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Bibliometric Analysis on Artificial Intelligence (2023-2026)

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Abstract: Artificial Intelligence (AI) has emerged as one of the most transformative and rapidly expanding research domains across the world. The present study conducts a bibliometric analysis of Artificial Intelligence research publications indexed in the Dimensions database during the period 2023–2026. A total of 2,497 research articles published across 1,017 sources were analyzed using Biblioshiny and bibliometric analytical techniques. The study examines annual scientific production, citation analysis, most productive authors, influential affiliations, country-wise research productivity, highly cited documents, keyword co-occurrence, thematic evolution, and collaboration networks. The findings reveal an extraordinary annual growth rate of 477.4%, indicating the accelerating scholarly interest in AI-related studies. Healthcare, medical education, diagnostics, and public health emerged as dominant application areas of AI research. The USA was identified as the leading contributor in terms of scientific production and citation impact, while strong collaboration networks were observed among global researchers, particularly from China and the United States. Keyword and thematic analyses revealed growing emphasis on generative artificial intelligence, healthcare applications, AI literacy, and ethical integration of AI technologies. The study highlights the interdisciplinary, collaborative, and rapidly evolving nature of AI research and provides valuable insights for researchers, academicians, policymakers, and industry professionals interested in emerging AI trends and future research directions.

Keywords: Artificial Intelligence, Bibliometric Analysis, Citation Analysis, Biblioshiny, Scientific Production.

1. Introduction and Literature Review

Artificial Intelligence (AI) has emerged as one of the most revolutionary technological developments of the modern era, transforming the operational, economic, educational, healthcare, industrial, and social structures of societies worldwide. AI refers to the capability of computer systems and machines to perform tasks that traditionally require human intelligence, including reasoning, learning, problem-solving, pattern recognition, language processing, decision-making, and predictive analysis (Russell & Norvig, 2021). The rapid growth of AI technologies has accelerated digital transformation across multiple sectors, making AI one of the most influential and fastest-growing research domains globally. The advancement of machine

learning, deep learning, neural networks, robotics, computer vision, natural language processing, and generative AI technologies has significantly expanded the practical applications of AI systems. The increasing availability of big data, cloud computing infrastructure, advanced computational capabilities, and open-source AI frameworks has further contributed to the large-scale adoption and implementation of AI technologies across industries and institutions (Goodfellow et al., 2016). As a result, governments, academic institutions, healthcare organizations, financial institutions, and multinational corporations are investing heavily in AI-driven research, innovation, and automation to enhance productivity, efficiency, and competitiveness.

The emergence of generative AI technologies such as ChatGPT, Gemini, Claude, and other large language models has further intensified global scholarly and industrial interest in Artificial Intelligence. These intelligent systems have demonstrated advanced capabilities in content generation, conversational interaction, data analysis, research assistance, automation, and decision support. (Dwivedi et al., 2023) highlighted that generative AI technologies are significantly reshaping business operations, education systems, communication processes, and knowledge management practices. However, the study also emphasized concerns related to ethical governance, misinformation, algorithmic bias, privacy protection, intellectual property rights, and responsible AI usage. Healthcare has emerged as one of the most dominant and rapidly growing application areas of Artificial Intelligence. AI technologies are increasingly used in disease prediction, clinical diagnostics, medical imaging, robotic surgery, pathology, drug discovery, patient monitoring, and precision medicine. (Topol, 2019) explained that AI has the potential to improve diagnostic accuracy, reduce medical errors, optimize healthcare operations, and provide personalized treatment solutions. Similarly, (Esteva et al., 2017) demonstrated that deep learning algorithms achieved dermatologist-level accuracy in skin cancer classification, reflecting the significant potential of AI-based healthcare systems. The increasing integration of AI within healthcare has also stimulated substantial research activity in medical sciences, nursing, pathology, and public health domains.

AI applications in education have also received growing academic attention due to their ability to personalize and improve learning experiences. (Luckin et al., 2016) argued that AI-powered educational systems such as intelligent tutoring systems, adaptive learning platforms, and automated assessment mechanisms can enhance teaching effectiveness and student learning outcomes. (Holmes et al., 2019) further discussed that AI technologies can transform educational environments by supporting customized learning pathways, real-time feedback, and student performance evaluation. At the same time, scholars have emphasized the importance of balancing technological advancement with ethical, pedagogical, and human-centered educational values.

In the business and management context, AI technologies are increasingly used for predictive analytics, customer relationship management, fraud detection, digital marketing, financial forecasting, and strategic decision-making. (Brynjolfsson and McAfee, 2017) observed that AI-driven digital transformation is fundamentally reshaping organizational structures, labor markets, and economic systems worldwide. (Davenport and Ronanki, 2018) also noted that organizations implementing AI systems are achieving significant improvements in operational efficiency, automation, and customer experience management. The growing adoption of AI in business sectors demonstrates its increasing strategic importance in modern economic environments.

Despite the remarkable opportunities associated with AI technologies, several ethical, legal, and societal concerns have emerged regarding their development and implementation. (Bostrom, 2014) warned that advanced AI systems may create significant risks related to human control, decision-making autonomy, and societal safety if not governed responsibly. Similarly, (Floridi et al., 2018) emphasized the necessity of ethical AI frameworks focusing on fairness, accountability, transparency, privacy protection, and human oversight. Concerns regarding algorithmic discrimination, cybersecurity threats, misinformation, unemployment displacement, and unethical AI usage have encouraged scholars and policymakers to advocate for responsible and sustainable AI governance mechanisms. The extraordinary growth of AI-related scientific publications in recent years has created a need for systematic evaluation and mapping of the existing literature. Researchers across disciplines are producing an enormous volume of AI-related studies, making it difficult to identify influential themes, emerging trends, collaborative structures, and intellectual developments without systematic analysis. Bibliometric analysis has therefore become an important research methodology for quantitatively examining publication patterns, citation structures, co-authorship networks, keyword relationships, thematic evolution, and scientific productivity within a research domain (Donthu et al., 2021). Bibliometric techniques help researchers understand the intellectual structure and developmental trajectory of a field by analyzing large volumes of scholarly publications using statistical and visualization tools. (Aria and Cuccurullo, 2017) explained that modern bibliometric software such as Bibliometrix and Biblioshiny enables researchers to conduct science mapping, thematic analysis, collaboration analysis, citation analysis, and network visualization effectively. These tools provide deeper insights into research productivity, influential publications, author collaboration patterns, thematic clusters, and emerging knowledge areas within a discipline. Several bibliometric studies have specifically examined Artificial Intelligence research trends and developments. (Fu et al., 2022) conducted a bibliometric analysis of AI research in healthcare and found that machine learning, deep learning, predictive analytics, and medical imaging emerged as major research themes. The study identified the United States and China as leading contributors to global AI healthcare research. Similarly, (Verma et al., 2021) observed substantial growth in interdisciplinary collaboration and international co-authorship within AI research publications. (Huang et al., 2023) analyzed global AI research trends and reported that generative AI, explainable AI, ethical AI, and machine learning have become dominant contemporary research themes. The study highlighted the multidisciplinary nature of AI research involving collaboration among healthcare professionals, engineers, educators, computer scientists, and policymakers. The increasing occurrence of interdisciplinary AI studies demonstrates that AI technologies are no longer confined to computer science alone but are now integrated into multiple academic and industrial domains.

The growing popularity of large language models and generative AI systems has further expanded research interest in AI-powered educational and research applications. (Kasneci et al., 2023) discussed the opportunities and challenges associated with using ChatGPT and similar AI systems in education and academic research. The authors argued that generative AI can support content generation, research assistance, personalized learning, and academic productivity. However, concerns regarding plagiarism, misinformation, bias, academic integrity, and overreliance on AI systems were also highlighted. Existing literature clearly demonstrates that Artificial Intelligence has evolved into a highly dynamic, multidisciplinary, and globally influential research field with rapidly increasing academic, industrial, and societal significance. AI technologies are actively transforming healthcare, education, finance, management,

communication, governance, and scientific research activities worldwide. Simultaneously, ethical governance, responsible AI implementation, transparency, and sustainability have emerged as major concerns within contemporary AI scholarship. Although numerous studies have explored specific AI applications and implications, there remains a significant need for updated bibliometric analysis capturing recent developments in AI research, particularly after the rapid expansion of generative AI technologies during recent years. The present study addresses this gap by conducting a comprehensive bibliometric analysis of Artificial Intelligence research using data collected from the Dimensions database for the period 2023–2026. The study examines publication growth trends, citation structures, influential journals, productive authors, institutional contributions, country-wise scientific production, thematic evolution, keyword co-occurrence networks, and collaboration structures within the global AI research landscape. The findings are expected to provide valuable insights for researchers, academicians, policymakers, and industry professionals regarding the current state and future direction of Artificial Intelligence research.

2. Methodology

The present study is descriptive and analytical in nature and is based on bibliometric research methodology to examine the scientific growth, intellectual structure, collaboration patterns, and thematic evolution of Artificial Intelligence research publications during the period 2023–2026. The study primarily aims to examine annual scientific production in AI research, identify the most productive authors, journals, affiliations, and countries, analyze citation patterns and influential research documents, evaluate keyword occurrence and thematic evolution, and study collaboration networks and co-occurrence structures among researchers and research themes. The bibliometric data for the study was collected from the Dimensions AI database, and only research articles related to Artificial Intelligence were included in the analysis. During the data cleaning process, duplicate records, incomplete records, and documents with missing titles or author information were removed to ensure data quality and analytical accuracy. A final dataset consisting of 2,497 research articles was used for the bibliometric analysis. The collected data was analyzed using the Biblioshiny interface of the Bibliometrix package in R software. Various bibliometric techniques and indicators were employed to examine the conceptual and intellectual structure of the research domain. Additionally, AI tools such as ChatGPT, Google Gemini, Grok AI, and NotebookLM were utilized for understanding complex statistical outputs, refining interpretations, organizing content, and improving the overall presentation quality of the research paper.

3. Bibliometric Analysis

Table 1: Main Information of Data Entered for Bibliometric Analysis on Artificial Intelligence

Description	Results
MAIN INFORMATION ABOUT DATA	
Timespan	2023:2026
Sources (Journals, Books, etc)	1017
Documents	2497
Annual Growth Rate %	477.4
Document Average Age	1.18
Average citations per doc	12.55

References	75686
DOCUMENT CONTENTS	
Keywords Plus (ID)	1
Author's Keywords (DE)	1
AUTHORS	
Authors	11206
Authors of single-authored docs	218
AUTHORS COLLABORATION	
Single-authored docs	229
Co-Authors per Doc	5.34
International co-authorships %	27.51
DOCUMENT TYPES	
article	2497

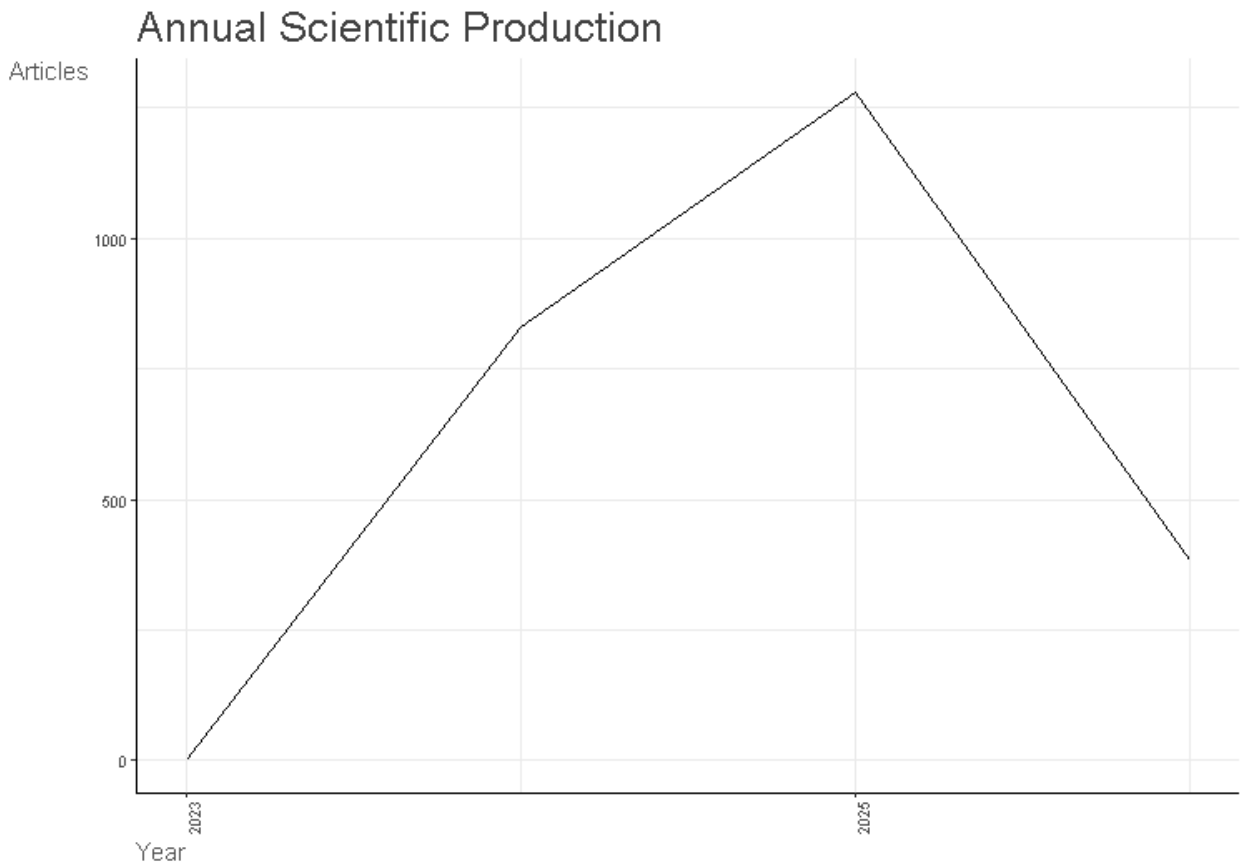
The bibliometric dataset on Artificial Intelligence (AI) covers the period from 2023 to 2026 and includes 2,497 research articles published across 1,017 different academic sources. The annual growth rate of 477.4% indicates an exceptionally rapid expansion of AI-related scholarly publications during the selected period, reflecting the increasing global interest and adoption of AI technologies across multiple disciplines. The average age of documents is 1.18 years, showing that the literature is highly recent and contemporary in nature.

The dataset generated a total of 75,686 references, demonstrating the extensive scholarly foundation and interconnectedness of AI research. The average citation per document is 12.55, suggesting that the publications have already achieved considerable academic visibility and influence despite their recent publication years. The study further reveals strong collaborative research practices, with 11,206 authors contributing to the literature and an average of 5.34 co-authors per document, indicating the multidisciplinary and team-oriented nature of AI research.

International collaboration is also notable, as 27.51% of the publications involve international co-authorship, highlighting the globalized nature of AI research activities. The majority of documents are journal articles, emphasizing that peer-reviewed academic publishing remains the dominant medium for disseminating AI-related knowledge. Overall, the findings demonstrate that Artificial Intelligence is currently one of the fastest-growing and highly collaborative research domains in the global academic landscape.

Table 2: Annual Scientific Production

Year	Articles
2023	2
2024	830
2025	1280
2026	385

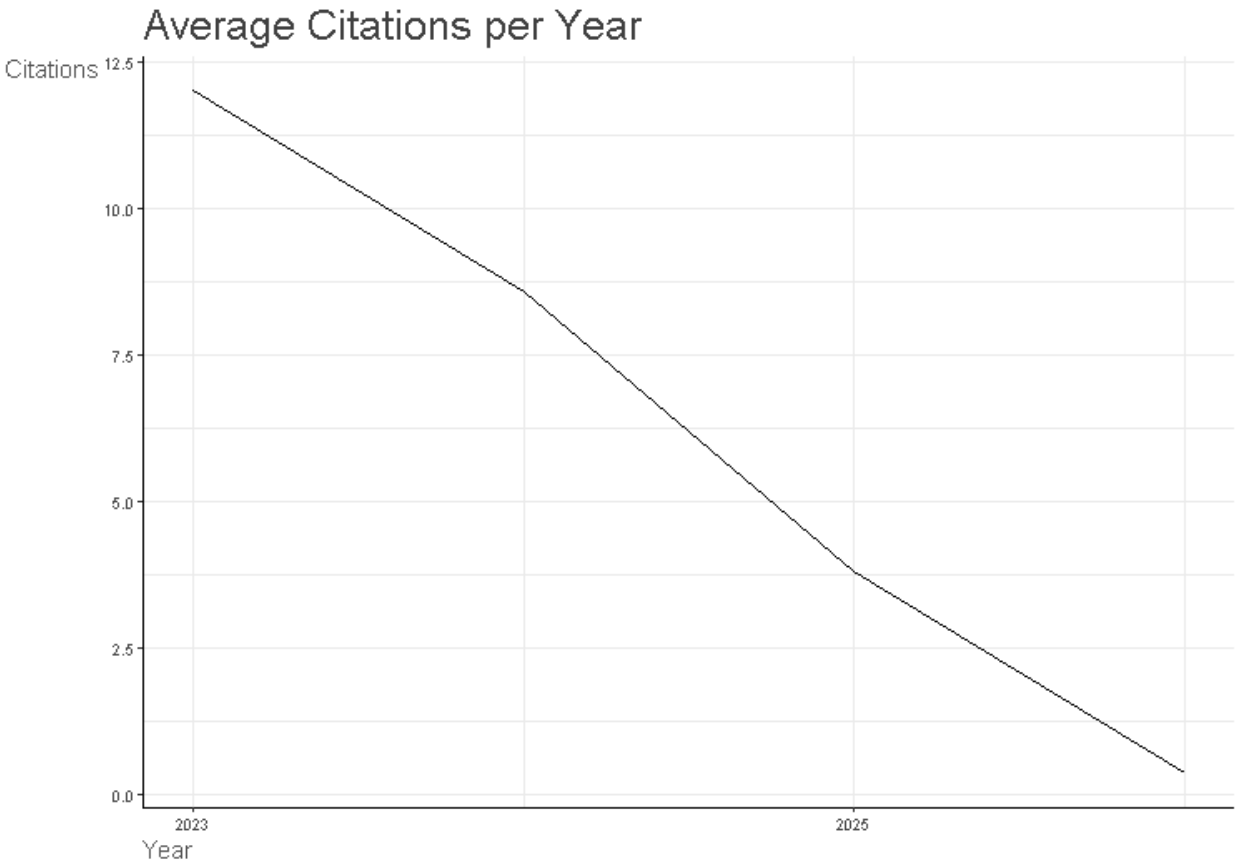


The annual scientific production analysis shows a significant rise in AI-related publications over the study period. In 2023, only 2 articles were published, whereas the number sharply increased to 830 articles in 2024 and further expanded to 1,280 articles in 2025. This substantial growth reflects the rapid acceleration of research interest in Artificial Intelligence, particularly after the widespread adoption of generative AI technologies and advanced machine learning applications.

Although the number of publications declined to 385 in 2026, this reduction may be due to incomplete indexing or partial data availability for the year rather than an actual decline in research interest. The overall trend clearly demonstrates that AI has emerged as a dominant and rapidly expanding area of academic investigation. The increasing publication volume also indicates growing investments by universities, industries, healthcare institutions, and governments in AI-based innovation and research development.

Table 3: Average Citation Per Year

Year	MeanTCperArt	N	MeanTCperYear	CitableYears
2023	48	2	12	4
2024	25.73	830	8.58	3
2025	7.62	1280	3.81	2
2026	0.35	385	0.35	1



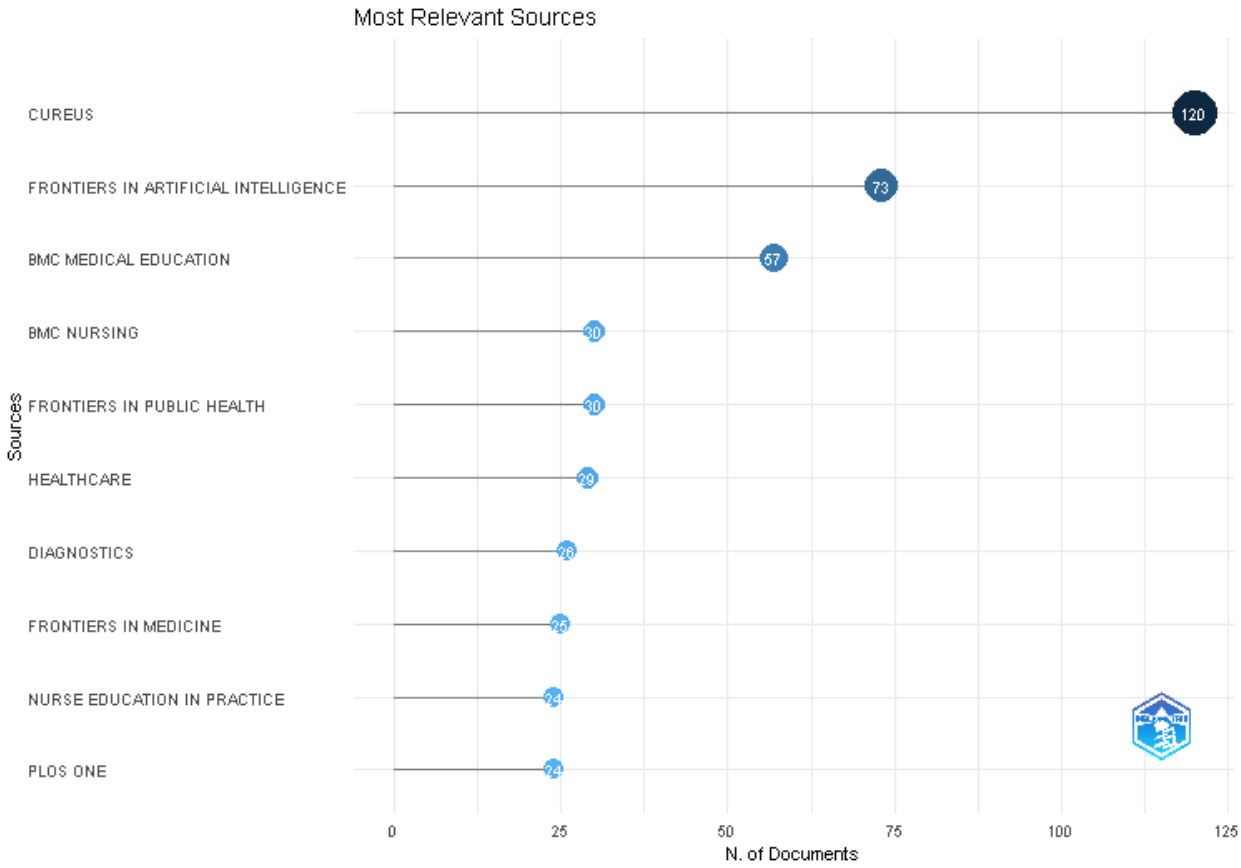
The citation analysis indicates that publications from earlier years received significantly higher citations compared to recent publications. Articles published in 2023 achieved an average total citation count of 48 citations per article and an average of 12 citations per year, which is the highest among all years. This is expected because older publications have had more time to gain scholarly recognition and citations.

Similarly, publications from 2024 obtained an average of 25.73 total citations per article and 8.58 citations per year, showing strong academic impact. However, the average citations decrease substantially for publications in 2025 and 2026, mainly because recently published studies have had less exposure time in the academic community. The findings suggest that earlier AI studies established influential foundations that are heavily cited by subsequent researchers. Overall, the citation trend confirms the growing scholarly relevance and academic influence of AI research.

Table 4: Most Relevant Sources

Sources	Articles
CUREUS	120
FRONTIERS IN ARTIFICIAL INTELLIGENCE	73
BMC MEDICAL EDUCATION	57
BMC NURSING	30

FRONTIERS IN PUBLIC HEALTH	30
HEALTHCARE	29
DIAGNOSTICS	26
FRONTIERS IN MEDICINE	25
NURSE EDUCATION IN PRACTICE	24
PLOS ONE	24

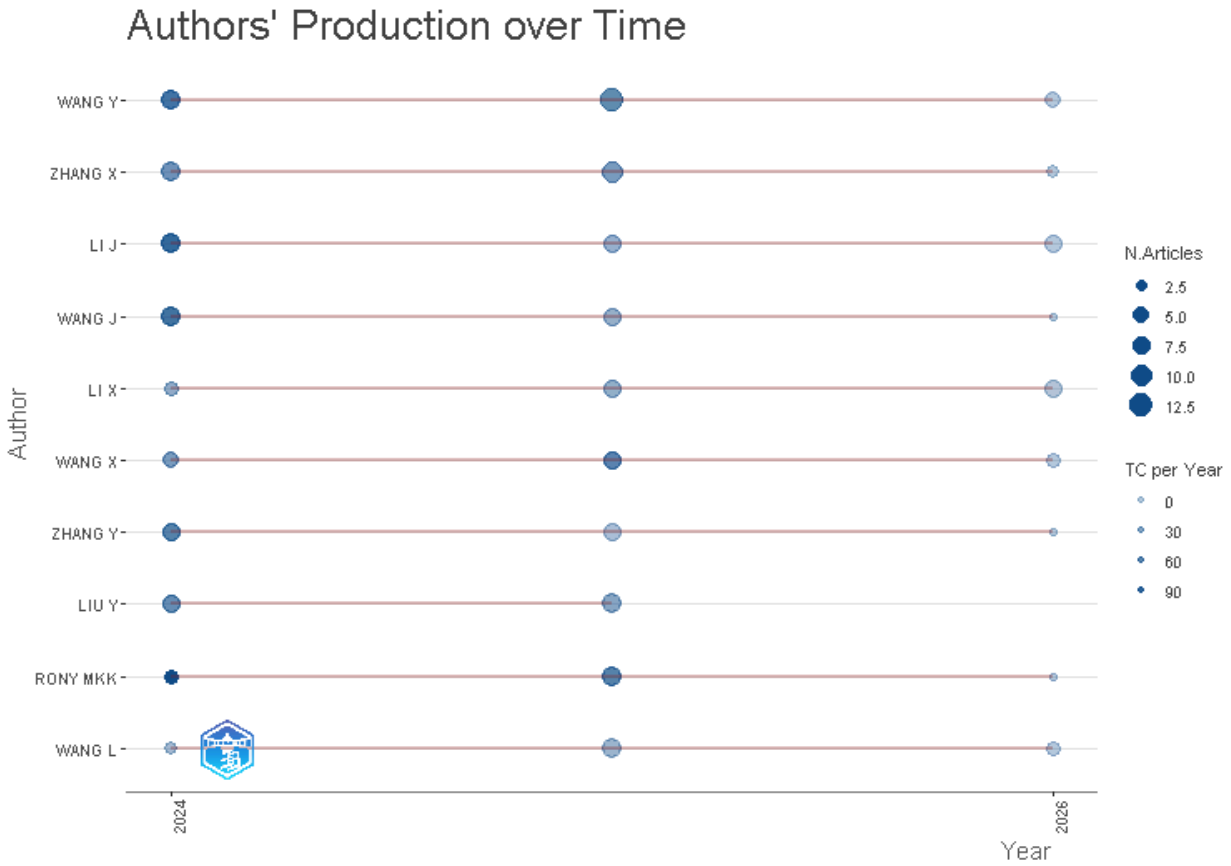


The analysis of the most relevant sources reveals that AI-related research is highly concentrated in healthcare, medical, and interdisciplinary journals. The journal *CUREUS* published the highest number of articles (120), followed by *Frontiers in Artificial Intelligence* with 73 articles and *BMC Medical Education* with 57 articles. This indicates that AI research is being actively explored in medical education, healthcare services, diagnostics, and public health domains.

Other significant sources such as *BMC Nursing*, *Healthcare*, *Diagnostics*, and *Frontiers in Medicine* further confirm the strong integration of AI applications within healthcare and medical sciences. The presence of journals like *PLOS ONE* also demonstrates the multidisciplinary nature of AI research. Overall, the findings suggest that healthcare-related applications of AI are currently among the most dominant and rapidly expanding research areas globally.

Table 5: Most Relevant Authors

Authors	Articles	Articles Fractionalized
WANG Y	27	5.60830338
ZHANG X	22	3.56975108
LI J	21	3.96479076
WANG J	17	3.8613456
LI X	16	2.54280303
WANG X	16	2.3995782
ZHANG Y	16	3.04007937
LIU Y	15	2.88079004
RONY MKK	15	1.66426074
WANG L	15	3.28932179

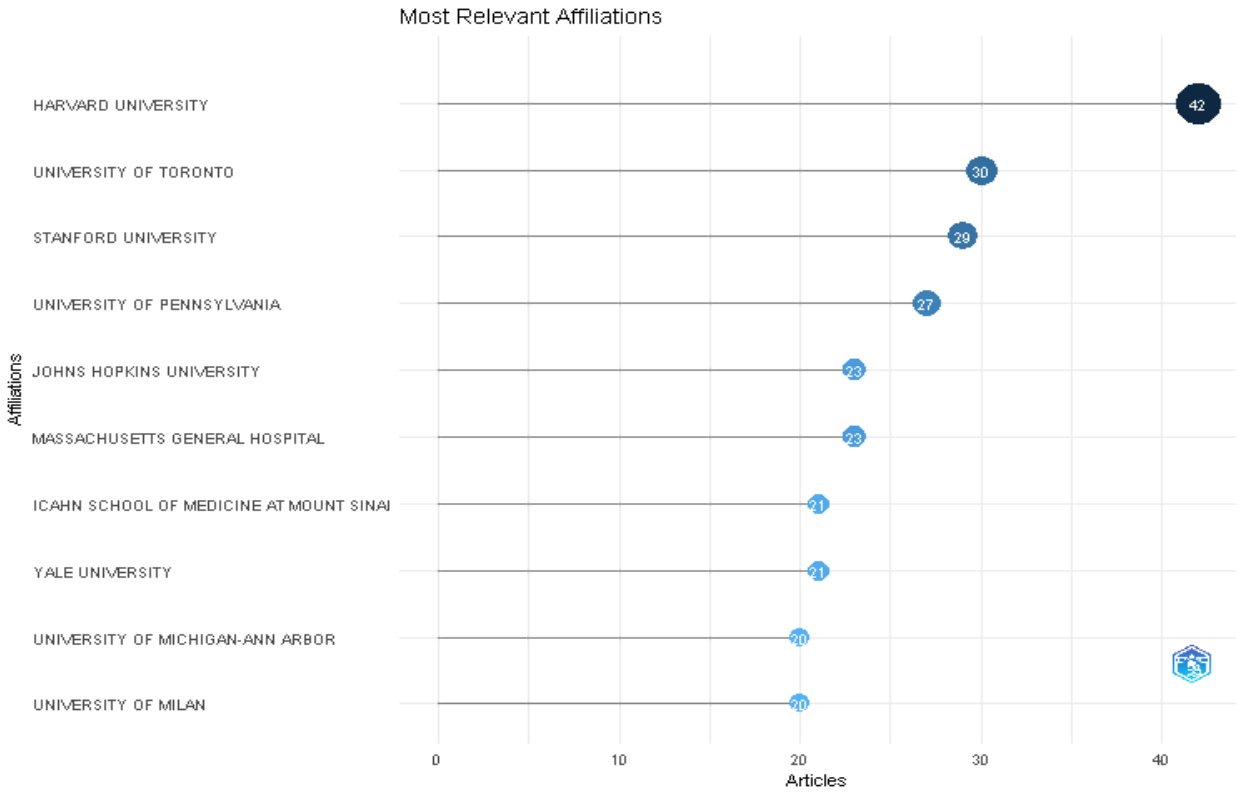


The analysis of the most productive authors shows that several researchers have made substantial contributions to AI-related literature. Among them, WANG Y emerged as the most productive author with 27 articles, followed by ZHANG X with 22 articles and LI J with 21 articles. These authors have played a significant role in advancing AI research during the study period.

The fractionalized article count indicates the proportionate contribution of authors in collaborative works. Although some authors have high publication counts, their fractionalized scores are comparatively lower due to multi-author collaborations. This highlights the collaborative and interdisciplinary nature of AI research, where scholars from different fields work together on complex research problems. The findings also demonstrate strong participation from Asian researchers, particularly Chinese authors, in global AI scholarship.

Table 6: Most Relevant Affiliation

Affiliation	Articles
HARVARD UNIVERSITY	42
UNIVERSITY OF TORONTO	30
STANFORD UNIVERSITY	29
UNIVERSITY OF PENNSYLVANIA	27
JOHNS HOPKINS UNIVERSITY	23
MASSACHUSETTS GENERAL HOSPITAL	23
ICAHN SCHOOL OF MEDICINE AT MOUNT SINAI	21
YALE UNIVERSITY	21
UNIVERSITY OF MICHIGAN-ANN ARBOR	20
UNIVERSITY OF MILAN	20



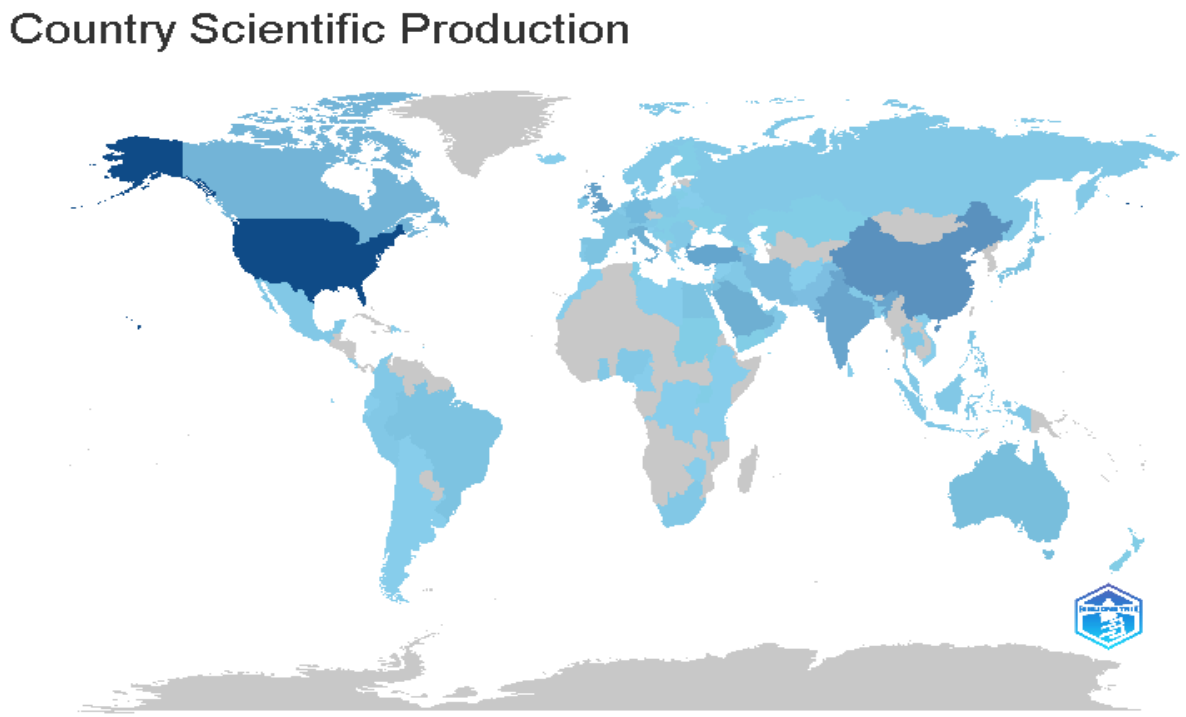
The affiliation analysis reveals that globally reputed universities and medical institutions are leading contributors to AI research. Harvard University ranked first with 42 publications, followed by University of Toronto and Stanford University. These institutions are globally

recognized for their strong research infrastructure, technological advancement, and interdisciplinary innovation ecosystems.

The presence of institutions such as Johns Hopkins University, Yale University, and University of Michigan-Ann Arbor demonstrates the dominance of advanced research universities and healthcare institutions in AI development. The findings indicate that top-tier institutions with strong medical and technological research capabilities are driving global AI innovation and academic productivity.

Table 7: Country's Scientific Production

Region	Freq
USA	681
UK	215
TURKEY	204
INDIA	189
ITALY	157
SAUDI ARABIA	155
CHINA	152
CANADA	114
GERMANY	107
IRAN	91

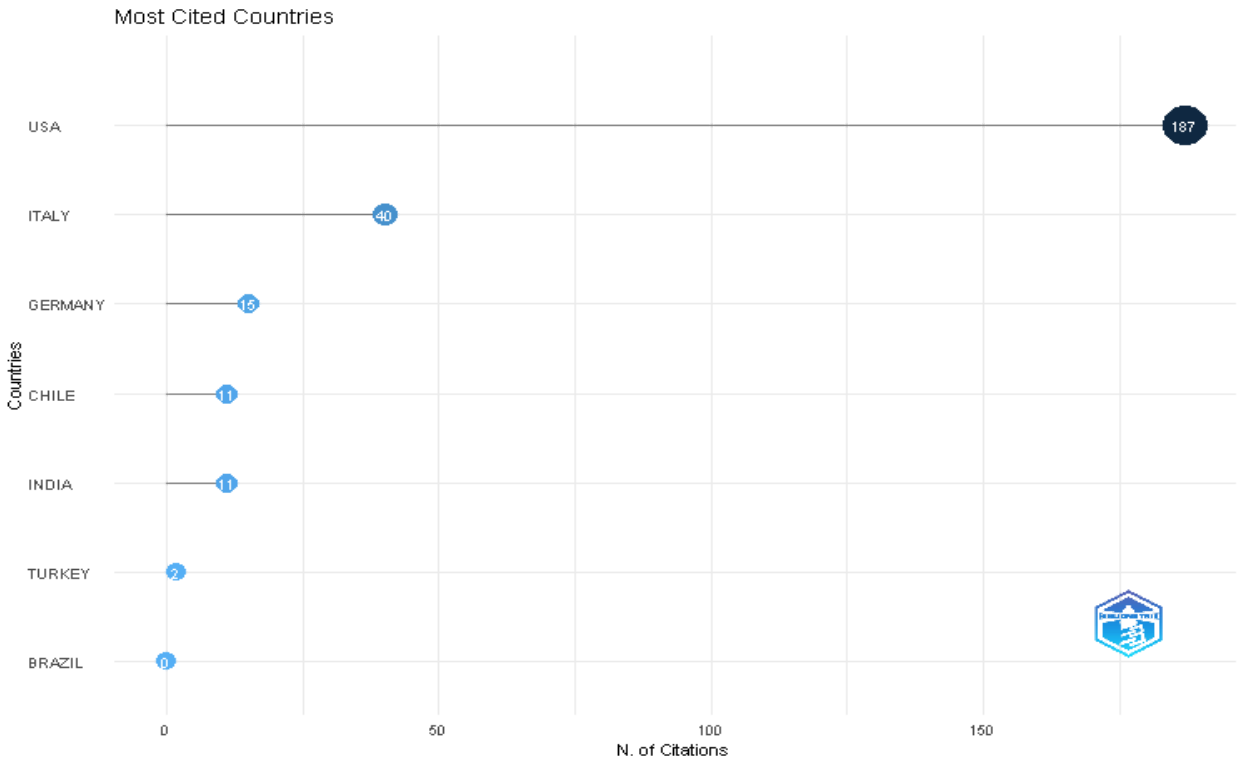


The country-wise scientific production analysis shows that the USA is the leading contributor to AI research with 681 publications, significantly outperforming other countries. The UK, Turkey, India, Italy, and Saudi Arabia also contributed substantially to the global AI literature. India secured the fourth position with 189 publications, demonstrating the country's growing engagement in AI research and innovation.

The findings indicate that AI research is not limited to technologically advanced Western nations but is increasingly expanding into emerging economies as well. Countries such as China, Iran, and Saudi Arabia are also actively contributing to AI-related studies. This global distribution reflects the universal relevance and adoption of Artificial Intelligence across diverse academic, industrial, and healthcare sectors.

Table 8: Most Cited Countries

Country	TC	Average Article Citations
USA	187	31.2
ITALY	40	20
GERMANY	15	15
CHILE	11	11
INDIA	11	11
TURKEY	2	2
BRAZIL	0	0



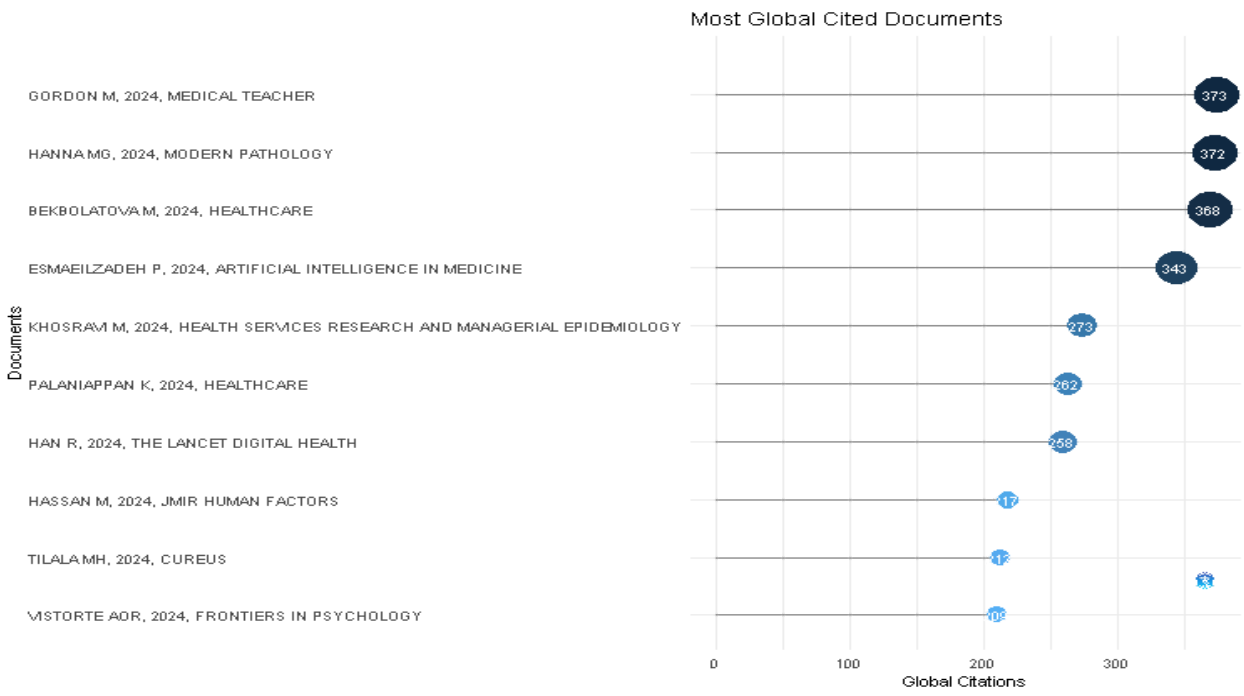
The citation analysis reveals that the USA not only produced the highest number of publications but also achieved the highest citation impact with 187 total citations and an average of 31.2

citations per article. Italy ranked second with an average of 20 citations per article, indicating strong research quality and academic influence.

Although India and Chile produced comparatively fewer highly cited articles, they maintained an average of 11 citations per article, reflecting moderate research impact. Turkey and Brazil showed relatively lower citation performance. The findings suggest that countries with advanced research infrastructure, funding support, and international collaborations tend to achieve higher citation visibility and global academic recognition in AI research.

Table 9: Most Cited Documents

Paper	Total Citations	TC per Year	Normalized TC
GORDON M, 2024, MEDICAL TEACHER	373	124.33	14.50
HANNA MG, 2024, MODERN PATHOLOGY	372	124.00	14.46
BEKBOLATOVA M, 2024, HEALTHCARE	368	122.67	14.30
ESMAEILZADEH P, 2024, ARTIFICIAL INTELLIGENCE IN MEDICINE	343	114.33	13.33
KHOSRAVI M, 2024, HEALTH SERVICES RESEARCH AND MANAGERIAL EPIDEMIOLOGY	273	91.00	10.61
PALANIAPPAN K, 2024, HEALTHCARE	262	87.33	10.18
HAN R, 2024, THE LANCET DIGITAL HEALTH	258	86.00	10.03
HASSAN M, 2024, JMIR HUMAN FACTORS	217	72.33	8.43
TILALA MH, 2024, CUREUS	212	70.67	8.24
VISTORTE AOR, 2024, FRONTIERS IN PSYCHOLOGY	209	69.67	8.12



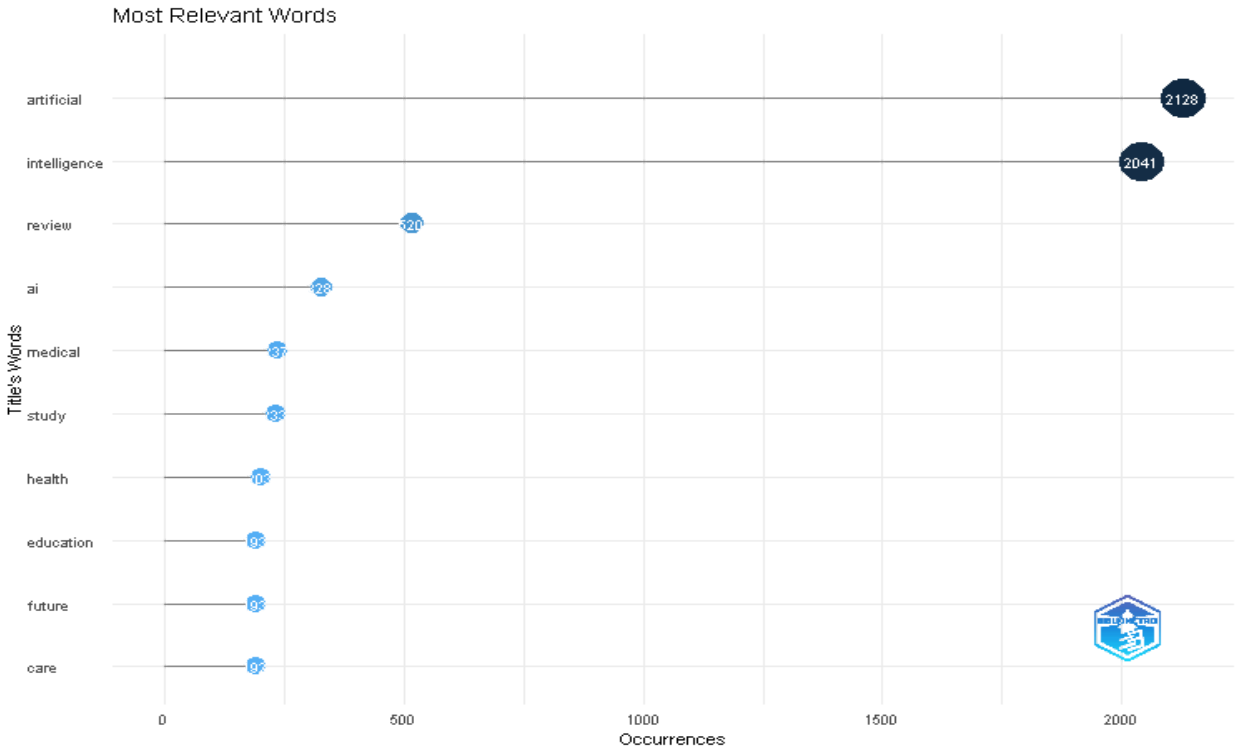
The most cited documents analysis identifies highly influential publications that significantly shaped AI research. The study by GORDON M published in *Medical Teacher* in 2024 received

the highest total citations (373), closely followed by HANNA MG in *Modern Pathology* with 372 citations and BEKBOLATOVA M in *Healthcare* with 368 citations.

Most of the highly cited papers are related to healthcare, medical education, pathology, and AI implementation in medical sciences. This demonstrates that healthcare applications of AI have attracted immense academic and practical attention globally. The high normalized citation scores further indicate that these publications have performed exceptionally well relative to other studies published during the same period. Overall, the findings highlight the transformative role of AI in healthcare and medical research domains.

Table 10: Most Relevant Unigram Words

Words	Occurrences
artificial	2128
intelligence	2041
review	520
ai	328
medical	237
study	233
health	203
education	193
future	193
care	192



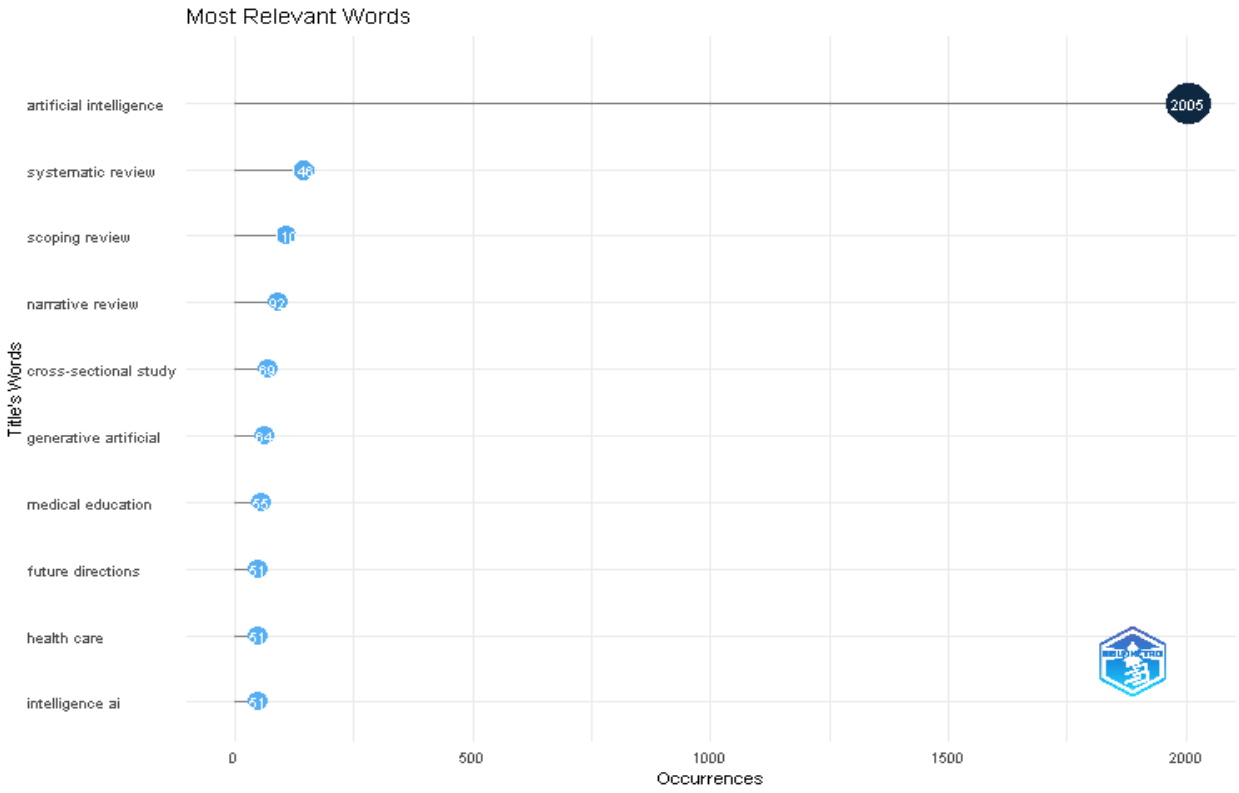
The unigram analysis shows that the most frequently occurring words are “artificial” and “intelligence,” confirming the core focus of the dataset on Artificial Intelligence research. Other

highly occurring terms such as “review,” “medical,” “health,” “education,” and “care” suggest that AI research is strongly concentrated in healthcare and educational applications.

The occurrence of terms like “future” and “study” indicates that researchers are actively exploring future directions, implications, and practical implementations of AI technologies. Overall, the findings demonstrate that AI research is interdisciplinary and heavily associated with medical, educational, and healthcare-related themes.

Table 11: Most Relevant Bigram Words

Words	Occurrences
artificial intelligence	2005
systematic review	146
scoping review	110
narrative review	92
cross-sectional study	69
generative artificial	64
medical education	55
future directions	51
health care	51
intelligence ai	51



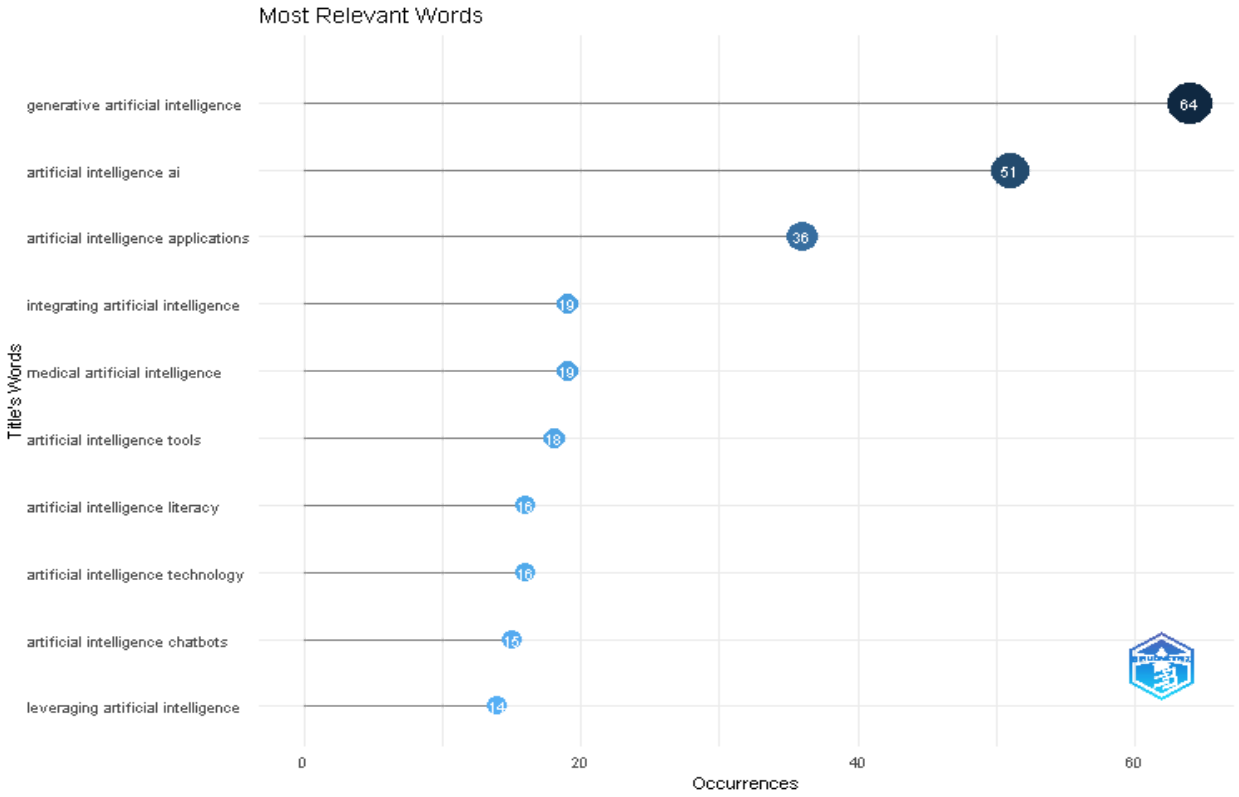
The bigram analysis reveals that the phrase “artificial intelligence” dominates the dataset with 2,005 occurrences, indicating its central importance in the literature. Other frequently occurring

phrases such as “systematic review,” “scoping review,” and “narrative review” suggest that a large portion of AI research involves review-based studies aimed at synthesizing existing knowledge.

Terms like “medical education,” “health care,” and “future directions” further confirm the growing integration of AI within healthcare and educational sectors. Additionally, the presence of “generative artificial” reflects increasing scholarly attention toward generative AI technologies such as large language models and AI-powered content generation systems.

Table 12: Most Relevant Trigram Words

Words	Occurrences
generative artificial intelligence	64
artificial intelligence ai	51
artificial intelligence applications	36
integrating artificial intelligence	19
medical artificial intelligence	19
artificial intelligence tools	18
artificial intelligence literacy	16
artificial intelligence technology	16
artificial intelligence chatbots	15
leveraging artificial intelligence	14

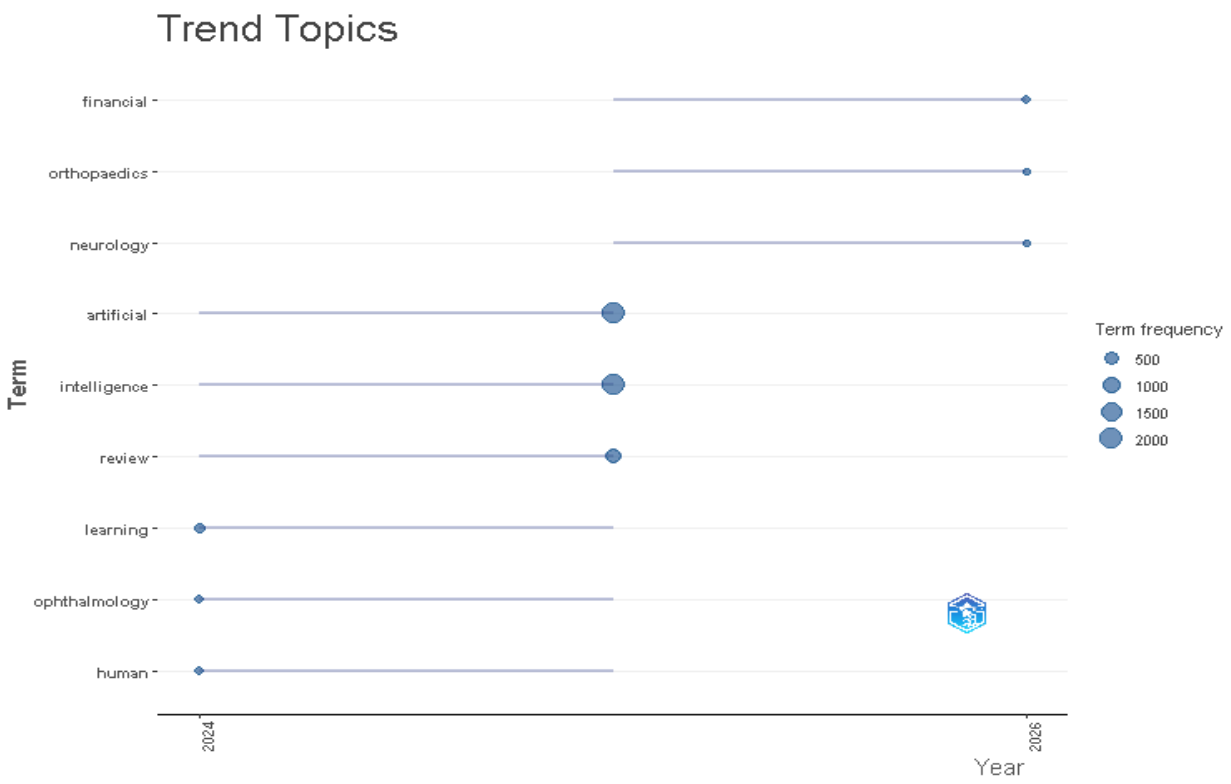


The trigram analysis highlights "generative artificial intelligence" as the most dominant phrase, reflecting the recent surge in research interest surrounding generative AI technologies. Other important trigrams such as "artificial intelligence applications," "artificial intelligence tools," and "artificial intelligence literacy" indicate that researchers are focusing on the practical implementation, usability, and awareness of AI systems.

The occurrence of phrases like "artificial intelligence chatbots" and "leveraging artificial intelligence" suggests increasing exploration of conversational AI and AI-driven decision-support systems. Overall, the findings indicate that current AI research is shifting toward applied and user-centered technological innovations.

Table 13: Trend Topics

Term	Frequency	Year (Q1)	Year (Median)	Year (Q3)
learning	83	2024	2024	2025
ophthalmology	31	2024	2024	2025
human	29	2024	2024	2025
artificial	2128	2024	2025	2025
intelligence	2041	2024	2025	2025
review	520	2024	2025	2025
financial	11	2025	2026	2026
orthopaedics	8	2025	2026	2026
neurology	7	2025	2026	2026



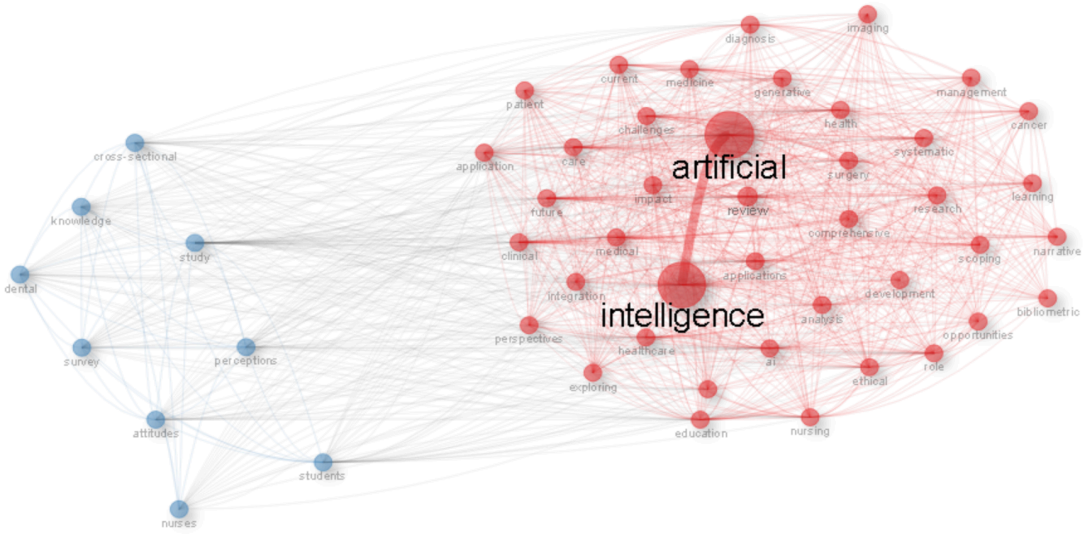
The trend topic analysis shows that terms such as “learning,” “ophthalmology,” and “human” were prominent during 2024–2025, reflecting the growing application of AI in medical diagnostics, education, and human-centered research. The consistently high frequency of “artificial,” “intelligence,” and “review” across 2024–2025 indicates the continued dominance of core AI research themes.

Emerging topics such as “financial,” “orthopaedics,” and “neurology” appeared mainly during 2025–2026, suggesting the expansion of AI applications into finance and specialized healthcare disciplines. The findings demonstrate that AI research themes are continuously evolving and diversifying into new domains over time.

Table 14: Cluster for Network Diagram of Co-Occurrence Words

Node	Cluster	Betweenness	Closeness	PageRank
artificial	1	117.586741	0.02040816	0.15385521
intelligence	1	109.614256	0.02040816	0.14995387
review	1	6.05233899	0.01960784	0.0494938
ai	1	2.78156341	0.02040816	0.02347874
medical	1	1.12210811	0.01923077	0.02228158
health	1	0.55942114	0.01851852	0.0184278
education	1	0.88726562	0.01923077	0.02037167
future	1	0.90340818	0.02	0.02076484
care	1	0.82687822	0.01923077	0.0194753
applications	1	1.27212709	0.01960784	0.0218755
healthcare	1	0.67804138	0.01851852	0.0173478
clinical	1	0.76797022	0.02	0.01827294
systematic	1	0.39142631	0.01886792	0.01747963
challenges	1	0.55325732	0.01754386	0.01772932
role	1	0.3656456	0.01851852	0.01459239
medicine	1	0.19913304	0.01724138	0.01295381
nursing	1	0.64816012	0.01818182	0.01688793
ethical	1	0.38925014	0.01851852	0.01502834
analysis	1	0.5362338	0.01754386	0.01416392
surgery	1	0.12997661	0.015625	0.01194802
diagnosis	1	0.19315273	0.015625	0.01208888
research	1	0.33250339	0.01639344	0.01281051
current	1	0.3097138	0.01754386	0.01454857
cancer	1	0.14139213	0.01515152	0.01151509
scoping	1	0.11147209	0.01612903	0.01350812
practice	1	0.15234463	0.01639344	0.01182727
narrative	1	0.10924116	0.01538462	0.01187807
perspectives	1	0.20738145	0.01612903	0.01213364
generative	1	0.11597675	0.01639344	0.0104754
management	1	0.11277351	0.01587302	0.0098343
impact	1	0.09675006	0.01666667	0.00957859

application	1	0.14590392	0.01666667	0.00945384
learning	1	0.08419991	0.01639344	0.0089318
integration	1	0.19258428	0.01754386	0.01017957
bibliometric	1	0.02961582	0.01351351	0.00932519
development	1	0.01746855	0.01388889	0.00672231
imaging	1	0.0595182	0.015625	0.00781511
opportunities	1	0.02133691	0.01449275	0.00817935
patient	1	0.06925074	0.01666667	0.0079464
comprehensive	1	0.04012396	0.01538462	0.0086441
exploring	1	0.08067059	0.01612903	0.0081825
study	2	2.14396257	0.01923077	0.02592977
students	2	0.57660228	0.01694915	0.02076132
attitudes	2	0.39488562	0.01587302	0.01525455
cross-sectional	2	0.24580311	0.01587302	0.01450802
perceptions	2	0.23421427	0.01639344	0.01185396
survey	2	0.20600445	0.015625	0.01077762
knowledge	2	0.14732632	0.01538462	0.01170555
nurses	2	0.03438026	0.01388889	0.00894518
dental	2	0.12824444	0.01515152	0.00830301

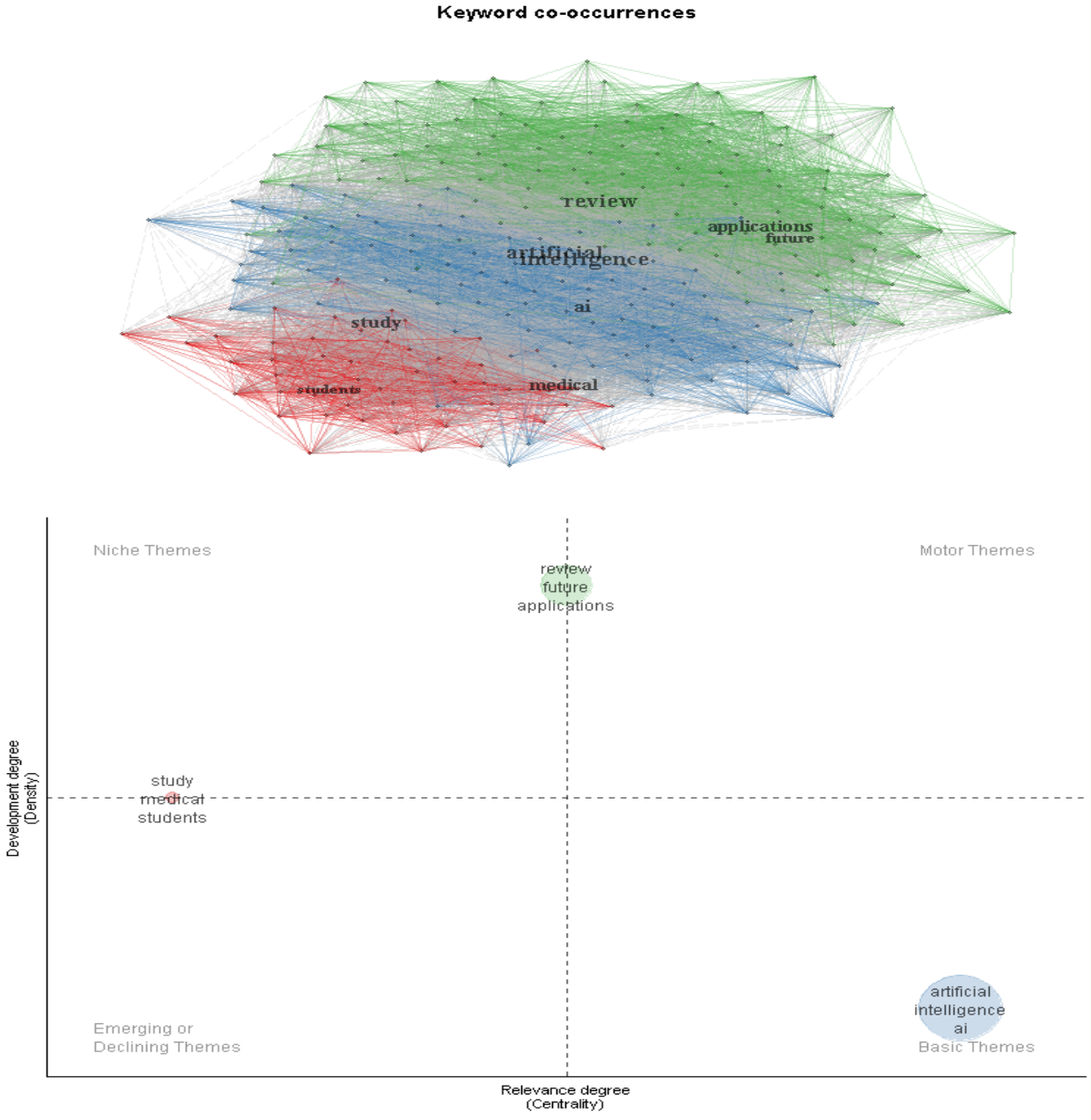


The co-occurrence network analysis reveals that “artificial” and “intelligence” are the most central and influential keywords in the research network, as indicated by their highest betweenness, closeness, and PageRank values. These keywords act as major connecting nodes linking multiple research themes and concepts.

Other important keywords such as “medical,” “health,” “education,” “clinical,” and “healthcare” demonstrate that healthcare-related AI applications dominate the research landscape. The presence of terms like “ethical,” “challenges,” and “integration” indicates growing scholarly concern regarding ethical issues, implementation barriers, and responsible AI adoption. Overall, the network structure reflects a highly interconnected and multidisciplinary AI research ecosystem.

Table 15: Thematic Map

Cluster	CallonCentrality	CallonDensity	RankCentrality	RankDensity	ClusterFrequency
study	1.20023146	6.66752637	1	2	2329
artificial	3.05156955	5.96300886	3	1	8342
review	1.69745751	7.39069045	2	3	4643



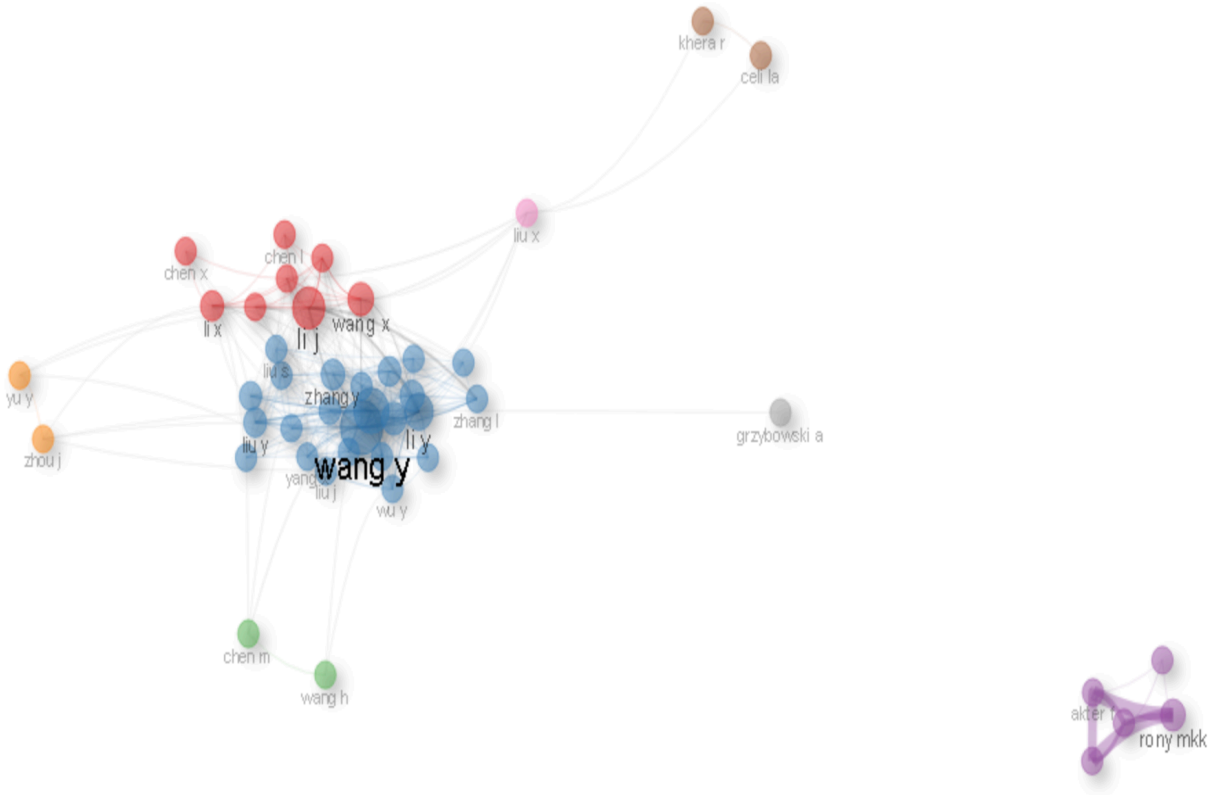
The thematic map analysis identifies three major thematic clusters: “study,” “artificial,” and “review.” Among these, the cluster “artificial” achieved the highest centrality, indicating that it is the most influential and widely connected research theme within the dataset.

The “review” cluster exhibited the highest density, suggesting that review-oriented studies are highly developed and internally cohesive. Meanwhile, the “study” cluster showed the highest frequency, indicating widespread occurrence across the literature. Overall, the thematic map demonstrates that AI research is strongly centered on foundational AI concepts and systematic synthesis of existing knowledge.

Table 16: Collaboration Network

Node	Cluster	Betweenness	Closeness	PageRank
li j	1	57.1801533	0.01754386	0.04385757
li x	1	20.914414	0.01492537	0.0242966
wang x	1	23.1051565	0.01724138	0.03264998
wang l	1	10.6643881	0.01449275	0.02024005
li w	1	20.4688284	0.01587302	0.02423374
zhang s	1	4.97516668	0.01470588	0.02385789
chen l	1	0.9197585	0.01298701	0.01147953
chen x	1	0.17264493	0.01265823	0.0084268
wang y	2	112.955684	0.02	0.06309363
zhang x	2	75.8634896	0.01886792	0.050469
wang j	2	2.42144704	0.01470588	0.01763471
zhang y	2	8.19506762	0.01515152	0.02397731
liu y	2	16.6814343	0.015625	0.02458021
li h	2	17.7258902	0.01724138	0.03513599
chen y	2	8.65165194	0.01639344	0.02756769
li y	2	26.4012314	0.01754386	0.04511993
zhang h	2	24.0854884	0.01785714	0.03431645
chen s	2	29.249174	0.01694915	0.02890046
zhao y	2	3.95013047	0.01408451	0.0140631
wu y	2	6.65758975	0.01492537	0.0211791
yang j	2	4.27903289	0.01449275	0.01696014
zhang l	2	1.86646987	0.01449275	0.02211962
zhang j	2	3.42371152	0.01428571	0.01855172
zhang z	2	0.85606964	0.01515152	0.01830211
li m	2	7.61193092	0.01470588	0.0202974
liu s	2	2.03274227	0.01351351	0.01280273
huang x	2	3.15683523	0.01587302	0.02348805
li c	2	7.26966353	0.01612903	0.02489199
li z	2	8.58588393	0.01587302	0.02295509
liu j	2	10.7452211	0.015625	0.02125447
wang z	2	1.22664525	0.01428571	0.01525545
yang x	2	10.4407264	0.01538462	0.02312901

wang h	3	0.2	0.01162791	0.0069642
chen m	3	0.84154351	0.01219512	0.00949553
rony mkk	4	0.33333333	0.25	0.02846777
akter f	4	0.2962963	0.25	0.02746157
parvin mr	4	0	0.2	0.02494955
alrazeeni dm	4	0.37037037	0.25	0.02290865
almagharbeh wt	4	0	0.2	0.00732356
yu y	5	1.37793306	0.01219512	0.00799693
zhou j	5	1.72091503	0.01204819	0.00925057
khera r	6	0	0.00925926	0.00855463
celi la	6	0	0.00925926	0.00855463
liu x	7	74.1258865	0.01408451	0.01865387
grzybowski a	8	0	0.01098901	0.00433098



The collaboration network analysis reveals strong collaborative relationships among authors, particularly among Chinese researchers such as LI J, WANG Y, ZHANG X, and LIU X. WANG Y demonstrated the highest betweenness and PageRank values, indicating a highly influential position within the author collaboration network. The presence of multiple clusters suggests the existence of several independent research groups working on AI-related themes. Some authors act as bridging nodes connecting different collaboration groups, which enhances knowledge sharing and interdisciplinary integration. The findings confirm that AI research is highly collaborative, international, and network-driven, requiring expertise from multiple disciplines and institutions for successful research outcomes.

4. Results and Discussion

The bibliometric analysis identified 2,497 research articles published across 1,017 academic sources during the period 2023–2026, indicating the rapid expansion and multidisciplinary nature of Artificial Intelligence research globally. The annual scientific production demonstrated extraordinary growth, increasing from only 2 publications in 2023 to 1,280 publications in 2025, reflecting the rising global interest in Artificial Intelligence technologies, particularly generative AI, machine learning, and large language model applications. This rapid increase supports earlier studies which argued that advancements in machine learning, cloud computing, deep learning, and generative AI technologies have accelerated interdisciplinary AI research and technological adoption worldwide. The emergence of tools such as ChatGPT, Gemini, and other generative AI systems further intensified academic and industrial attention toward AI-driven innovation and automation. Citation analysis revealed that earlier publications achieved comparatively higher citation impact, with studies published in 2023 and 2024 receiving the highest average citations per article due to their foundational contribution and greater academic exposure. These findings indicate that early studies on generative AI, AI ethics, healthcare AI, and intelligent systems established important theoretical and practical foundations for subsequent research developments. Similar patterns have also been identified in previous bibliometric studies, where pioneering and foundational AI publications achieved significantly higher scholarly visibility and citation influence over time. The analysis further revealed that healthcare and medical sciences emerged as the most dominant application areas of Artificial Intelligence research. Journals such as CUREUS, Frontiers in Artificial Intelligence, Healthcare, and BMC Medical Education were among the most productive publication sources. Moreover, most highly cited documents were related to healthcare applications including diagnostics, pathology, clinical decision-making, medical education, and patient care systems. These findings strongly support previous studies which emphasized that AI technologies are rapidly transforming healthcare through predictive analytics, medical imaging, robotic surgery, precision medicine, and intelligent healthcare systems. The dominance of healthcare-related themes indicates that medical sciences currently represent one of the most active and impactful domains for AI implementation globally.

The study identified WANG Y, ZHANG X, and LI J as the most productive authors contributing to AI-related literature during the study period. Simultaneously, globally reputed institutions such as Harvard University, Stanford University, and the University of Toronto emerged as leading contributors to global AI scholarship. These findings demonstrate that advanced research universities and technologically equipped institutions with strong interdisciplinary ecosystems play a crucial role in driving AI innovation, research productivity, and global scientific collaboration. The dominance of these institutions also reflects the importance of funding support, technological infrastructure, and international partnerships in AI research development. Country-wise scientific production analysis showed that the USA was the leading contributor to Artificial Intelligence research, followed by the UK, Turkey, India, Italy, and China. The USA also achieved the highest citation impact, demonstrating its strong research infrastructure, advanced technological environment, and extensive collaboration networks. These findings align with earlier bibliometric studies that identified the USA and China as dominant contributors to global AI innovation and scientific productivity. India’s strong contribution further highlights the growing strategic importance of Artificial Intelligence research within emerging economies and digitally transforming nations.

Keyword co-occurrence, unigram, bigram, and thematic analyses revealed that terms such as "artificial intelligence," "generative artificial intelligence," "medical," "healthcare," and "education" dominated the literature. The prominence of "generative artificial intelligence" indicates the recent surge in scholarly attention toward conversational AI systems, AI-powered content generation, and large language models. Similarly, the occurrence of keywords related to ethics, challenges, integration, healthcare, and AI literacy reflects growing academic concern regarding responsible AI implementation, transparency, ethical governance, and sustainable adoption of AI technologies. These findings are consistent with previous studies emphasizing that ethical AI governance, transparency, fairness, and accountability have become central concerns within contemporary AI research. The collaboration network analysis confirmed that Artificial Intelligence research is highly collaborative, interdisciplinary, and internationally connected, with strong co-authorship patterns and multiple interconnected research clusters contributing to knowledge sharing and innovation. Strong collaborative relationships were particularly observed among researchers from China and other technologically advanced regions.

The findings suggest that AI research increasingly depends on interdisciplinary expertise involving healthcare professionals, computer scientists, engineers, educators, and management scholars. This supports earlier literature arguing that successful AI innovation requires collaborative ecosystems, global research partnerships, and cross-disciplinary integration. Overall, the results demonstrate that Artificial Intelligence research is rapidly evolving into a globally collaborative, application-oriented, and ethically conscious research domain with expanding influence across multiple sectors and disciplines.

5. Conclusion

This bibliometric analysis concludes that Artificial Intelligence has become one of the fastest growing and most influential research domains in the contemporary academic and technological environment. The rapid increase in publication output, citation impact, international collaboration, and thematic diversification demonstrates the expanding global importance of AI across healthcare, education, business, finance, and technological sectors. The findings indicate that healthcare-oriented AI applications and generative AI technologies currently dominate the research landscape, while ethical concerns, interdisciplinary integration, and responsible AI implementation are emerging as significant research priorities. The study further highlights the strong contribution of globally reputed institutions, international collaboration networks, and technologically advanced countries in shaping AI innovation and scientific development. Overall, the research confirms that Artificial Intelligence is continuously evolving into a multidisciplinary, collaborative, and strategically important field with substantial academic, industrial, economic, and societal implications for the future.

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