ISSN 2959-6149

Systematic Review and Prospects on Social Risks of Artificial Intelligence

— Visual Analysis Based on CiteSpace Knowledge Graph

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Abstract:

As artificial intelligence becomes more and more embedded in human society, it also creates social risks. With the help of CiteSpace software, 200 documents related to social risks of artificial intelligence searched from SSCI and SCI journals from 2000 to 2024 were sorted out to sort out the research progress and hot spots. Research shows that there are currently some highly influential scholars and institutions in the field of artificial intelligence social risks, and the number of relevant studies is increasing year by year. Risk resolution and sustainable development issues of artificial intelligence have become important research directions for the continuous development of artificial intelligence.

Keywords: Artificial Intelligence, Social Risk, Knowledge Graph, Research Trends

1. Introduction

Artificial intelligence (AI) [1] is a new technology driving scientific and technological revolution and industrial transformation, which is divided into three types: weak, strong and super artificial intelligence[2]. The intelligence level of weak artificial intelligence is equivalent to human intelligence, and it is mainly used in some specific fields, such as face recognition, speech recognition, natural language processing, etc. The intelligence level of strong artificial intelligence far exceeds human intelligence. It can simulate human thinking and behavior and achieve highly autonomous learning and decision-making in various fields. The intelligence level of super artificial intelligence far exceeds human intelligence. It can create and improve itself, and may even exceed the scope of human capabilities. In the 1960s, computer scientist John McCarthy proposed the term “artificial intelligence” and began to organize related research groups at MIT [3]. With the continuous development and advancement of computer technology, artificial intelligence technology has gradually matured. In the 1980s, artificial intelligence technology began to used in various fields, such as machine translation, image recognition, speech recognition, etc. At the beginning of the 21st century, artificial intelligence technology has been further developed, and some representative applications have emerged, such as self-driving cars, smart homes, etc.

As artificial intelligence becomes more and more embedded in human society, it also creates social risks [4]. In the development process of artificial intelligence, it has shown a continuous and rapid upward trend after 2018. The risks brought to society by the rapid development of artificial intelligence are also gradually increasing. Currently, the main risks faced by artificial intelligence include data security and privacy protection, artificial intelligence algorithm bias and discrimination, unemployment risks caused by automation, and ethical and moral issues caused by artificial intelligence, etc[5]. In addition, the development of artificial intelligence may also bring about problems such as social differentiation and increasing inequality [6]. “How can the risks and hazards systematically produced as part of modernization be avoided, minimized or guided” has become a key issue for scholars to explore [7]. In recent years, scholars have conducted extensive research and discussion on the social risks of artificial intelligence. On the one hand, they are promoting the sustainable development of artificial intelligence, and on the other hand, they are also conducting risk avoidance and risk resolution strategy for the social risks brought by artificial intelligence[8]. Artificial intelligence is a field full of potential and challenges. Although the development of artificial intelligence technology has brought conveniences and advantages, we also need to be alert to the risks and challenges it may bring. While we continue to advance the large development of artificial intelligence technology,

we need to actively explore risk avoidance and solution strategies to ensure that the development of artificial intelligence is in line with the interests and values of human society.

2. Data Sources and Research Methods

2.1 Data Sources

This article adopts a restricted search method of authoritative journals to ensure that the selected documents are of high quality and strong representativeness. The database searched is the WOS (web of science) database. The database is selected as the core collection of web of science. The citation index is ssci and Sci-expanded. TS= (Artificial Intelligence) and (Social risks) are used as the search condition. In order to make the research more comprehensive, this article sets the literature search time from 2000 to 2024. According to the above time search, 716 documents were obtained, and 200 documents were finally selected for review to analyze their research status and development direction.

2.2 Research Methods

CiteSpace[9] is a visualization application software written in Java language. It focuses on analyzing the potential knowledge contained in scientific analysis. Because the structure, regularity, and distribution of scientific knowledge are expressed through visual means, the visual graphs obtained by analysis in this way are also referred to as 'scientific knowledge maps'. [10].

This article uses bibliometric methods and content analysis methods to conduct literature review research. Bibliometrics is a quantitative analysis method that can explain the distribution characteristics of scientific documents and the law of document growth and aging from a macro perspective, and provide a quantitative description for exploring the research frontiers of relevant disciplines [11]. The content analysis method mainly starts from the subject content of the document. It is a qualitative analysis method that not only studies the external characteristic information of the document, but also analyzes the specific information contained in it [12]. Through CiteSpace literature analysis software, it is possible to analyze keywords, authors, institutions and other fields in the field of artificial intelligence risks.

3. Overall analysis of social risks of artificial intelligence

The amount of papers for statistical classification can directly reflect the overall trend and research enthusiasm in the field of artificial intelligence risk. The publication of sample papers from 2000 to 2024 is Figure 1. The number of papers has increased significantly since 2019.

Changes in the number of research publications in related fields can determine changes in research trends in this field. It is an important reference object for measuring the development and changes in related fields, and is of great value for studying and judging future research trends. Since 2018, the number of published articles on social risks of artificial intelligence has gradually increased to more than 50 articles, and has maintained rapid growth from 2019 to 2023. In 2023, the number of published articles will exceed 500.

2019 has become an important node for the growth of the number of published articles. The main reason is that the world has made important progress in the development of the field of artificial intelligence in 2019. With the increase in artificial intelligence research and the acceleration of social development, risk uncertainty has gradually intensified. In response to the problems exposed by artificial intelligence in social governance, during this period, the number of publications on artificial intelligence social risk research has accelerated, and research interest has also increased. While the number of published articles has increased, more attention has also been paid to the risks and uncertainties of artificial intelligence and social trust issues. It can be seen that changes in the number of publications are of great value in reflecting changes in research trends.

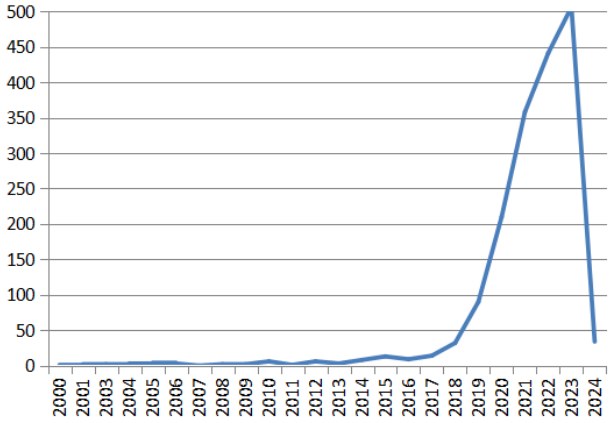

Figure 1. The overall situation of social risks in artificial intelligence

In the future, the research trend of social risks of artificial intelligence will continue to grow, and the number of published articles will continue to increase. As the number of published articles increases, people's attention to related research will continue to increase. At the same time, research on the social risks of artificial intelligence will also continue to increase deeper. Under this trend, changes in the number of publications will reflect changes in research trends more clearly. Changes in the number of publica-

tions are an important reflection of changes in research trends. It can reflect changes in the research direction, research focus and research trends in the academic community.The increase in the number of research works means that research in this field has attracted more and more attention. At the same time, it reflects that research in this field is in the ascendent period.

The increase in the number of papers in the field of artificial intelligence social risk research reflects that artificial intelligence has aroused widespread interest in society, and at the same time, the increasing impact of artificial intelligence on society. Therefore, the increase in the number of papers published in the field of artificial intelligence social risk research is very important for studying the social impact of artificial intelligence and solving social problems. At the same time, the increase in the number of paper presentations in the field of artificial intelligence social risk research provides an important reference for future research trends. Future research will delve deeper into the laws and characteristics of the social risks of AI, while paying more attention to the impact and role of AI in society.

4. Research Topics on Social Risks of Artificial Intelligence

4.1 Keyword analysis

Using CiteSpace software to draw keyword map analysis (Figure 2), keyword co-occurrence analysis can provide a glimpse of high-frequency keywords that appear in a certain field during the statistical period and the correlation between high-frequency keywords, revealing current research hot spots. When two or more keywords appear simultaneously in different documents, it is called keyword co-occurrence, and analysis of their betweenness centrality can reveal the mutation or transformation relationship between research hotspots.

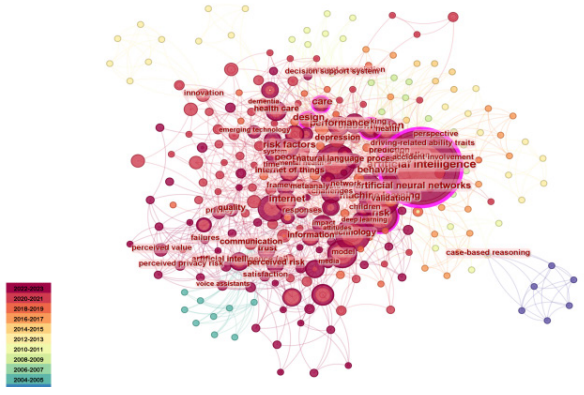

Figure 2. Keyword analysis

This article's CiteSpace analysis of WOS keywords is set to Time Slicing for 2 years, Keyword is selected for Node Types, and the default Cosine is used for connection strength. As shown in the figure, 'artificial intelligence' is the main cluster. In addition, 'artificial neural networks', 'machine learning', 'technology' and 'natural language' are the main keywords. It can be seen that in the research on the social risks of artificial intelligence, artificial intelligence, machine learning, technology, etc. are the main focus of research.

4.2 Analysis of research institutions

In the collinear analysis of Citespace institutions (Figure 3), institutions with close cooperation in the research field were found, among which 'trust' and 'children privacy' were the main clusters. Secondly, 'Internet tramework people', 'risk factors' and 'classification' are the main keywords. In the field of research on social risks of artificial intelligence, the number of studies increases, the number of institutions also gradually increases. An analysis of the WOS literature shows that 'trust' and 'children privacy' have the largest number of publications. If divided by country and region,the United States has the largest number of research institutions in related fields , followed by countries such as China. Through institutional collinear analysis, it can be seen that research in the field of artificial intelligence social risks is gradually increasing, and the emphasis on research in this field is also increasing.

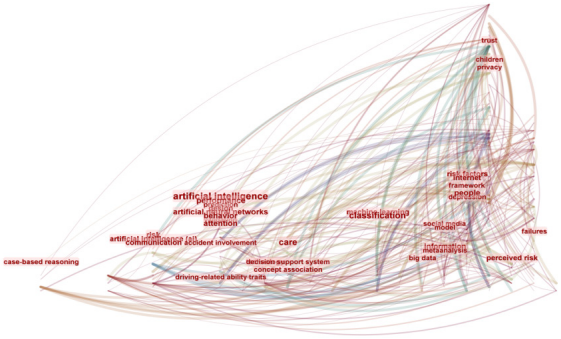

Figure 3. Institutional collinear analysis

4.3 Analysis by study authors

In the CiteSpace author collinearity analysis (Figure 4), global scholars' research on artificial intelligence is extensive and dispersed. Among researchers, Acharya U Rajendra is the scholar who has published the most articles, with 679 articles. Research on the social risks of artificial intelligence occurs all over the world. Among them, scholars from the United States, the United Kingdom, China and other countries account for the top three proportions. The relevant knowledge in scholars' research papers not only promotes the accelerated development of the field of

artificial intelligence social risks, but also provides an important reference for in-depth research.

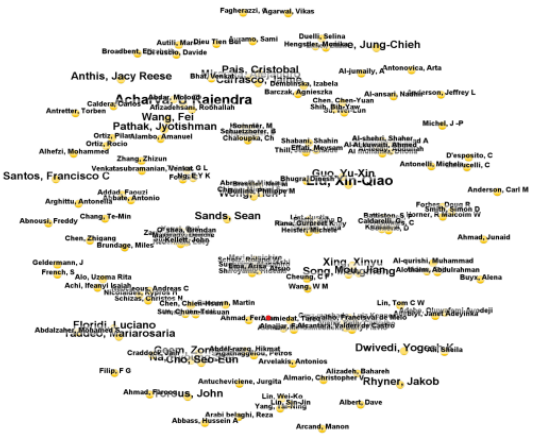

Figure 4. Author collinearity analysis

4.4 Analysis of national documents

The collinear chart of countries publishing articles (Figure 5) shows in CiteSpace that the countries with the largest number of articles published are the United States, China, and the United Kingdom. These three countries occupy the top three positions in terms of the number of articles published. Research on the social risks of AI in countries with advanced AI technology has been published in many countries around the world, and interest in AI-related topics continues to grow.

Figure 5. Collinear analysis of publishing countries

5. Conclusion and prospect

5.1 Conclusion

This article uses the WOS database and CiteSpace software to conduct a quantitative analysis of the relevant literature on artificial intelligence social risk research, and summarizes and analyzes it from the overall situation, keyword analysis, institutional analysis, author analysis, etc.

Looking at the overall situation, research on social risks of artificial intelligence has begun to receive widespread attention in recent years. Research has shown an accelerated growth trend since 2018. Keyword analysis results show that “artificial intelligence”, “social risk”, “security”, “privacy protection”, etc. are the most common keywords in artificial intelligence social risk research. Among them, “artificial intelligence” has received more attention in recent years, especially after 2018, and “social risks” and “security” have also shown a rapid growth trend. The correlation analysis results between keywords show that the correlation between “artificial intelligence” and “social risk” is the strongest, which may be due to the rapid development and popularization of artificial intelligence that has led to more social problems. At the same time, there is also a strong correlation between “artificial intelligence” and “security”. This may be because the application fields of artificial intelligence are becoming more and more extensive, and there are more and more issues involving the security field. The correlation between “artificial intelligence” and “privacy protection” is relatively weak, which may be because privacy protection is a broader field that does not only involve artificial intelligence. In addition, the study also found that different scholars have different concerns about the social risks of “artificial intelligence”. Some scholars are more concerned about its impact on the job market, while others are more concerned about that on social justice. These diverse interests reflect the complexity and diversity of AI social venture research. At the same time, in recent years, more and more scholars have begun to take an interest in the sustainable development of artificial intelligence, which is also an important direction for the study of the social risks of artificial intelligence. In this study, we summarized the current status and trends of artificial intelligence social venture research based on the results of keyword and correlation analysis.

5.2 Prospect

With the rapid development of artificial intelligence in recent years, the social risks brought by artificial intelligence have gradually increased. In the research on social risks of artificial intelligence, the sustainable development of artificial intelligence [13] involves many aspects, including technological sustainability, economic sustainability, environmental sustainability and social sustainability. . The sustainability of artificial intelligence technology refers to issues such as energy consumption and carbon emissions during the use of the technology itself. Economic sustainability means that the development of artificial intelligence will not have excessive negative impacts

on the social economy, such as rising unemployment and the widening gap between rich and poor. Environmental sustainability means that the development of artificial intelligence will not cause excessive damage to the natural environment, such as excessive consumption of natural resources and the generation of large amounts of waste. Social sustainability means that the development of artificial intelligence will not cause excessive negative impacts on society, such as discrimination [14], privacy leakage [15] and other issues.

Therefore, research on the sustainable development of artificial intelligence requires in-depth analysis and discussion from various perspectives so that the development of artificial intelligence can truly bring well-being to mankind without excessive adverse effects on the environment and society. Research on the social risks of artificial intelligence has aroused widespread interest around the world and has become an important research direction in the social sciences. The social risks caused by the continuous development and application of artificial intelligence technology are also increasing. Therefore, studying the social risks of artificial intelligence has important theoretical and practical implications. In the future, we must continue to strengthen research on the sustainable development of AI in order to better promote the development and application of AI, and at the same time pay more attention to the social risk research of AI so that the development of AI can truly bring well-being to humans, and it will not have an excessive negative impact on the environment and society. In this process, we must strengthen international cooperation to jointly promote the sustainable development of artificial intelligence and the development of social risk research.

6. References

[1] Arrieta, AB, Díaz-Rodríguez, N, Del Ser, J , et.Explainable Artificial Intelligence (XAI): Concepts, taxonomies, opportunities and challenges toward responsible AI,INFORMATION FUSION,2020,58,82-115.doi: 10.1016/j.inffus.2019.12.012

[2] Lavrenovs, A .Heinaaro, K,Graf, R.Towards Classifying Devices on the Internet Using Artificial Intelligence,2020 12TH INTERNATIONAL CONFERENCE ON CYBER CONFLICT (CYCON).doi:309-325.10.23919/cycon49761.2020.9131713

[3] Sabanovic, S,Milojevic, S ,Kaur, J.John McCarthy,IEEE ROBOTICS & AUTOMATION MAGAZINE,2012,19,4,99. doi:10.1109/MRA.2012.2221259.

[4] Kim, E, Jang, GY , Kim, SH. How to Apply Artificial Intelligence for Social Innovations, APPLIED ARTIFICIAL INTELLIGENCE, 2022, 36, 1.10. 1080/08839514. 2022. 2031819.

[5] Luccioni, A , Bengio, Y,On the Morality of Artificial Intelligence,IEEE TECHNOLOGY AND SOCIETY MAGAZINE,2020,39,1,16-25.doi:10.1109/MTS.2020.2967486.

[6] Li, G ,Li, N ,Sethi, SP.Does CSR Reduce Idiosyncratic Risk? Roles of Operational Efficiency and AI Innovation,PRODUCTION AND OPERATIONS MANAGEMENT,2021,30,7,2027-2045.doi:10.1111/poms.13483.

[7] Tian, P.Y. Social Engineering: An Important Philosophical Paradigm in the Era of Risk Society - Also on the Historical Turn of Philosophical Research Paradigms, Science, Technology and Dialectics, 2007.40.

[8] Robinson, SC.Trust, transparency, and openness: How inclusion of cultural values shapes Nordic national public policy strategies for artificial intelligence (AI), TECHNOLOGY IN SOCIETY,2021,63.doi: 10.1016/j.techsoc.2020.101421.

[9] Ding,X, Yang, Z. Knowledge mapping of platform research: a visual analysis using VOSviewer and CiteSpace, ELECTRONIC COMMERCE RESEARCH, 2020, 22, 3, 787-809. doi: 10.1007/s10660-020-09410-7.

[10] Chen Y, Chen F.M, Hu Z.G, Wang X.W. Principles and applications of citation space analysis—A practical guide to CiteSpace[J].2014.9.

[11] Jiang Y. “Research on Bibliometrics in the Field of Humanities and Social Sciences”, Social Sciences Literature Press, 2013.

[12] Robert, P.W. “Introduction to Content Analysis”, Gezhi Publishing House, 2019.

[13] Yang, Y,Qin, J.R,Lei, J,Liu, YP. Research Status and Challenges on the Sustainable Development of Artificial Intelligence Courses from a Global Perspective, SUSTAINABILITY, 2023, 15, 21.doi: 10.3390/su15129335.

[14] Zhao, J,Wu, MQ,Zhou, LY,Jia, J.Cognitive psychology-based artificial intelligence review, FRONTIERS IN NEUROSCIENCE,2022,16.doi: 10.3389/fnins.2022.1024316.

[15] Chung, KC,Chen,CH,Tsai, HH,Chuang, YH.Social media privacy management strategies: A SEM analysis of user privacy behaviors, COMPUTER COMMUNICATIONS, 2021, 174, 122-130. doi: 10.1016/j.comcom.2021.04.012.