



Exploring Authorship Patterns in Artificial Intelligence Literature in Library Science: A Bibliometric Analysis

Bhuvaneshwari Patil¹, Gavisiddappa Anandhalli²
¹Research Scholar, Department of Library and Information Science
Karnataka State Akkamahadevi Women University
Jnana Shakti Campus, Vijayapura
Karnataka-586108, India
bhuvipatil10896@gmail.com

²Professor, Department of Library and Information Science
Karnataka State Akkamahadevi Women University
Jnana Shakti Campus, Vijayapura
Karnataka-586108, India
gavi.vijju@gmail.com

Received: 29 June 2024

Revised: 13 August 2024

Accepted: 26 August 2024

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ABSTRACT

This study examines the authorship pattern and research collaboration in Artificial Intelligence (AI) based on 3495 scholarly communications between 2014 and 2023. The analysis delves into various significant aspects such as types and trends of authorship, author productivity, author per paper, Document-wise distribution, and geographical distribution. Notably, multiple-author papers emerge as more prevalent within AI. Additionally, the study identifies the USA as the highest contributor country in AI.

Keywords: Artificial Intelligence, Authorship Pattern, Authorship Trend, Degree of Collaboration, Library Science

1. Introduction

Authorship pattern refers to the distribution and characteristics of authors contributing to scholarly works within a particular field or discipline. This pattern encompasses various aspects such as the number of authors per publication, collaboration networks among authors, author demographics (e.g., gender, geographical location), and authorship order. Analysing authorship patterns can provide insights into research trends, collaboration dynamics, and the structure of scholarly communities within a field. This analysis often involves bibliometric methods and can help researchers, institutions, and policymakers understand the landscape of scholarly communication and collaboration. This study analysed the authorship pattern and collaboration dynamics of Artificial

Intelligence (AI) literature from 2014 to 2023 using data from the Web of Science database. The study aimed to explore trends in authorship, collaboration networks, and other characteristics of AI research publications over the specified timeframe.

About Web of Science database

Web of Science is a comprehensive and widely used academic citation database maintained by Clarivate Analytics. It indexes scholarly literature from various disciplines, including science, social science, arts, and humanities. Web of Science offers access to a comprehensive collection of peer-reviewed journals, conference proceedings, patents and other scholarly resources. It offers advanced search and citation analysis tools, making it valuable for researchers, institutions, and policymakers to discover relevant literature, track citation metrics, and analyse research trends.

2. Review of Related Literature

Ali, H., & Kumari, A. (2018) investigated the authorship patterns in Biodiversity Literature from 1989 to 2016 using the Web of Science Core Collection. With 154,654 records analysed, a decline in single-author papers and increased collective contributions were observed. Collaboration levels fluctuated over time, with an overall increasing trend. The collaborative index, reaching a universal level value of 4.50, indicates a preference for collaborative research in biodiversity literature. Gaston KJ led with 257 papers and an average fractional count of 0.33, securing the top position.

Chithiraivel, S., Jeyshankar, R., & Sivasekaran, K. (2020) examined authorship patterns in eosinophilia literature from 1998 to 2017 using the Web of Science Core Collection. It identified 70,337 researchers contributing to 12,118 publications across 1,797 journals. Notably, the most common authorship configuration was four authors producing 1,625 publications. Collaboration levels fluctuated over time. The analysis included co-authorship overviews, efficiency rankings, and visualisations of collaboration networks. "Rothenberg ME" emerged as a prominent author with 116 publications, 11,662 citations, and 49.88 average citations per paper, earning a top h-index of 60.

Schiuma, G., Kumar, S., Sureka, R., & Joshi, R. (2023) intended to analyse the impact, themes, and contributors of the Knowledge Management Research and Practice (KMRP) journal using bibliometric analysis. Through bibliographic coupling analysis, it examines collaboration trends and identifies leading trends and the journal's evolution. The Scopus database is utilised to extract bibliographic data, and VOSviewer and Gephi software are employed for graphical visualisation.

Parida, D. K., & Nayak, S. (2023) used the scientometric analysis to explore research output on "Bifurcation" in India from 2016 to 2020 using the Scopus database. It identifies highly prolific authors, document types, and collaboration trends. Findings indicate that 2017 had the highest research paper count (1700), while 2018 had the lowest (19.65%). The average collaboration period is 0.18, and the time series analysis reveals figures for single-authored (137.8), multi-authored (1564), and collaborative papers (1701.8).

3. Purpose

1. We studied the year-wise distribution of Artificial Intelligence (AI) literature in Library Science over some time to understand the structure of the studied domain
2. We observed the language-wise distribution of AI literature in Library Science
3. Understand the geographical distribution of literature in Library Science in terms of publications across countries
4. Understand the authorship pattern in AI literature in Library Science
5. We analysed the degree of collaboration in AI literature in Library science in the studied time frame to know its impact and
6. We studied the author per paper for AI in Library Science in the studied period.

4. Methodology

In line with the structured objectives of the study, primary data was extracted from the Web of Science database covering the period from 2014 to 2023. This primary data comprised essential bibliometric components. Subsequently, the collected data underwent thorough analysis and interpretation, focusing on aspects such as the year-wise growth of literature, Relative Growth Rate (RGR), Doubling time (Dt), Document-wise distribution, Country-wise distribution, Authorship pattern, and Degree of collaboration of publications. The data was meticulously structured, tabulated, and scrutinised using MS Excel. The resultant findings were visually represented through tables and graphs, facilitating interpretation and discussion.

5. Data Analysis

Year	Number of Publications	Cum. Publications	Percentage	Average Growth Rate	Descriptive Statistics	
2014	102	102	2.92			
2015	112	214	3.20	0.91		
2016	120	334	3.43	0.93		
2017	111	445	3.18	1.08	Mean	349.5
2018	139	584	3.98	0.80	Std. D	323.51
2019	214	798	6.12	0.65	Max	999
2020	368	1166	10.53	0.58	Min	102
2021	541	1707	15.48	0.68		
2022	789	2496	22.58	0.69		
2023	999	3495	28.58	0.79		
Total	3495		100	0.29		

Table 1. Year-wise Growth rate of Artificial intelligence in Library Science

Table 1 presents the year-wise distribution of publications & the AGR in the field of Artificial Intelligence in Library Science. During the study period, a total of 3495 publications were identified. The analysis reveals a relatively stable growth rate in the first five years, followed by an increasing trend in the subsequent five years. The highest number of publications was recorded in 2023 (N=999, 28.58%), while the lowest was found in 2014 (N=102, 2.92%). The average growth rate was calculated as 349.5. Consequently, it can be inferred that there is an increasing trend in the publication of literature related to AI, as evidenced by the Web of Science database.

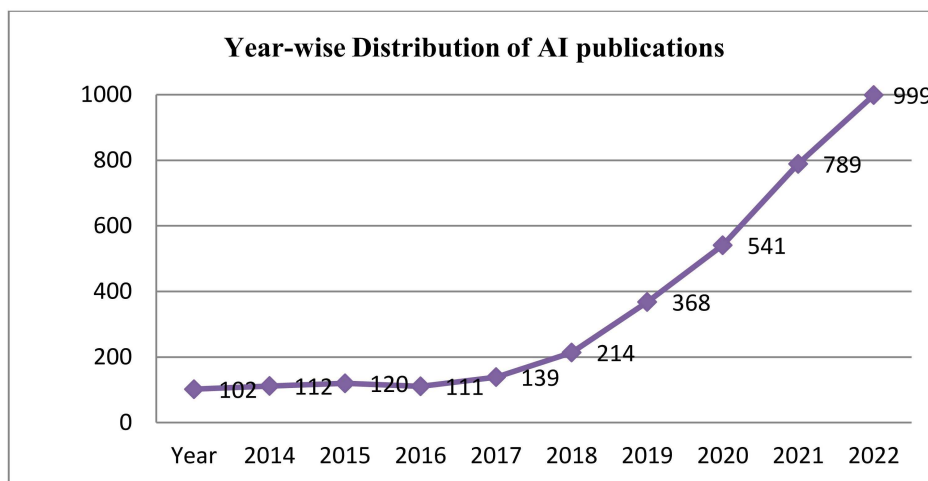


Table 2. Relative Growth Rate (RGR) and Doubling Time (Dt) of Artificial Intelligence

Year	No. of Publications	Cum	W1	W2	Rt	Mean Rt	Dt	Mean Dt
2014	102	102	4.62			1.12		0.682
2015	112	214	4.72	5.37	0.65		1.07	
2016	120	334	4.79	5.81	1.02		0.68	
2017	111	445	4.71	6.10	1.39		0.50	
2018	139	584	4.93	6.37	1.44		0.48	
2019	214	798	5.37	6.68	1.32	1.20	0.53	0.577
2020	368	1166	5.91	7.06	1.15		0.60	
2021	541	1707	6.29	7.44	1.15		0.60	
2022	789	2496	6.67	7.82	1.15		0.60	
2023	999	3495	6.91	8.16	1.25		0.55	
Total	3495		8.16					

Table 2 describes the RGR and Dt ; in the present study, the Relative Growth rate increased from 0.65 in 2015 to 1.25 in 2023, while the Doubling time decreased from 1.07 in 2015 to 0.55 in 2023. The mean value RGR in the first block (2015 to 2018) is 1.12, and in the second block (2018 to 2023) it is 1.20. Meanwhile, the mean value of Doubling time in the first block (2015 to 2018) is 0.68, and in the second block (2019 to 2023) it is 0.57. The analysis shows that Relative Growth Rate and Doubling time are inversely proportional to each other.

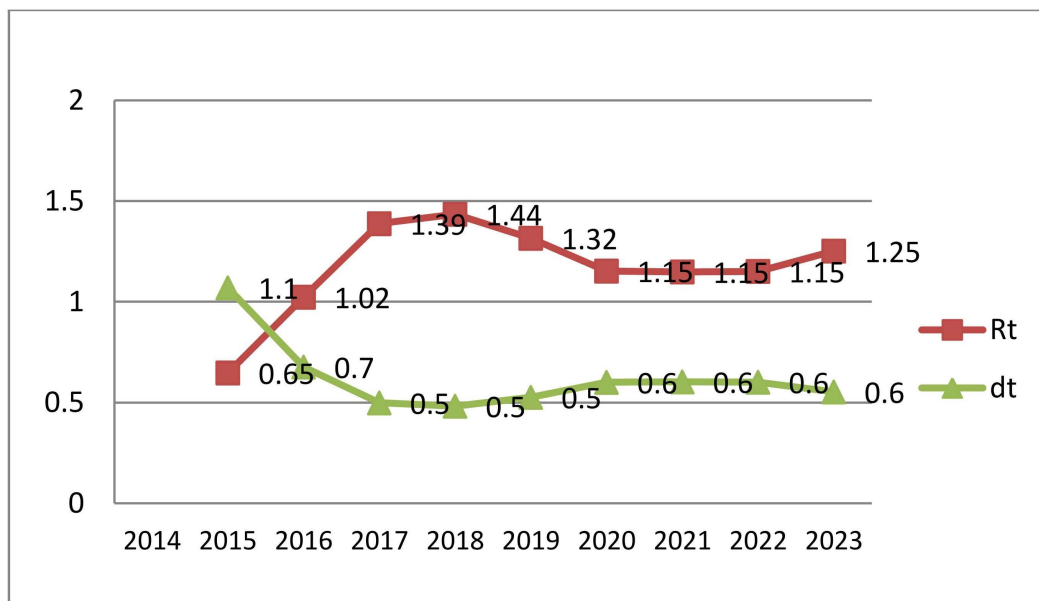


Table 3. Distribution of Publications by document type

Type of document	Number of publications	% age
Article	2509	71.78
Review	950	27.18
Editorial Material	21	0.60
Meeting Abstract	9	0.25
Letter	6	0.17

Table 3 presents the distribution of publications of AI literature in Library Science across various documents. Out of 3495 publications, the majority were journal articles (N=2509, 71.78%), followed by reviews (N=950, 27.18%). Additionally, fewer publications were categorised as editorial materials (N=21, 0.6%) and meeting abstracts (N=9, 0.25%). These findings indicate that journal articles are the preferred source of information for researchers in the field of AI.

Table 4 illustrates the language-wise distribution of literature. Out of the total 3495 records, 99.60% (3481) of publications were published in English. The remaining 1% was distributed among Chinese, Portuguese, Russian, Spanish, and Japanese languages.

Country	No. Publication	Rank
USA	1210	1
England	818	2
Switzerland	475	3
Netherlands	359	4
Germany	236	5
Canada	104	6
China	52	7
Ireland	33	8
Singapore	23	9
Japan	21	10
France	19	11
U Arab Emirates	15	12
Italy	14	13
Scotland	13	14
South Korea	11	15
Spain	11	15
Taiwan	11	15
New Zealand	10	18
India	8	19
Russia	7	20
Greece	6	21
Australia	5	22
Austria	5	22
Nigeria	5	22
Turkey	5	22

Brazil	3	26
Poland	3	26
Romania	3	26
Jordan	2	29
Malaysia	2	29
Mexico	2	29
Sweden	2	29
Lithuania	1	33
Serbia	1	33

Table 5. Country-wise distribution of publications

Table 5 presents the country-wise contribution to AI literature. Overall, 34 countries contribute to AI literature in Library Science. The USA makes the highest contribution with 1210 publications, followed by England with 818 publications and Switzerland with 475 publications. The remaining 992 publications are contributed by 31 countries listed in the table.

Year	Single Authors	Multiple Authors	DC
2014	3	98	0.97
2015	2	110	0.98
2016	3	117	0.98
2017	2	109	0.98
2018	4	135	0.97
2019	8	206	0.96
2020	7	361	0.98
2021	9	532	0.98
2022	18	771	0.98
2023	26	974	0.97
Total	82	3413	0.98

Table 6.1. Degree of Collaboration

Years	Single	Double	Triple	Four	Five	Six	Seven	Eight	Nine	Ten	More than 10	Multiple authors	Total No. of Authors	DC
2014	3	2	10	17	12	11	10	9	5	4	18	98	458	0.97
2015	2	7	9	14	9	15	16	7	7	4	22	110	505	0.98
2016	3	6	12	13	19	11	14	5	11	4	22	117	541	0.98
2017	2	9	9	15	18	15	3	7	7	3	23	109	457	0.98
2018	4	9	15	16	15	16	11	13	11	6	23	135	642	0.97
2019	8	13	19	18	26	27	20	17	4	15	47	206	917	0.96
2020	7	27	39	36	67	47	29	16	17	14	69	361	1563	0.98
2021	9	41	61	68	69	60	53	37	22	24	97	532	2356	0.98
2022	18	61	77	100	111	93	76	60	35	30	128	771	3511	0.98
2023	26	76	109	143	131	123	78	66	63	38	147	974	4491	0.97
Total	82	251	360	440	477	418	310	237	182	142	596	3413	15441	0.98

Table 6. Authorship pattern in Artificial Intelligence (AI) literature in Library Science

Table 6 shows the authorship trends and collaboration levels in AI research from 2014 to 2023. Out of 3495 research articles, only 82 were written by single authors, while 3413 were co-authored. This significant difference highlights the prevalence of collaborative work in AI. Additionally, the degree of collaboration has remained consistently high, peaking at 0.98 in 2021, indicating robust collaborative research effort in the AI Field.

Table 7 depicts the author per paper in Artificial Intelligence in Library Science from 2014 to 2023. The table indicates an average of 4.40 authors for each paper over the study period. Notably, the minimum number of authors per paper was observed in 2017, with 4.1 authors representing the lowest number of authors across the selected 10 years. Conversely, in 2015, the maximum number of authors per paper was recorded at 4.509, indicating the highest level of author participation for a publication. The findings suggest a significant and progressive contribution to AI over the specified period.

6. Findings

The following are the significant findings;

- There is an increasing trend in AI literature in Library Science publications over the study period, with a notable rise in the latter half of the decade. This growth is highlighted by the highest number of publications recorded in 2023 compared to the lowest in 2014, indicating a discernible upward trajectory in AI in Library Science research output.
- The major finding is that most publications in AI in Library Science from 2014 to 2023 were recorded as journal articles.
- In the field of AI in Library Science, more than 95% of publications are published in the English language.

- In AI literature, the USA leads with 1210 publications, England with 818, and Switzerland with 475. The remaining 31 countries contributed a total of 992 publications.
- In the field of artificial intelligence, multiple authors dominate over single authors.
- The average author per paper in the field of AI in Library Science is observed at 4.40

Year	No. of records	Total No. Authors	Author perpaper
2014	102	458	4.490
2015	112	505	4.509
2016	120	541	4.508
2017	111	457	4.117
2018	139	642	4.619
2019	214	917	4.285
2020	368	1563	4.247
2021	541	2356	4.355
2022	789	3511	4.450
2023	999	4491	4.495
Total	3495	15441	4.408

Table 7. Author per paper

7. Conclusion

The study examined authorship patterns and collaboration levels in AI research from 2014 to 2023, analyzing 3495 articles, collaboration levels, degree of collaboration, country-wise distribution, and the number of authors per paper. The findings reveal significant research activity in AI literature within Library Science during this period.

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