interaction design and intelligent HCI research, with the goal of making social media intelligent and welcoming. Creating a workable concept is one potential avenue for future research. Design inclusivity for human-computer interaction (HCI), enabling us to methodically and imaginatively integrate human emotional and social intelligence into the data and AI-driven design now in use for exchanges.

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