The role of Artificial Intelligence in enhancing library services in universities: a bibliometric analysis

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Abstract

The rapid evolution of Artificial Intelligence (AI) technologies presents a transformative opportunity for library services, particularly within African universities. This study employed a comprehensive bibliometric analysis to map the trends and patterns and the impact of AI in enhancing library services in African universities. A total of 616 datasets from Scopus (Elsevier), spanning from inception to 2023, were extracted, analysed, and visualised using tools like MS Excel, Harzing's Publish or Perish, and VOSviewer. An information specialist crafted the requisite keywords and verified the final search strategy. The results indicate an increasing trend in publications focused on AI's role in enhancing library services within African universities. China, the United States, India, and Nigeria are the most influential countries in this research domain, contributing 162 (23.41%), 132 (19.08%), 32 (4.62%), and 26 (3.76%) publications, respectively. Wuhan University of Technology emerged as the most influential institution, with seven (2%) publications. Citation analysis highlighted S. Gupta and S.K. Gupta (2019) and A.M. Cox et al. (2019) as the most cited articles in this field, with 147 and 130 citations, respectively. Keywords analysis revealed that "university libraries", "libraries", "data mining", and "artificial intelligence" were the most frequently used author keywords, appearing in 171 (7.63%), 168 (7.49%), 120 (5.35%), and 117 (5.22%) publications, respectively. Co-occurrence analysis identified six clusters of interconnected concepts, thematically organised around libraries, data mining, academic libraries, artificial intelligence, deep learning, and machine learning. The results reveal a growing interest in AI-driven solutions for cataloguing, digital resource management, user interaction, and predictive analytics, highlighting both the benefits and challenges faced by African university libraries. The study concludes with practical recommendations for policymakers and library managers to optimise AI adoption and suggests avenues for future research to further enhance library services on the continent.

Keywords: Artificial Intelligence; Library Services; African Universities; Bibliometric Analysis; Academic Libraries

Introduction

The rapid advancement of Artificial Intelligence (AI) technologies is reshaping numerous sectors, including higher education, where university libraries play a critical role in supporting research, teaching, and learning (Rahiman & Kodikal, 2024). In recent years, AI has gained significant traction as a tool for transforming library operations, offering innovative solutions for automating routine tasks, improving information retrieval, and enhancing user services (Hoving, 2024; Vasishta et al., 2024). These technologies hold immense potential to streamline cataloguing,

manage digital resources, and create more interactive and personalised user experiences, thereby meeting the evolving demands of academic communities (Kato et al., 2021; Khan et al., 2023).

In the context of African universities, where libraries often face challenges such as limited resources, staff shortages, and rapidly increasing information needs, the adoption of AI presents both opportunities and complexities (Echedom & Okuonghae, 2021). AI-powered tools like chatbots, intelligent search engines, and data mining systems could address some of these constraints by improving efficiency, reducing repetitive workloads, and enabling advanced information management capabilities (Soori et al., 2023). Despite the significant potential, the implementation of AI in African university libraries remains in its early stages, with varying levels of adoption across the continent. Existing studies have focused primarily on AI in global library systems (Ajakaye, 2022; Donkor & Afrane, 2023; Lalitha et al., 2024; Senthilkumar & Jagajeevan, 2024), while little is known about the specific trends and impact of AI in African academic libraries.

This study aims to fill this knowledge gap by conducting a comprehensive bibliometric analysis of AI-related research in university libraries across Africa. Bibliometric methods offer a powerful approach to quantifying research outputs, identifying influential authors and institutions, and map the thematic evolution of a research field. By examining publications from Scopus, this study seeks to uncover trends, collaborations, and research impacts related to AI's role in enhancing library services in African universities. The study also explores the most frequently used keywords and key thematic clusters in AI research, revealing the underlying intellectual structure of this field.

Objectives of the study

This study was conducted to measure the following:

- the productivity and growth of artificial intelligence in enhancing library services in universities in Africa research and,
- its impact based on citations received

Literature Review

Artificial intelligence (AI) is revolutionising various sectors, including university libraries, where it is increasingly being employed to enhance service delivery and meet the evolving demands of academic research and learning. AI applications in university libraries range from online reference services, intelligent search systems, and chatbots to automating routine tasks like cataloguing, classification, and circulation. These technologies improve the accuracy and speed of information processing, reduce time spent on repetitive tasks, and facilitate efficient collection management and information retrieval (Echedom & Okuonghae, 2021; Soori et al., 2023). The urgency to integrate AI into library systems was further underscored by the COVID-19 pandemic, which accelerated the adoption of AI-driven tools such as robots for book retrieval and AI-enhanced learning environments (Luca et al., 2022). While the use of AI in African university libraries remains in its early stages, emerging technologies are gradually being implemented, reflecting a global trend toward digital transformation in academic institutions.

The scholarly literature on the role of AI in enhancing library services encompasses a wide range of document types, primarily sourced from academic journals, conference proceedings, and specialised databases like Web of Science and Scopus (Asemi et al., 2021). Studies have indicated that conference papers have become a predominant document type related to AI's role in university libraries (Auza-Santiváñez et al., 2023; Hussain & Ahmad, 2024; Islam et al., 2024). Nonetheless, Vasishta et al. (2024b) found out that journal articles represent most document types in this domain.

Recent trends indicate a significant increase in publications on AI in university libraries, particularly since 2020. Bibliometric analyses reveal a growing interest in AI and machine learning applications in libraries, with an increasing number of studies in the past few years (Das & Islam, 2021; Vasishta et al., 2024; Yadav, 2021). Notably, over 60% of publications on AI in library settings have been produced in the last five years, reflecting a sharp rise in academic output on this subject (Maphosa & Maphosa, 2021).

Geographically, most publications on AI in university libraries come from China, the United States, and India, highlighting these countries' leadership in AI research (Dhamija & Bag, 2020; Islam et al., 2024; Mitha & Omarsaib, 2024). Studies confirm that Asia, particularly, contributes significantly to the body of research on AI in libraries (Hussain & Ahmad, 2024). Interestingly, despite 2022 witnessing the highest number of publications 145,000 papers, 2018 remains the year with the highest number of citations (950,000), indicating that earlier works in AI-related library research have maintained strong academic influence

(Auza-Santiváñez et al., 2023; Islam et al., 2024). This suggests that while publication volume has grown, citation rates do not always align chronologically with productivity.

Various bibliometric analyses have explored different aspects of AI's role in university libraries. For example, studies have focused on the mapping of AI literature in academic libraries (Hussain & Ahmad, 2024), the application of big data in library management (Islam et al., 2024), and the operational roles of AI in libraries (Dhamija & Bag, 2020). However, despite these valuable contributions, there remains a notable gap in comprehensive bibliometric analyses specifically examining how AI enhances library services in universities. This study aims to fill that gap by providing a detailed bibliometric analysis of the role AI plays in transforming library operations within higher education institutions.

Methodology

This study utilised bibliometric analysis to examine trends, patterns, and the impact of Artificial Intelligence (AI) in enhancing library services within African universities. Bibliometric analysis, a quantitative method for exploring academic literature, allows for the identification of influential publications, authors, and institutions while mapping the intellectual structure of a research field. Data for this study was sourced from Scopus, a leading abstract and citation database (Schotten et al., 2017), which was selected due to its extensive coverage of AI-related publications and established use in bibliometric research. The dataset covered publications from the inception of the database to 2023, ensuring a comprehensive overview of AI research in university libraries.

To retrieve relevant literature, a detailed search strategy was developed in collaboration with an information specialist. The search terms were designed to capture AI applications in university libraries across Africa, using keywords such as "artificial intelligence," "AI applications," "data mining," "machine learning," "university libraries," "academic libraries," and "Africa", and their alternative terms. Boolean operators (AND, OR) were used to refine the results. The search was limited to publications indexed in Scopus up to 2023. The inclusion criteria specified studies based on the search terms conducted in the "article title, abstract, and keyword" search field that focused on AI applications in libraries or higher education institutions in African universities. Document types included journal articles, conference papers, reviews, and book chapters. Studies not relevant to AI or unrelated to African universities were excluded, leaving a total of 616 publications for analysis.

The metadata of the selected publications, such as titles, authors, affiliations, publication years, countries of origin, document types, citation counts, and keywords, were extracted from the Scopus database. The data was organised using Microsoft Excel to facilitate further analysis. The dataset was carefully reviewed by an information specialist to ensure its accuracy and completeness. Several tools were used to perform the bibliometric analysis. Microsoft Excel was employed for descriptive statistical analysis and to create visual representations of publication trends, country contributions, and document types. Harzing's Publish or Perish software was used for citation analysis, helping to identify the most cited publications, authors, and journals. VOSviewer was utilised for co-occurrence analysis, generating keyword maps and visualising relationships between key concepts. The tool also enabled the identification of research clusters based on the author's keywords network.

The analysis focused on several key parameters. Publication output was measured by examining the number of publications per year to identify research trends over time. Geographical distribution was analysed to determine the most active countries and institutions contributing to AI research in university libraries, while citation counts were used to assess the academic impact of individual works. Keyword analysis uncovered the most frequently used terms and emerging topics in AI research, and co-occurrence analysis was conducted to identify clusters of related concepts and thematic trends.

The data was visualised using graphs, tables, and network maps, offering a comprehensive view of trends, and thematic clusters.

Results

This section shows the bibliometric analysis results, which are organised under the following categories: document and source types, year of publication, subject areas, keyword and text analysis, geographical distribution of publications, most influential institutions, and citation analysis.

Document and Source Types

Table 1 exhibits the distribution of different types of documents in the dataset. The results show that Articles accounted for most of the publications 299 (48.54%) of the total 616 documents, followed

by Conference Papers 205 (33.28%), and Conference Review 46 (7.47). The Review and Book Chapter recorded 30 (4.87%) and 19 (3.08%) of the total publications. Other document types that recorded less than 1% of the total publications included Book 6 (0.97%), Note 5 (0.81%), Short Survey 2 (0.32%) and Retracted 2 (0.32%). The document type with the least publications was Editorial and Erratum with 1 each representing (0.16%) and (0.16%) respectively. This pattern of document distribution highlights how actively researchers participate in a range of scholarly activities, with a particular focus on articles and conference presentations.

Table 1: Document Type

Document Type	Total Publications	Percentage (%)
Article	299	48.54
Conference Paper	205	33.28
Conference Review	46	7.47
Review	30	4.87
Book Chapter	19	3.08
Book	6	0.97
Note	5	0.81
Short Survey	2	0.32
Retracted	2	0.32
Editorial	1	0.16
Erratum	1	0.16
Total	616	100.00

Table 2 shows the types of sources of the publications. Most of the publications were found in Journals, constituting 338 (54.87%) publications, followed by Conference Proceedings 173 (28.08%) and Book Series 81 (13.15%). Only a few publications were found in Book 23 (3.73%) and Trade Journal 1 (0.16%). Overall, the distribution of publication sources highlights a strong emphasis on journals and conferences, reflecting a robust research culture that values both peer-reviewed dissemination and academic dialogue. The presence of books and book series enriches the intellectual landscape, offering comprehensive and authoritative resources for researchers.

Table 2: Source Type

Source Type	Total Publications	Percentage (%)
Journal	338	54.87
Conference Proceeding	173	28.08
Book Series	81	13.15
Book	23	3.73
Trade Journal	1	0.16
Total	616	100.00

Year of Publications/Evolution of Published Studies

Table 3 presents the distribution of publications over the years from 1971 to 2023. The table and the graph depict an increasing trend in publications over time, with the most recent years having a higher number of publications. The table and graph (Figure 1) indicate significant growth in the past six years (2018-2023), with the most significant growth occurring in 2023 (15.26%), 2022 (12.34%), and 2021(10.88%). The year 1971 to 2007 marks the evolution stage of research in the field of Artificial Intelligence in enhancing library services in university libraries, showing less than 1% publications. In all, the distribution of publications over the years reflects a positive and accelerating trend in Artificial Intelligence helping to improve the services university libraries render to users. This growth not only signifies increased academic output but also demonstrates university libraries' growing interest in AI-driven solutions.

Table 3: Year of Publications

Year	Total Publications	Percentage (%)	Cumulative Percent
1971	2	0.32	0.32%
1974	2	0.32	0.65%
1978	1	0.16	0.81%
1981	1	0.16	0.97%
1983	3	0.49	1.46%
1984	2	0.32	1.79%
1985	4	0.65	2.44%
1986	2	0.32	2.76%
1987	3	0.49	3.25%
1990	5	0.81	4.06%

Year	Total Publications	Percentage (%)	Cumulative Percent
1991	3	0.49	4.55%
1992	7	1.14	5.68%
1993	3	0.49	6.17%
1994	2	0.32	6.49%
1995	5	0.81	7.31%
1996	2	0.32	7.63%
1997	6	0.97	8.60%
1998	4	0.65	9.25%
1999	2	0.32	9.58%
2000	4	0.65	10.23%
2001	4	0.65	10.88%
2002	2	0.32	11.20%
2003	6	0.97	12.18%
2004	4	0.65	12.82%
2005	4	0.65	13.47%
2006	9	1.46	14.94%
2007	6	0.97	15.91%
2008	9	1.46	17.37%
2009	11	1.79	19.16%
2010	14	2.27	21.43%
2011	12	1.95	23.38%
2012	16	2.60	25.97%
2013	18	2.92	28.90%
2014	27	4.38	33.28%
2015	14	2.27	35.55%
2016	15	2.44	37.99%
2017	17	2.76	40.75%
2018	33	5.36	46.10%
2019	45	7.31	53.41%
2020	50	8.12	61.53%
2021	67	10.88	72.40%
2022	76	12.34	84.74%
2023	94	15.26	100.00%
Total	616	**100.00**	

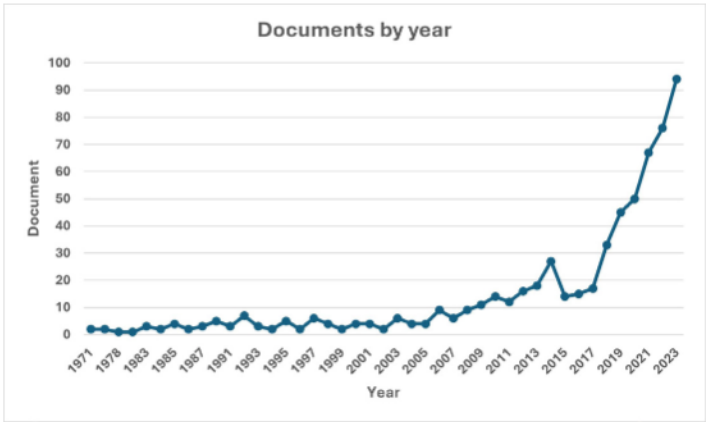

Fig. 1: Document by Year

Subject Area

Table 4 illustrates the interdisciplinary role of Artificial Intelligence (AI) in enhancing library services within university libraries, covering a broad range of subject areas. Computer Science leads with the highest number of publications at 352 (33.40%), followed by Social Sciences, which has 281 publications (26.66%), and Engineering with 141 publications (13.38%). This indicates that AI's impact on university libraries is most extensively explored in technical and social disciplines.

Other significant fields include Mathematics, which accounts for 73 publications (6.93%), Decision Sciences with 41 publications (3.89%), and Arts and Humanities with 33 publications (3.13%). Business-related topics also appear, with Business, Management, and Accounting contributing 25 publications (2.37%). The physical sciences are represented by Physics and Astronomy, which have 21 publications (1.99%), while the health sector is marked by 18 publications (1.71%) in Medicine. Additionally, Agricultural and Biological Sciences and Economics, Econometrics and Finance each contribute 13 (1.23%) and 11 (1.04%) publications, respectively, as does Material Science with 11 (1.04%).

Less prominent subject areas, each with fewer than 1% of total publications, include Environmental Science with 10 publications (0.95%) and Energy with 6 publications (0.57%). Other fields such as Earth and Planetary Sciences (5 publications, 0.47%), Health Professions (4 publications, 0.38%), and Neuroscience and Psychology, each with 2 publications (0.19%), further underline the diverse reach of AI. Smaller contributions from fields like Biochemistry, Genetics and Molecular Biology, Chemical Engineering, Chemistry, Multidisciplinary, and Pharmacology, Toxicology, and Pharmaceutics each account for 1 publication (0.09%).

Table 4: Subject Area

Subject Area	Total Publications (n=1054)	Percentage (%)
Computer Science	352	33.40
Social Sciences	281	26.66
Engineering	141	13.38
Mathematics	73	6.93
Decision Sciences	41	3.89
Arts and Humanities	33	3.13
Business, Management and Accounting	25	2.37
Physics and Astronomy	21	1.99
Medicine	18	1.71
Agricultural and Biological Sciences	13	1.23
Economics, Econometrics and Finance	11	1.04
Materials Science	11	1.04
Environmental Science	10	0.95
Energy	6	0.57
Earth and Planetary Sciences	5	0.47
Health Professions	4	0.38
Neuroscience	2	0.19
Psychology	2	0.19
Biochemistry, Genetics and Molecular Biology	1	0.09
Chemical Engineering	1	0.09
Chemistry	1	0.09
Multidisciplinary	1	0.09
Pharmacology, Toxicology and Pharmaceutics	1	0.09

Keywords Analysis

Table 5 provides a keyword analysis of the role of Artificial Intelligence (AI) in university libraries, categorised under several key themes. Library types are a prominent category, with university libraries appearing most frequently with 171 mentions (7.63%), followed by Libraries with 168 mentions (7.49%), Academic libraries with 108 (4.82%), Digital libraries with 69 (3.08%), University library with 43 (1.92%), and Library with 35 mentions (1.56%).

Another key theme centers around technology and tools, including terms like Data mining (120 mentions, 5.35%), Artificial Intelligence (117, 5.22%), Machine learning (45, 2.01%), Big Data (40, 1.78%), Deep learning (27, 1.20%), Data Mining Technology (22, 0.98%), and Recommender systems (18, 0.80%).

The theme of library services includes keywords such as Information services (37 mentions, 1.65%), Library services (29, 1.29%), and Learning systems (28, 1.25%). Additionally, Information Management (22, 0.98%) and Association rules were grouped under the theme of Information Management.

Lastly, the analysis of users includes keywords like Students (25 mentions, 1.12%) and Human (20, 0.89%).

Table 5: Top Keywords

Author Keywords	Total Publications (n=2242)	Percentage (%)
University Libraries	171	7.63
Libraries	168	7.49
Data Mining	120	5.35
Artificial Intelligence	117	5.22
Academic Libraries	108	4.82
Digital Libraries	69	3.08
Machine Learning	45	2.01
University Library	43	1.92
Big Data	40	1.78
Information Services	37	1.65
Library	35	1.56
Library Services	29	1.29
Learning Systems	28	1.25
Deep Learning	27	1.20
Students	25	1.12
Data Mining Technology	22	0.98
Information Management	22	0.98
Human	20	0.89
Association Rules	19	0.85
Recommender Systems	18	0.80

Text Analysis

Figure 2 shows the network visualization map which provides a comprehensive analysis of the relationships between texts in the role of AI in university libraries research. This map aids in understanding the prevailing research trends by illustrating how frequently various texts co-occur in literature. The map encompasses a total of 144 texts, grouped into six (6) distinct clusters represented by different colours. These texts are interconnected by 2559 links, reflecting a total link strength of 5915 thematically organised around libraries, data mining, machine learning, learning systems, reference services and service quality. This dense network indicates a robust interrelationship among the research topics in the field.

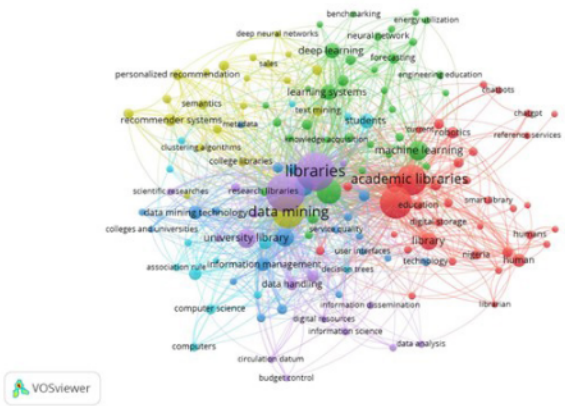

Figure 2: VOSviewer visualization of a term co-occurrence network based on title and abstract fields

Geographical Distribution of Publications - Most Influential Countries

Table 6 highlights the top countries contributing to publications on the role of Artificial Intelligence (AI) in university libraries. Leading the list are China with 162 publications (23.41%) and the United States with 132 (19.08%). Other countries with notable contributions include India with 32 publications (4.62%), Nigeria with 26 (3.76%), the United Kingdom with 22 (3.18%), Germany with 16 (2.31%), and Pakistan with 14 (2.03%).

Among the top contributors, Bangladesh, France, Iran, and Kuwait are the least represented, each with 6 publications (0.87%). This analysis demonstrates that AI research in university libraries is driven by contributions from a diverse set of countries, with a strong presence from both developed and developing nations.

Table 6: Top Countries contributed to the publications

Country	Total Publications (n=692)	Percentage (%)
China	162	23.41
United States	132	19.08
India	32	4.62
Nigeria	26	3.76
United Kingdom	22	3.18
Germany	16	2.31
Pakistan	14	2.02
Japan	13	1.88
Australia	12	1.73
Indonesia	12	1.73
South Africa	12	1.73
Canada	10	1.45
Thailand	10	1.45
Malaysia	9	1.30
Spain	9	1.30
Saudi Arabia	8	1.16
South Korea	8	1.16
Taiwan	8	1.16
Bangladesh	6	0.87
France	6	0.87
Iran	6	0.87
Kuwait	6	0.87

Most Influential Institutions

Table 7 presents institutions with a significant contribution to the role of AI in improving library services in university libraries. Institutions with a minimum of 3 publications were considered. With 7 (2.00%) publications, the Wuhan University of Technology appeared as the most productive institution, followed by the University of South Africa and Wuhan University with 6 (1.71%) publications each. Also, the University of Illinois Urbana-Champaign, The University of Sheffield, Jianghan University, the University of Ilorin, Virginia Polytechnic Institute, and State University and Kuwait University recorded 5 (1.43%) publications each. The table listed 27 institutions.

Table 7: Most influential institutions

Institution	Total Publications (n=350)	Percentage (%)
Wuhan University of Technology	7	2.00
University of South Africa	6	1.71
Wuhan University	6	1.71
University of Illinois Urbana-Champaign	5	1.43
The University of Sheffield	5	1.43
Jianghan University	5	1.43
University of Ilorin	5	1.43
Virginia Polytechnic Institute and State University	5	1.43
Kuwait University	5	1.43
Kyushu University	4	1.14
Harbin University of Commerce	4	1.14
Allama Iqbal Open University	4	1.14
GISMA University of Applied Sciences	3	0.86
Université McGill	3	0.86
Johns Hopkins University	3	0.86
University of Ibadan	3	0.86
Old Dominion University	3	0.86
Federal University of Agriculture, Abeokuta	3	0.86
Universitetet i Oslo	3	0.86
Stanford University	3	0.86
Kyushu Institute of Information Sciences	3	0.86
Monash University	3	0.86
Texas A&M University	3	0.86
Indiana University-Purdue University Indianapolis	3	0.86
University of California, Berkeley	3	0.86
Tsinghua University	3	0.86
Universidad de Alcalá	3	0.86
Universidad de Granada	3	0.86
North South University	3	0.86
Lahore University of Management Sciences	3	0.86
The University of Jordan	3	0.86
Hunan Institute of Science and Technology	3	0.86
Jilin Agricultural University	3	0.86
Minjiang University	3	0.86
University of Jinan	3	0.86
Imam Abdulrahman Bin Faisal University	3	0.86
Kogi State University	3	0.86
Southwest University	3	0.86
Adeleke University	3	0.86

Citation Analysis

Table 8 provides an analysis of the role of Artificial Intelligence in university libraries from 1971 to 2023, offering valuable insights into citation metrics and the impact of research over these 53 years. The data includes 616 papers that have collectively received 4,714 citations, resulting in an average of 88.94 citations per year. Each paper, on average, garnered 7.65 citations. The h-index of 35 and g-index of 52 indicate the substantial influence of the most impactful papers, demonstrating both the depth and breadth of contributions in this domain. These metrics highlight the steady growth and dissemination of research on the role of AI in enhancing university library services.

Table 8: Citations Metrics

Metrics	Data
Publication years	1971-2023
Citation years	53 (1971-2024)
Papers	616
Citations	4714
Citations/year	88.94
Citations/paper	7.65
h-index	35
g-index	52

Table 9 presents the most influential articles on the role of Artificial Intelligence in enhancing services in university libraries. Topping the list is the work by Gupta and Gupta (2019) received 147 citations. Following closely is the article by Cox et al. (2019) titled *"The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries"* with 130 citations and Stock and Stock's (2013) *"Handbook of Information Science"* garnered 115 citations. These highly cited works highlight the academic impact of Artificial Intelligence in enhancing the services provided by university libraries.

Table 9: Highly cited articles

No	Authors	Title	Year	Cites	Cites Per Year
1	S. Gupta, S.K. Gupta	Abstractive summarization: An overview of the state of the art	2019	147	29.4
2	A.M. Cox, S. Pinfield, S. Rutter	The intelligent library: Thought leaders' views on the likely impact of artificial intelligence on academic libraries	2019	130	26
3	W.G. Stock, M. Stock	Handbook of information science	2013	115	10.45
4	G. Cao, M. Liang, X. Li	How to make the library smart? The conceptualization of the smart library	2018	79	13.17
5	R.O. Okunlaya, N. Syed Abdullah, R.A. Alias	Artificial intelligence (AI) library services innovative conceptual framework for the digital transformation of university education	2022	76	38
6	V.L. Rubin, Y. Chen, L.M. Thorimbert	Artificially intelligent conversational agents in libraries	2010	75	5.36
7	A.M. Cox, M.A. Kennan, L. Lyon, S. Pinfield, L. Sbaffi	Maturing research data services and the transformation of academic libraries	2019	74	14.8
8	J.E. Andrews, H. Ward, J. Yoon	UTAUT as a Model for Understanding Intention to Adopt AI and Related Technologies among Librarians	2021	64	21.33
9	P. Jomsri	Book recommendation system for digital library based on user profiles by using association rule	2014	63	6.3
10	A. Wheatley, S. Hervieux	Artificial intelligence in academic libraries: An environmental scan	2020	59	14.75

Discussion of results

The study's results align closely with findings from the existing literature, providing both complementary insights and distinctions in certain areas. The document and source types identified in this study emphasise the dominance of articles and conference papers, which accounted for 48.54% and 33.28% of the publications, respectively. This is consistent with other bibliometric studies (Asemi et al., 2021; Hussain & Ahmad, 2024; Vasishta et al., 2024), that highlight journal articles and conference papers as predominant document types in AI-related library research. These results demonstrate a substantial presence of journal articles and conference papers, reflecting the importance of

academic dialogue and conference dissemination in this domain.

Regarding the types of sources, journals and conference proceedings were the leading publication outlets, representing 54.87% and 28.08% of the sources, respectively. This mirrors trends observed in the literature, where academic journals are identified as the main channels for AI research dissemination (Auza-Santiváñez et al., 2023; Maphosa & Maphosa, 2021).

The study reveals a significant growth in AI-related research in libraries since 2018, with 2023 marking the peak of publications (15.26%). This trend parallels broader bibliometric analyses, which indicate a surge in AI research in libraries, particularly following the COVID-19 pandemic, which accelerated the adoption of AI tools (Luca et al., 2022). In contrast to other studies that show a more pronounced impact of earlier years like 2018 in terms of citations (Auza-Santiváñez et al., 2023), our findings underscore the recent acceleration of publication outputs, suggesting that AI's role in enhancing library services is a rapidly evolving field with increasing academic interest.

Subject area analysis shows that AI research in university libraries is highly interdisciplinary, with computer science (33.40%) and social sciences (26.66%) being the most prominent fields. This is consistent with findings from Mitha & Omarsaib (2024) and Yadav (2021), who also identified the significant intersection between AI and various academic disciplines. Our results underscore the relevance of AI not only in technical fields but also in social sciences, further supporting the view that AI plays a crucial role in diverse academic and research contexts, as previously noted by Hussain & Ahmad (2024).

In terms of geographical distribution, China and the United States emerged as the leading contributors, reflecting the global leadership of these countries in AI research, as previously documented (Dhamija & Bag, 2020). The presence of countries like India and Nigeria in our analysis also corroborates other studies (Islam et al., 2024), suggesting that emerging economies are making significant strides in AI research in university libraries. However, our findings indicate a need for greater global collaboration and support to enhance AI research across Africa and other underrepresented regions.

Finally, the citation analysis in this study reflects a steady impact of AI research in libraries, with an h-index of 35 and an average of 88.94 citations per year. This is comparable to global citation metrics, where earlier works have retained strong academic influence (Auza-Santiváñez et al., 2023). The presence of highly cited works, such as Gupta & Gupta (2019) and Cox et al. (2019), mirrors similar patterns identified in bibliometric studies, further demonstrating the broad interdisciplinary appeal of AI in library contexts (Das & Islam, 2021).

In all, the results of this study not only corroborate much of the existing literature but also highlight areas where AI research in university libraries is expanding, particularly in terms of interdisciplinarity, geographic reach, and document diversity. These results underscore the importance of continued support for AI-driven solutions to enhance library services and promote academic excellence globally.

Conclusion

This study provides a comprehensive bibliometric analysis of the role of Artificial Intelligence (AI) in enhancing library services within university libraries, particularly focusing on document types, source distribution, subject areas, keyword/text analysis and geographical contributions. The results indicate that journal articles and conference papers dominate scholarly outputs, with a clear upward trend in AI-related publications over the past six years.

The results highlight the growing interest and investment in AI technologies to improve the efficiency and quality of university library services, particularly in automating repetitive tasks, streamlining information retrieval, and supporting academic research. Institutions from China, the United States, and India were among the most influential contributors to AI research in libraries, underlining the global nature of this emerging field. The text and citation analyses further showcase key research trends and influential works that have shaped the AI landscape in university libraries.

Contribution to Knowledge

This study contributes to the understanding of how AI is being utilised in university libraries, providing a robust dataset that maps the evolution of research in this field. It offers valuable insights into the types of documents and sources that dominate AI research, as well as the subject areas most impacted by AI technologies. By identifying the most productive institutions and geographical regions, the study sheds light on global collaborations and leadership in the AI-driven transformation of university libraries.

Furthermore, the study's keyword and citation analyses add depth to the current discourse, revealing thematic clusters and highly influential papers. The interdisciplinary nature of AI's role in libraries is emphasised, supporting academic excellence and fostering digital skills for both researchers and library users. This research underscores the significance of AI in addressing the evolving needs of university libraries, particularly in Africa, where the potential for AI-driven innovations is gradually gaining traction.

Limitations

While the study provides valuable insights, it is not without limitations. The data was sourced primarily from databases like Scopus, which may have excluded relevant studies from other databases or regions, particularly grey literature and non-English publications.

Future Research

While this study provides a thorough overview of the role of AI in university libraries, it also opens avenues for future research. Future studies could explore the specific impact of AI technologies on user experiences and information-seeking behaviours in university libraries. Investigating the effectiveness of AI tools such as chatbots, machine learning algorithms, and digital reference systems in enhancing library services can offer practical insights into improving these technologies.

Additionally, there is a need for more research on the ethical implications of AI in libraries, including data privacy concerns, algorithmic biases, and the inclusivity of AI tools for diverse user groups. Comparative studies between developed and developing countries could also provide valuable insights into the differing levels of AI adoption and integration in university libraries. Lastly, as AI continues to evolve, tracking the long-term impact of these technologies on library management, academic research, and educational outcomes will be crucial for sustaining AI-driven innovations in university libraries.

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