

The Impact of Artificial Intelligence on Economic Development: A Bibliometric Analysis Based on CiteSpace

Jiayong Liu^{1,✉}, Lan Jiang²

¹ School of Economics and Management, Yan'an University, Yan'an, Shaanxi, 716000, China

² School of Economics and Management, Xi'an Aeronautical Institute, Xi'an, Shaanxi, 710077, China

ABSTRACT

The article is based on CiteSpace software for bibliometric analysis of the impact of artificial intelligence on economic development. Literature information comes from CNKI Knowledge Network database, identifying the hotspots and characteristics of the research related to artificial intelligence and economic development from the perspective of the number of articles issued, core authors, keywords, etc., and comprehensively analyzing 3,340 pieces of literature during the period from 2013 to 2023. The study shows that the number of published articles on the research on the impact of artificial intelligence on economic development increases year by year, and by 2021, the number of published articles is more than 600. Most authors publish related articles in the range of 3-7 articles, and there are fewer collaborations between authors. There are 16 keywords that appear more than 30 times in the field of the impact of AI on the economy between 2013~2023, which is statistically accounted for the total of 15.41%. The keyword clustering is divided into 7 cluster classes, and the clustering module $Q=0.781$, $S=0.877$, which has a high feasibility degree. The keyword with the highest intensity of emergence (3.91) in the field of research on the impact of artificial intelligence on economic development after 2018 is "research and development applications".

Keywords: Artificial Intelligence; CiteSpace; Bibliometric Analysis; Economic Development

1. Introduction

Artificial intelligence (AI), as a product of technological innovation, is crucial to the transformation and upgrading of enterprises, and its great influence is expected to promote the overall progress of the economy and society [1]. Although AI is still in its infancy, its application has gradually been widely penetrated into all walks of life, and its rapid development will inevitably produce a strong impetus to the industrial economy, directly contributing to economic and social development.

Artificial intelligence has profoundly affected traditional production and life, prompting a variety of

✉ Corresponding author.

E-mail address: liujy1688@126.com (J. Liu).

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intelligent hardware and new technologies, such as voice unlocking, fingerprint recognition and face recognition, etc. [2-4]. Based on this, the industrial pattern led by artificial intelligence has developed rapidly. By pulling the prosperity of the upstream industry chain, including high-tech, automated production and life and other core areas, AI can vigorously promote the development of informatization, lead the transformation of traditional technology industries to a higher level, and then effectively strengthen the national economic strength and improve the growth rate and quality of China's economy [5-8]. Based on the actual demand, many downstream industries, such as the research and development of algorithmic software, the establishment of graphic models, the development of intelligent chips, and the innovation of intelligent processors and memory, have shown a rapid growth trend under the development of AI technology [9-12]. In addition, the adoption of AI can effectively activate the potential associated industries in the economic system and release their potential, thus creating significant growth momentum, so that industries that originally had no opportunity to get involved in AI can follow the pace of the times and expand their markets after utilizing this technology, thus obtaining lucrative economic returns [13-16]. With endless creativity, powerful collaboration capabilities and far-reaching influence, AI can help the economy flourish, promote the transformation and upgrading of traditional industries to intelligence, promote the combination of the real economy and the virtual economy, and further reduce the cost of investment and improve efficiency [17-20]. At the critical stage of China's transition to a high-quality economy, AI is increasingly highly valued by enterprises, and we should seize this opportunity to closely integrate AI with economic and social development, and jointly promote the pace of the new era.

This paper carries out a bibliometric analysis study on the impact of artificial intelligence on economic development. The study is based on CiteSpace software and selects CNKI Knowledge Network database to collect and process relevant literature. Combining a number of bibliometric analysis methods (bibliographic method, knowledge graph analysis, mathematical statistics, etc.), the literature data are presented in the form of graph visualization. The potential impact of AI on economic development is mined by analyzing the laws of related literature issuance volume, core author relevance, keyword co-occurrence and clustering from 2013 to 2023.

2. CiteSpace software and data information processing

2.1. CiteSpace software

CiteSpace [21] software is mainly based on the theory of co-citation analysis and path-finding network algorithm, etc., through the measurement of research literature in a specific field, so as to explore the key paths and knowledge turning points in the evolution of the subject area, and analyze and study the potential power mechanism and development frontiers of the evolution of the discipline by mapping the cooperation, co-citation, co-presentation, and co-funding.

CiteSpace can help readers better understand the overview of the research field they are engaged in, as well as highlighting some of the important literature in the developmental history of the field. Specifically, CiteSpace can help researchers answer the following questions:

- 1) What are the seminal and landmark research publications in the field of study being pursued?
- 2) What are the literature that plays a key role in the research field being pursued?
- 3) What are the dominant research themes in the field of study?
- 4) How are the different research areas interrelated?
- 5) What is the evolution of research frontiers based on a certain knowledge base?

2.2. Software Operation Procedure

1) System application environment. CiteSpace is a system software developed based on the Java language, and it is necessary to ensure the matching Java Runtime (JRE) before installation and startup. A 32-bit computer system needs to install the JRE for Windows x86, and a 64-bit computer

system needs to install the JRE for Windows x64. In this research, we will use the CiteSpace 4.0.R5SE (64-bit) as the analyzing software and a computer with Java HotSpot(TM) 64-Bit Server VM JRE:1.8.0_66-b18 (64-bit) application and 64-bit Windows 7 operating system installed.

2) Collecting literature data. After selecting the research topic, literature data can be downloaded from Web of Science, PubMed, CSSCI, CNKI and other databases, in which the literature data downloaded from Web of Science and PubMed can be analyzed directly, while the literature data information downloaded from CSSCI, CNKI and other databases need to be formatted before processing. CiteSpace analysis software for data format requirements to ISI as a standard, the text file formed by the downloaded data must be named "download*.txt", if the downloaded literature data is more, you can use the "TXT document combiner. If you download more literature data, you can use the "TXT document merger" to process the document.

3) Set the time zone. The CiteSpace software runs the "Time Slicing" module in the main window under the "From... To..." Set the start and end time of the data to be analyzed, and select the time partition by "Years Per Slice", for example, select 3, which means that every three years is used as a time interval for analysis.

4) Selection of the object of analysis.

5) Filtering of data for analyzed objects.

6) Graph pruning. Pathfinder and Minimum Spanning Tree algorithms can be used when the obtained maps are too large and chaotic. Determine the pruning algorithm and then choose the pruning strategy: pruning slicenetworks can prune the plots for each time period and then stitch them together. Pruning the mergednetworks allows pruning the entire graph.

7) Graph visualization options: CiteSpace graph visualization has both dynamic and static options, static is selected by default. The option Show networks by Time Slice means that multiple plots will be displayed in time slots, and the option ShowMerged Network means that the results of all time slots will be displayed on one plot.

In this study, the software will be used to implement the bibliometric analysis of the study of the impact of artificial intelligence on economic development, through the collection and processing of relevant information, and data visualization and presentation.

2.3. Standardization of data and information

2.3.1. Database selection. The data source of this study is CNKI Knowledge Network Database [22], combining the breadth of the research text and the quality requirements of the research level, selecting the higher quality "CSSCI" source articles generally recognized by the academic community as the sample data. The Citation Index database, with CNKI as the search platform, contains more than 12,000 of the world's more authoritative academic journals in the fields of natural sciences, engineering technology, biomedicine, social sciences, humanities and arts.

2.3.2. Data collection. The search time is 11:30 a.m. on February 10, 2024, "Economic growth" and "Artificial intelligence" are selected as the subject words, the time span is set to 2013-2023, the document type is selected as "academic journal", "dissertation", "conference" and "newspaper", and the advanced search formula is: TS=(Economic growth And Artificial intelligence), a total of 3340 research articles related to artificial intelligence in the field of economic development were retrieved through this search method.

2.3.3. Data information processing. First of all, create two new folders in the computer, named "project" and "data" respectively, because the data format requirements of CiteSpace software are based on the text data format of the ISI database, and the downloaded literature data needs to be named "download**.txt" and then downloaded and saved in batches to the "data" folder (Note: the document entries contained in the text document downloaded each time are ≤ 500), if the downloaded data is too much, you can use "The TXT Document Merger" software merges the documents, then names them as "download**.txt", and finally uses the CiteSpace software to create visual graphs and analyze the results.

3. CiteSpace-based bibliometric analysis methodology

3.1. Bibliography

According to the research needs of this paper, the CNKI Knowledge Network database is used as the data source to find out the literature on the related topics of the study of the impact of economic development under artificial intelligence, scientific knowledge mapping and visualization analysis to systematically sort out and analyze, and at the same time, find out and read the books related to the impact of economic development under artificial intelligence and the CiteSpace scientific knowledge mapping to determine the content of the study and grasp the research methodology and the writing of the article to provide sufficient theoretical support.

3.2. Knowledge mapping analysis method

In this study, CiteSpace visual analysis software was used to analyze the authors and institutions of the research literature on the impact of artificial intelligence on economic development, and the keywords of the research literature for scientific knowledge mapping. Scientific knowledge mapping such as co-occurrence mapping and clustering mapping were used to reveal the changes in the number of publications in the field, the author relationship and institutional characteristics, the relationship between research content and thematic evolution, the research hotspots in different contexts, and the cutting-edge trend of future research, and ultimately to provide in-depth interpretation of the evolution of research development in the field.

1) Word Frequency Analysis. Word frequency analysis [23] is to take the key words and subject words in the research paper as the object of analysis, and to analyze the frequency of all key words in the field of the discipline under study over a period of time to analyze the research hot spots, research progress, development trends and other aspects of predicting the development trend of the discipline, and it is the most commonly used bibliometric method of hot spot analysis.

2) Word co-occurrence analysis. Word co-occurrence analysis is composed of two or more co-occurring keywords in the article, which can be used to show the most critical knowledge structure and the main content of the article, this method is often used in the bibliometrics for the definition and identification of research hotspots, and the production of the word co-occurrence analysis network can help to decipher the nature of the knowledge structure of this research.

3) Co-word cluster analysis. Co-occurrence cluster analysis [24] is based on co-occurrence analysis, the frequency of co-occurrence of words as the object of study, through the clustering statistical method to simplify the massive co-occurrence network relationship into a clear class relationship, and can scientifically and objectively explain the subject word in the content and the relationship between the close connection.

3.3. *Logical analysis*

Using logical analysis methods such as induction, deduction, analysis and synthesis, abstraction and generalization, the general situation of research in the field of economic development under artificial intelligence, the intrinsic connection of research knowledge and the process of its evolution and development are analyzed in depth, so as to reveal the essence of the law of artificial intelligence affecting economic development.

3.4. *Mathematical and statistical methods*

Using CiteSpace software to carry out mathematical statistics on the measurable data of the relevant research literature [25], through the scientific knowledge mapping analysis after the literature author, the time of publication, keywords, co-occurrence results, clustering results, emergent results and other information extraction, and using Excel software to data statistics and made into a table and map, in the form of visualization for statistical analysis.

4. **Analysis of the distribution and composition of research outputs**

4.1. *Trends in the number of publications*

The number of publications reflects the attention, research heat and the number of achievements of the research topic in the research field. According to the metrological visualization analysis provided by China Knowledge, 3340 core literatures were analyzed.

Figure 1 shows the number of published literature about the research on the impact of AI on economic development from 2013 to 2023. The statistics of the sample literature show two stages of development: the first stage is 2013~2017, and the number of core literature on AI and economic development during these four years is less than 100, which indicates that the attention and research efforts of the academic community on this topic are obviously insufficient in this period, and also shows the weak theoretical foundation of the study and the lack of a research team in this period. The second stage is 2018~2023 (as of the date of literature search), in 2018, AI technology began to achieve initial results, coupled with the fact that after the epidemic in 2021, the government attaches great importance to economic development, and makes every effort to promote the landing of AI technology, and academics have paid more attention to the study of AI technology for economic development. Therefore, the number of articles published in this period showed accelerated growth, especially in the period of 2021-2023, which is an exponential growth, the number of articles published in 2021 exceeded 600, until the number of articles published in 2023 reached 846. This indicates that the research on this topic gradually matured during this period, the number of high-quality core articles began to increase, and AI on economic development has not only become a hot topic at present, but also will become a hot topic in the future.

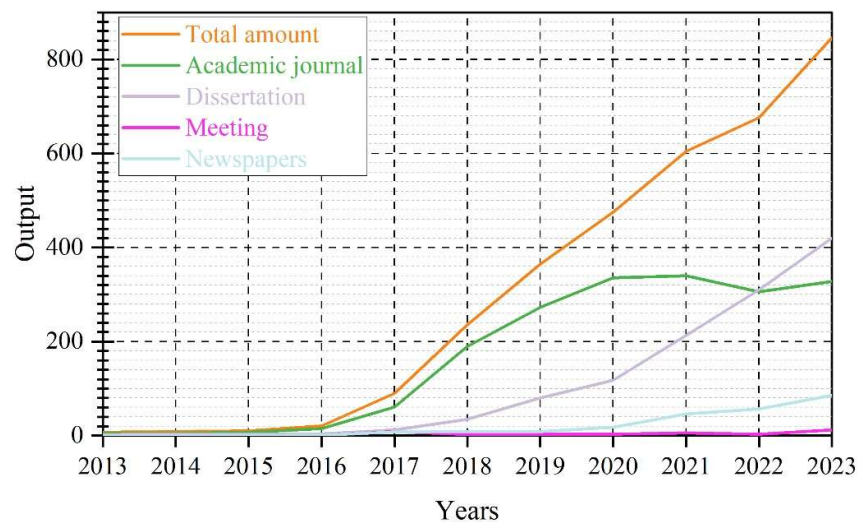


Fig. 1. The literature of artificial intelligence on economic development

4.2. Author distribution and relevance

By setting the Node Types type and selecting Author you can get the author collaboration visualization mapping. Figure 2 shows the author cooperation visualization mapping of the top 20 authors in terms of the number of articles published in the study of the impact of artificial intelligence on economic development. By analyzing the mapping, we can get the situation among the scholars who have important influence on the research in this field, and judge from the macro level to grasp the current situation of the issuance of articles and the current status of the research.

In the visualization graph of author cooperation, the size of nodes indicates the number of authors' articles, and the number of inter-author links indicates the degree of cooperation between authors. From the figure, we can conclude that the top 20 authors with the number of articles, the connecting line is 1, and the density of the cooperation network between authors is 0.0012. Among them, two authors, RBP and LMF, have published more than 10 articles, which are 19 and 14, respectively, and the rest of the authors have published between 3 and 7 articles. If the authors with 7 or more publications are defined as core authors, the publications of the core authors account for 26.32% of the total number of literature selected in this study, which indicates that there is no core group with stability in this field, and also from the figure, we can see that the connectivity between the authors is sparse, which indicates that there are more authors who are independent researchers in this field of study, and only the two authors, LMF and XYZ, have taken a collaborative approach, and there is less close cooperation between most of the authors.

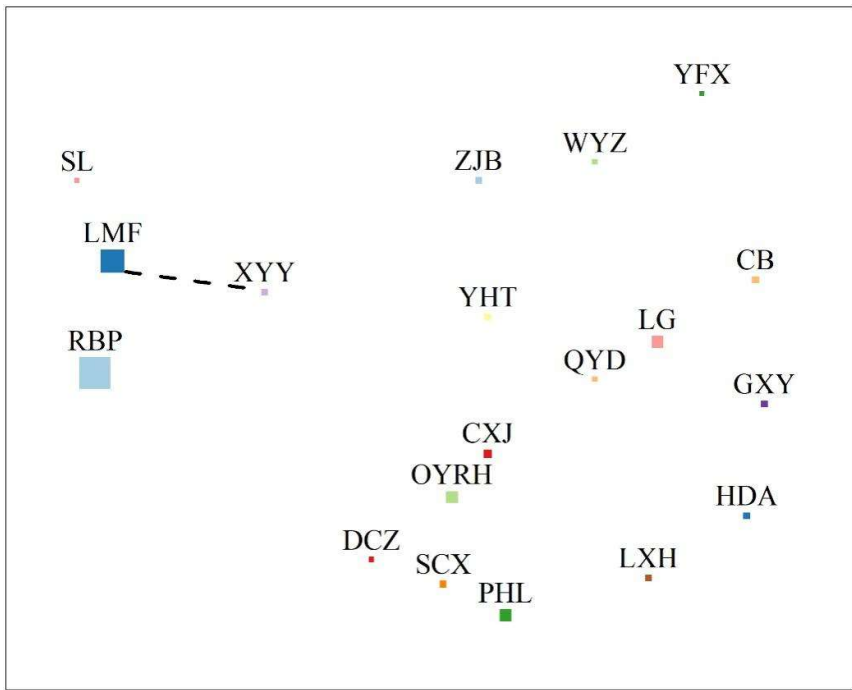


Fig. 2. Artificial intelligence shows the development of economic development

4.3. Keyword Co-occurrence

The research hotspots of each field in each period and the time evolution of its research lineage are generally the most noteworthy focuses. In this paper, we use keyword co-occurrence analysis to determine the research hotspots in the field of digital economy in China by combining table and graph, counting the frequency of high-frequency keywords, and constructing: "keyword co-citation network".

Set the Node Types type, select Keyword to arrive at the keyword co-occurrence network mapping as shown in Figure 3, through the keyword co-occurrence network mapping can be visualized to reflect the current research hotspots and the current situation. From the figure, it can be seen that the research topics in this research field show diversity. Table 1 shows the keywords focusing on the research in the field of the impact of artificial intelligence on economic development from 2013 to 2023. In order to highlight the focus, only the keywords with frequency ≥ 30 are intercepted in the table. According to the statistical analysis, these 16 keywords in the literature account for 15.41% of the total number of keywords, and the percentage of the frequency of occurrence is around 50%, which is a good representation. According to the chart, the keyword with the highest frequency is "digital economy", which appears the most often, with 823 times, followed by "artificial intelligence", "high-quality economic development", "digital transformation" and other research topics with relatively high frequency, which have become the main research topics in this field. The magnitude of centrality reflects the magnitude of the research value of the field being analyzed. It can be seen from the table that the centrality of "digital economy" is 1.75 and that of "artificial intelligence" is 1.44, indicating that these two topics have important research significance and value, while the themes of "social welfare and policy", "Internet +" and "digital government" have relatively high frequency but low centrality values, indicating that although these research topics have attracted the attention of scholars, the research value and significance of this topic have not attracted widespread attention.

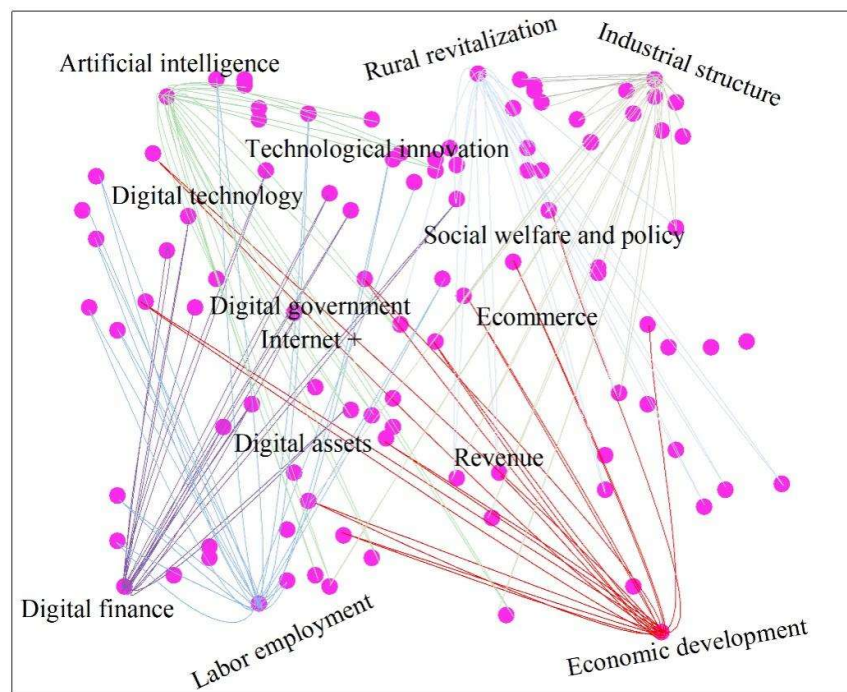


Fig. 3. Key words common network map

Table 1. Artificial intelligence affects the frequency of high frequency keywords

Key words	Frequency	centrality	Key words	Frequency	centrality
Digital economy	823	1.75	Artificial intelligence	55	0.67
Artificial intelligence	358	1.44	New kinetic energy	44	0.62
High quality development	163	1.13	Smart economy	39	0.55
Digital transformation	118	1.02	Social welfare and policy	37	0.53
Industrial development	84	0.91	Digital government	33	0.47
Real economy	78	0.88	Internet +	31	0.44
Financial technology	66	0.76	Digital technology	30	0.31
Manufacturing	55	0.7	Labor employment	30	0.25

4.4. Keyword clustering analysis

Figure 4 presents the keyword clustering labels based on the log-likelihood ratio (LLR) algorithm, the clustering module value $Q = 0.781 > 0.3$, the clustering structure is significant and reasonable, the network homogeneity is very high, and the clustering results have a high degree of confidence. From the figure, we can see that the key areas of the study of the impact of artificial intelligence on the economy are: economic growth, digital economy, structural transformation, technological innovation, rural revitalization, labor and employment, policy governance 7 clusters of S value of 0.877 are greater than 0.72, the results have a high degree of credibility.

Industrial Integration (Cluster 1):

Artificial intelligence is seen as a driver of productivity and economic growth, capable of improving

the efficiency of the decision-making process by analyzing large amounts of data. Through intelligent transformation, the integration of the digital economy and the real economy will be developed to improve efficiency gains.

Digital Economy (Cluster 2):

As a new economic form, the digital economy is conducive to improving the quality and efficiency of regional economic growth. The development process of the digital economy will form a range of economic effects and economies of scale, and the superposition of the two will play a positive role in promoting the quality and efficiency of regional economic growth.

Structural transformation (Cluster 3):

Artificial Intelligence provides a new path to alleviate industrial structural problems, effectively reducing production costs and improving production efficiency through digital technology, and promoting enterprises to realize upgrading through the substitution effect of human resources.

Technological Innovation (Cluster 4):

As a representative of technological innovation, AI has a profound impact on many aspects of macroeconomics, such as high-quality growth, and the development of AI will trigger profound changes in macroeconomics in terms of employment and income distribution.

Rural Revitalization (Cluster 5):

Digital economy helps rural revitalization, rural digital economic development, the necessity of digital village construction, implementation dilemma and realization path. Innovative implementation paths of digital economy to help rural revitalization from digital literacy, infrastructure, market regulation, etc., to promote industrial revitalization and achieve economic development.

Labor and Employment (Cluster 6):

Artificial intelligence in automated production can increase the value of product units, thus expanding the market size and region and providing more production jobs for workers.

Policy Governance (Cluster 7):

The development of AI requires policymakers to establish comprehensive social safety nets and provide retraining programs for vulnerable workers to make the AI transition more inclusive, protect livelihoods and curb inequality.

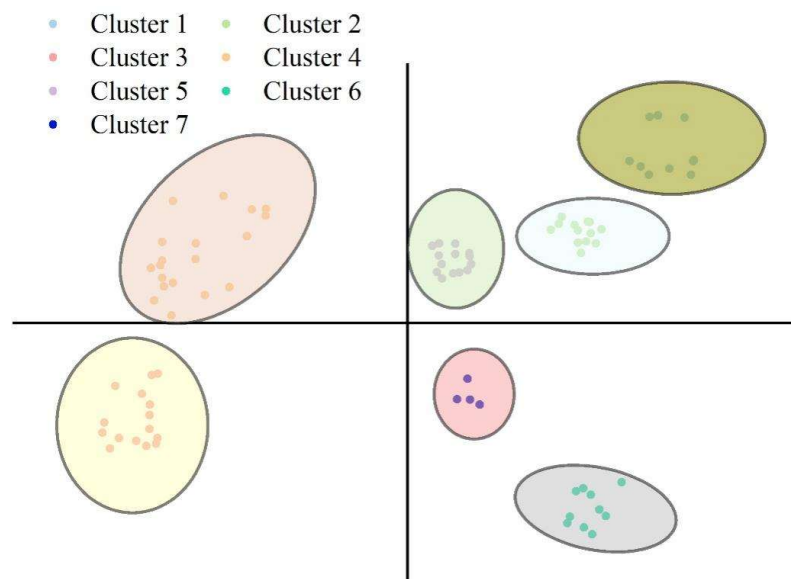


Fig. 4. Keyword clustering tag based on logarithmic approximation algorithm

4.5. Emergent Words and Intensity Assessment

In this section, 10 keywords that emerged after 2018 are selected, which are industrial change,

national strategy, economic growth, employment impact, income inequality, R&D application, smart industry, data-driven, rural revitalization, and digital governance, which are recorded as keywords 1-10 in order.

Figure 5 presents the emergence intensity of the 10 emergent keywords, and Table 2 shows the start and end year of each keyword. It can be seen that a wave of research on the impact of AI on economic development emerged after 2018. In terms of the emergence intensity, R&D application has the highest emergence intensity of 3.91. It is followed by smart industry, income inequality, industrial change, and employment impact, all with emergence intensities of 3 or more.

Industrial change, national strategy, and economic growth issues are the key topics around 2018, while there is a shift towards employment impact and income inequality research after 2019. By 2020 and beyond, more experts and scholars begin to focus on AI R&D applications, the development of smart industries, and begin to apply AI technology to rural revitalization. Through digital governance, the development of the countryside will be driven and economic growth will be increased.

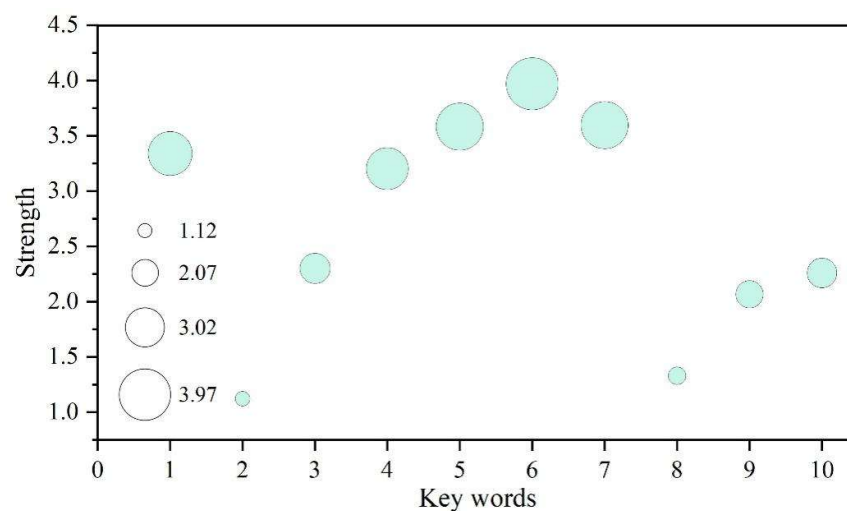


Fig. 5. The sudden strength of a sudden keyword

Table 2. The start and end of each keyword

Key words	Strength	Begin	End
1	3.341	2018	2023
2	1.123	2018	2023
3	2.301	2018	2023
4	3.204	2019	2023
5	3.584	2019	2023
6	3.971	2020	2023
7	3.597	2020	2023
8	1.33	2020	2023
9	2.068	2020	2023
10	2.26	2020	2023

5. Conclusion

The study screened the data information about the impact of artificial intelligence on economic development from 2013 to 2023 from CNKI Knowledge Network Database. Bibliometric analysis methods such as literature information and knowledge graph analysis were applied, and CiteSpace software was borrowed to present the frontiers and hotspots of the research in this field in multiple dimensions (the number of publications, authors, keywords, and the intensity of emergence). The results of the bibliometric analysis are as follows: the number of publications in the study of the impact of artificial intelligence on economic development has increased year by year from 2018, and 846 related documents have been published in 2023. According to statistics, the number of authors who published related literature from 2013 to 2023 is 19, of which the core authors account for 26.32% of the total. The keyword “digital economy” has the highest frequency of 823 times in the related literature, and its centrality is 1.75, which is of great research value to economic development. CiteSpace clustering visualization shows that the keywords in the research on the impact of AI on economic development can be classified as industrial integration, digital economy, structure, transformation, technological innovation, rural revitalization, economic development, and the impact of AI on economic development. After 2018, 10 keywords in related fields have emerged, among which the keyword “R&D application” has the highest intensity of 3.91.

Future research can further focus on the selection of AI indicators, changes in innovation patterns brought about by AI, and the impact of AI policy analysis on economic development.

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References

- [1] Qin, Y., Xu, Z., Wang, X., & Skare, M. (2024). Artificial intelligence and economic development: An evolutionary investigation and systematic review. *Journal of the Knowledge Economy*, 15(1), 1736-1770.
- [2] Lalar, S., Kumar, T., Kumar, R., & Kumar, S. (2025). Unlocking Potential: The Role of Artificial Intelligence in Revolutionizing Special Education for Inclusive Learning. In *Impacts of Generative AI on the Future of Research and Education* (pp. 201-232). IGI Global.
- [3] Abdullahi, S. B., Khunpanuk, C., Bature, Z. A., Chiroma, H., Pakkaranang, N., Abubakar, A. B., & Ibrahim, A. H. (2022). Biometric information recognition using artificial intelligence algorithms: A performance comparison. *IEEE Access*, 10, 49167-49183.
- [4] Jiang, E. (2020, July). A review of the comparative studies on traditional and intelligent face recognition methods. In *2020 International Conference on Computer Vision, Image and Deep Learning (CVIDL)* (pp. 11-15). IEEE.
- [5] Zhang, H., Ding, Y., Niu, J., & Jung, S. (2024). How artificial intelligence affects international industrial transfer—Evidence from industrial robot application. *Journal of Asian Economics*, 95, 101815.
- [6] Jiang, J., & Chen, S. (2024). Influence of Artificial intelligent in Industrial Economic sustainability development problems and Countermeasures. *Heliyon*, 10(3).
- [7] Benotsmane, R., Kovács, G., & Dudás, L. (2019). Economic, social impacts and operation of smart factories in Industry 4.0 focusing on simulation and artificial intelligence of collaborating robots. *Social Sciences*, 8(5), 143.
- [8] Zou, W., & Xiong, Y. (2023). Does artificial intelligence promote industrial upgrading? Evidence from China. *Economic research-Ekonomska istraživanja*, 36(1), 1666-1687.
- [9] Peres, R. S., Jia, X., Lee, J., Sun, K., Colombo, A. W., & Barata, J. (2020). Industrial artificial intelligence in industry 4.0-systematic review, challenges and outlook. *IEEE access*, 8, 220121-220139.
- [10] Ahmad, T., Zhang, D., Huang, C., Zhang, H., Dai, N., Song, Y., & Chen, H. (2021). Artificial intelligence in sustainable energy industry: Status Quo, challenges and opportunities. *Journal of Cleaner Production*, 289, 125834.
- [11] Felten, E., Raj, M., & Seamans, R. (2021). Occupational, industry, and geographic exposure to artificial intelligence: A novel dataset and its potential uses. *Strategic Management Journal*, 42(12), 2195-2217.
- [12] Judijanto, L., Asfahani, A., Prusty, A., Krisnawati, N., & Bakri, A. A. (2022). Industrial Revitalization with AI between Opportunities and Challenges for Global Economic Growth. *Journal of Artificial Intelligence and Development*, 1(1), 49-57.
- [13] Yang, T., Yi, X., Lu, S., Johansson, K. H., & Chai, T. (2021). Intelligent manufacturing for the process industry driven by industrial artificial intelligence. *Engineering*, 7(9), 1224-1230.
- [14] Khan, A. A., Laghari, A. A., Li, P., Dootio, M. A., & Karim, S. (2023). The collaborative role of blockchain, artificial intelligence, and industrial internet of things in digitalization of small and medium-size enterprises. *Scientific Reports*, 13(1), 1656.
- [15] Han, F., & Mao, X. (2024). Artificial intelligence empowers enterprise innovation: evidence from China's industrial enterprises. *Applied Economics*, 56(57), 7971-7986.
- [16] Zhu, L., Yu, Z., & Zhan, H. (2020). Impact of industrial agglomeration on regional economy in a simulated intelligent environment based on machine learning. *Ieee Access*, 9, 20695-20702.
- [17] Korinek, A., & Stiglitz, J. E. (2021). Artificial intelligence, globalization, and strategies for economic development (No. w28453). National Bureau of Economic Research.

- [18] Lu, C. H. (2021). The impact of artificial intelligence on economic growth and welfare. *Journal of Macroeconomics*, 69, 103342.
- [19] He, Y. (2019). The importance of artificial intelligence to economic growth. *Korean Journal of Artificial Intelligence*, 7(1), 17-22.
- [20] Mamedov, O., Tumanyan, Y., Ishchenko-Padukova, O., & Movchan, I. (2018). Sustainable economic development and post-economy of artificial intelligence. *Entrep. Sustain*, (2018), 6.
- [21] Linghui Yang, Hamdan Amer Ali Al Jaifi & Kelvin Yong Ming Lee. (2024). A dynamic bibliometric analysis of financial inclusion and happiness with CiteSpace. *Cogent Economics & Finance*(1),
- [22] Qian Cai & Bing Zhang. (2023). Research on Integrated Labor Education in Primary and Secondary Schools Based on CiteSpace Analysis of CNKI Database. *Journal of Big Data and Computing*(1),
- [23] Henrique Faccin & Thiago Alexandro Nascimento de Andrade. (2025). Textual analysis of teaching-learning evaluations in higher education: Deep learning and lexical investigation approaches. *Expert Systems With Applications*125982-125982.
- [24] Liu Yang & Yin Zhijun. (2020). Understanding Weight Loss via Online Discussions: Content Analysis of Reddit Posts Using Topic Modeling and Word Clustering Techniques. *Journal of medical Internet research*(6),e13745.
- [25] N. A. Merzlyakova, D. V. Volnova & N. N. Rozhkov. (2024). Application of Mathematical Statistics Methods in System Analysis of Factors Affecting Properties of Film Yarns. *Fibre Chemistry*(2),1-4.