

Original Paper

The Impact of Artificial Intelligence on Information Dissemination Mechanisms—Bibliometric Analysis Based on CiteSpace

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Abstract

Artificial intelligence technology is redefining the modes of information dissemination. This article explores how artificial intelligence influences and changes the patterns of information dissemination from three perspectives: disseminator, media and audience. In this paper, CiteSpace software is used to analyze the literature on artificial intelligence information dissemination on China National Knowledge Infrastructure (CNKI), summarize and discuss the key words of the development trend of artificial intelligence information dissemination: man-machine integration, sharing mechanism and virtual technology.

Keywords

Artificial intelligence, Information dissemination mechanism, CiteSpace

1. Introduction

Artificial Intelligence (AI) is an important subdiscipline of computer science. It was first defined during Dartmouth Conference in 1956 as a technology that can research, develop and create a “brain of machine” that is akin to that of humans and enables machines to think and learn like humans (Nick, 2017). With the rapid development of science and technology, AI is getting more matured and has been applied in every industry or trade. More specifically, it has reshaped and dramatically changed the patterns and ways of information dissemination.

2. The Impact of AI on Information Dissemination Patterns

There are three important elements in the process of information dissemination: disseminator, media and audience. AI technology has penetrated into these elements to enable a faster and more effective information dissemination. With the emergence of AI, each element is getting more intelligent.

2.1 AI's Impact on Disseminators

As the trigger of information dissemination, disseminator can get more information resources with the help of AI technology. In this process, information resources are mainly recognized and collected by a human being, whose ability is relatively limited. AI technology, however, can make up for the limitation as it can not only collect information data from many aspects and channels, but also can complete data analyzing and processing within the shortest time. For information collection, intelligent devices can acquire voices and images that cannot be recognized by a human being. Intelligent devices are becoming more popular than ever in news reporting because they can collect graphics, articles and sound and convert these resources into texts. During the National Two Sessions, in 2021, new AI products such as IFlyTEK Smart Office X2 were adopted to help journalists efficiently collect information on site and converse them into manuscripts for reporting. It can be seen that AI technology has been integrated into the process of information dissemination, and the disseminators have changed from humans to smart devices. Therefore, AI technology has exerted influence on the source of information dissemination by processing resources from the very beginning and improving the efficiency of information access and accuracy of output.

2.2 AI's Impact on Media

From print media to electronic media, and to digital media, the media of information dissemination have gone through three eras. With the synchronous development of economy, culture and science, substantial changes have been occurred in dissemination media. The traditional concept of media no longer exists. After AI technology emerged, it redefined the media of information dissemination. A new form brought by AI has made the media more immersive. Hardware media have become a widely-accepted information carrier. Being integrated with AI, machinery equipment has been upgraded and enabled to act as media to work and transmit information like humans. In the age of AI, intelligent machines and devices have become parts of our lives, and media immersion is inevitable. AI is not yet as emotional as a human being, but it has become a perfect tool to help people collect and organize data. With the development of technologies such as artificial intelligence, virtual reality (VR), augmented reality (AR), mixed reality (MR), and holographic imaging, media of information dissemination have also expanded.

2.3 AI's Impact on Audience

AI's impact on audience mainly embodies in the forms of final presentation of information and experience of audience. The adoption of AI technology mainly aims to improve audience's perception of the content being disseminated. AI technology can help tackle the problems such as information barrier and asymmetry in the process of information dissemination. The major impact of AI in this

respect focuses on improving users' experience. The fire at Notre Dame Cathedral in Paris on April 15, 2019 helped promote the application of AI technology in protecting and inheriting cultural heritage. Today, an increasing number of tourists can travel around the world via live streaming or visit scenic spots via smart devices. Xinhua News Agency developed a 2D AI Virtual Anchor in 2018 along with Sogou, Inc., and launched its 3D version in the following years. In 2021, Xinhua News Agency introduced a smart studio that allowed the free switching of multiple scenes during the National Two Sessions. AI Anchors can efficiently complete information collection and output with relatively small errors and improve audience experience. With the development of science and technology, people are paying more attention to the visualization of news. Transforming media of information dissemination from screen into virtual scene allows audience to experience on-site atmosphere, truly understand and feel the situations of news, and brings greater sense of immersion to users.

3. Exploring the Development Trend of AI Information Dissemination

In the literature related to AI information dissemination, the repetition and highly-frequent occurrence of a keyword means that it has been the hotspot of the research field. In this research, CiteSpace software was used to take keywords as analysis units, time slice was set to 1, threshold was set to 50, and the keyword co-occurrence map was formed, as shown in Figure 1.

The diameter of node circle represents the frequency of occurrence of keywords. The larger the diameter is, the higher the frequency is. The font size of keywords represents the different degree of importance. The larger the font size, the more important and central it is. In previous studies, algorithms, big data, media convergence, intelligent communication, etc., are all high-frequency hotspots in the research field of AI information dissemination.

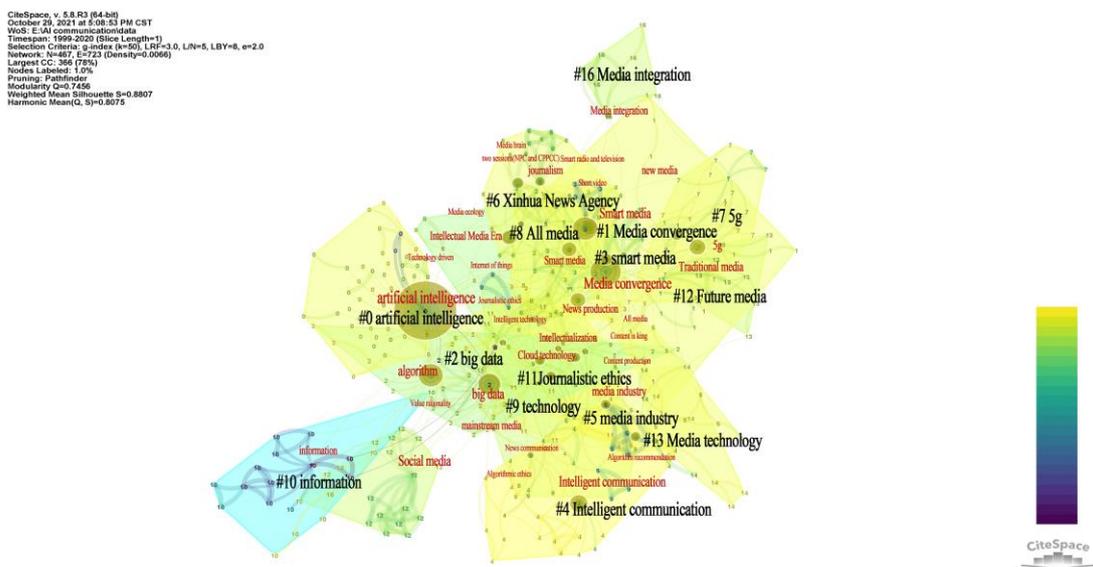


Figure 1. Contribution Diagram of Keywords in AI Information Dissemination Research

The “Time Zone View” function of CiteSpace was used to draw the map of hot Time Zones of AI information dissemination research from 1999 to 2020 (as shown in Figure 2), which shows the keywords with high frequency and rapid growth in different periods in this research field. By summarizing the keywords and the combined cluster identifiers, it can be found that there are three major future trends in the research on AI information dissemination.

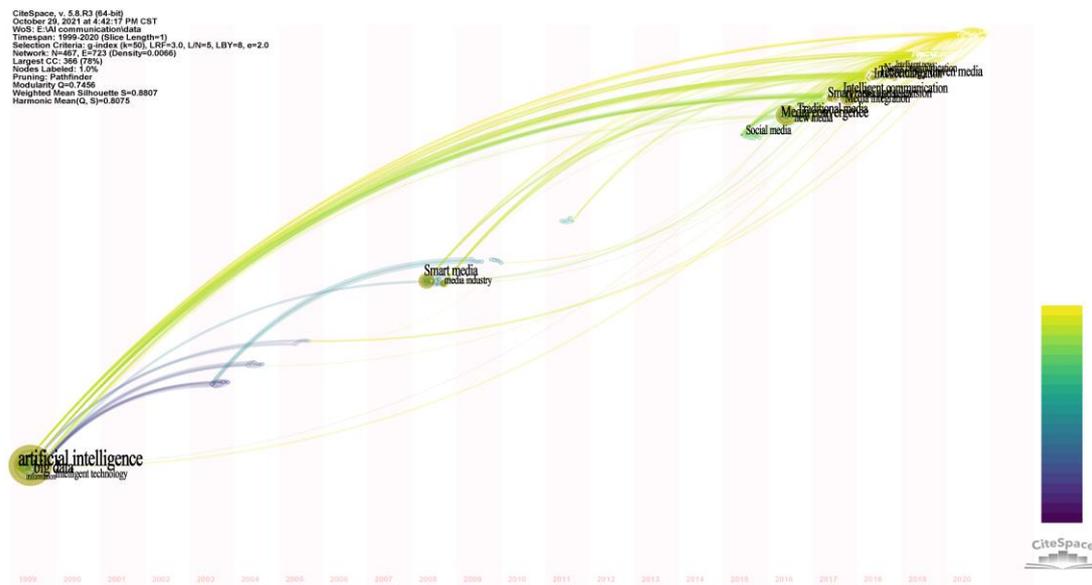


Figure 2. Time Zone View of Hot Spots in AI Information Dissemination Research

Table 1. Keywords of the Previous Studies on AI Information Dissemination

keyword	frequency	Year of first occurrence
artificial intelligence	326	1999
Media convergence	73	2016
big data	54	1999
algorithm	32	2017
Smart media	32	2008
Intelligent technology	27	1999
information	26	1999
5g	24	2018
Short video	22	2018
Intelligent communication	22	2017
News production	21	2017
Smart media	20	2017
Public opinion governance	20	1999

Intellectual Media Era	20	2018
National Governance	19	1999
journalism	19	2016
Governance Innovation	18	1999
new media	18	2016
Media brain	17	2018
Intellectualization	17	2018
media industry	17	2008
News communication	15	2018
All media	14	2018
Algorithm recommendation	13	2018
Content production	12	2017
mainstream media	11	2018
Journalistic ethics	11	2018
Media integration	11	2017
Social media	10	2015
Xinhua News Agency	10	2018
Traditional media	10	2016

3.1 Human-machine Integration

It can be seen from Table 1 that in 2018, the top five core keywords in studies on AI information dissemination are 5G, short video, intellectual media era, media brain and intellectualization, three of which are related to artificial intelligence and media convergence. Human-machine convergence will be a trend of future development. Although progress has been made in developing AI technology, along with successful practices in some fields, its application in information dissemination still needs to be improved. AI for natural language processing system has already matured by realizing fast text conversion in the processes of information collection, dissemination and output, saving manpower and material resources, and allowing media workers to have more time to engage in other news business. AI news robots can replace human reporters to complete long hours of continuous work with lower character error rate. The development of big data and algorithms has promoted the efficiency of meeting users' demand with information resources, but information cocoon cannot be avoided. AI cannot deal with emotions and moods like humans, but the integration of AI and humans can make up for their respective shortcomings and take their advantages to facilitate information dissemination. Therefore, in the process of intelligent dissemination, there will be a trend of mutual integration and synergetic development of human beings and AI devices. Facing the reform and development of new technologies, we should actively make good use of advanced science and technology.

3.2 Data Sharing Mechanism

It can be seen from Figure 2 that one of the research hotspots of AI information dissemination will be “algorithm ethics”, indicating that the development of AI in the future is unstoppable, and it is necessary to establish algorithm ethics to restrain possible problems in data sharing. “With the proposition of absolute data sharing, dataism conflicts with rights-based data ethics that supports data sharing but opposes the behavior of sharing data without respecting individual rights or in disorderly and unrestrained manner” (Li, 2018). Any disseminator should guarantee data privacy and obtain informed consent of each user before collecting and analyzing their personal data, so as to avoid algorithmic bias which has attracted an increasing attention in society. For example, the price of riding a car via DiDi to the same dropping point may be varied for users of different mobiles, that is to say, the price for iPhone users is higher than that of Huawei users. In the era of AI, major network platforms and APP platforms should comply with relevant management rules and reasonably collect and use users’ data on the basis of data sharing mechanism. At present, many organizations are working to realize data sharing, and at the same time, many data protection systems have been developed to ensure that science and technology are benefiting human beings.

3.3 Virtual Technology

It can be seen from Figure 1 that algorithms, big data, media convergence and intelligent communication are all high-frequency hot spots of the research on AI information dissemination, and that AI is changing our lives as well as the presentation modes of the elements of information dissemination. Early in 2017, the Associated Press mentioned about AI’s role in newspaper business in *Artificial Intelligence Playbook* and stated that the combination of AI and VR would be the development trend of future technologies. AI and VR are quite different: the former is mainly adopted to contextualize visual and auditory effects for human beings. In the near future, VR technology will improve the experience of news audiences, for example, allows them to experience the virtual scenes of disasters. The effect of information dissemination with VR technology will be much improved. In addition, the technology can also connect and reconstruct time and space for audience to get overlapped and immersive experience. The immersive mode can avoid the bias of information dissemination. The rapid development of AI technology enables the combination of virtuality and reality in the process of information dissemination and allows audience to receive main information in a more real and effective mode.

4. Conclusion

From traditional printing media to AI information dissemination, disseminating modes we experienced have undergone substantial changes. Instead of single information dissemination, audiences are requiring diversified and valid information more than ever. Combining with AI technology, major information dissemination platforms can identify individual needs of users, filter and push messages to users more accurately and precisely. The biggest advantage of AI in information dissemination is that it

can analyze and screen users' habits through data sharing and meet individual needs of personalized dissemination. In the era of AI technology, however, we should avoid algorithm bias and comply with the rules of data sharing. we should also rationally understand that utilizing the power of AI technology can complement the shortcomings of human beings, but potential risks in AI devices should be well-controlled. To sum up, we should make proper use of AI technology to help us spread information efficiently.

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