

Application of Artificial Intelligence for Library Services: A Systematic Literature Review

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Abstract

Artificial intelligence (AI) revolutionizes traditional library services by offering opportunities for effective and quality service delivery through AI-powered systems. Artificial intelligence has the potential to automate many library operations and services to provide 24/7 assistance to library users in meeting their information requirements. Hence, libraries tend to integrate artificial intelligence into their operations and service delivery. This can be further verified by reviewing the current state of knowledge regarding artificial intelligence and libraries. Therefore, the objectives of the study were to find the current status of knowledge regarding the application of artificial intelligence for library services and to investigate the research gaps in the application of artificial intelligence for library services. The study followed the Systematic Literature Review (SLR) methodology and the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

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The review used 88 articles published during the period from 2002 to 30th April 2024, which were extracted from LENS.ORG and Google Scholar. Biblioshiny of R software and VOSviewer software were used for the analysis. The review revealed that extensive research studies were focused on discovering different library services and operations where AI can be utilized to enhance the effectiveness and efficiency of service delivery, and challenges faced by libraries in using AI tools. The study further recognized areas where studies are lacking which include different AI tools for library service delivery, smart libraries, natural language processing, AI-powered Chatbots, ethical considerations of AI, education and personalized learning, digital library and Distributed Artificial Intelligence, AI for participatory library service, future of libraries in the age of AI, AI Literacy. Hence, the findings provide some implications for future research regarding artificial intelligence and libraries.

Keywords: Artificial Intelligence, Library Services, Library Technology, PRISMA, Systematic Literature Review

Introduction

Libraries are regarded as service-oriented organizations and their services have been transformed by advanced technologies in the modern era. In the digital age, the growing demands of library users are changing rapidly. This has compelled librarians to seek new and innovative technologies to maintain the user experiences of their libraries. Therefore, libraries face evolving challenges in managing vast amounts of information, providing efficient services, and ensuring a seamless user experience. Traditional library systems have been significantly transformed by the integration of automation and information technologies. One such transformative technology is Artificial Intelligence (AI), which has the potential to revolutionize library operations and services (Manjunatha, 2023).

Artificial intelligence (AI) is a broad field of computer science that involves building smart machines capable of performing tasks that typically require human intelligence (Sarker, 2022). It makes computers smart and intelligent by allowing computers to provide answers to the questions raised by people. Thus, the main goal of AI is to enable computers and machines to perform cognitive functions such as problem-solving, decision-making, perception, and comprehension of human communication (Sarker, 2022). Because of such potentials of AI, it emerged as a major technological milestone, influencing the operations of both service-oriented organizations and business organizations.

AI has become an indispensable tool for improving organizational efficiency and productivity. AI adoption in libraries can provide a new technological landscape for delivering library services innovatively and effectively. According to Okunlaya et al. (2022), there are new technological options such as biometric recognition, expert systems, machine learning,

machine vision, algorithms, sensors, and robotization which are some AI-based technologies that can be utilized for enhancing library services and operations. There are numerous AI tools that can be used in the libraries to improve the efficiency of the services and to fulfill 24/7 user information support with minimal human intervention.

It is astounding how AI technologies have strongly influenced many sectors in the 21st century, including libraries. AI has become the new emerging trend for libraries currently. AI in libraries can be considered as a collection of techniques that enable machines to detect, understand, behave, learn, and execute administrative activities, providing libraries with cutting-edge technologies. Librarianship as a profession is known for incorporating cutting-edge technologies not just for information dissemination but also apply computer-based products and services to various library operational processes, and different library services. The major impact of AI applications on library functions shows the real efficiency and accuracy of the services rather than its technological exploitations. Hence, AI can be recognized as a novel type of technology that libraries utilize to achieve the main aim of the library.

Libraries tend to increasingly integrate AI for their operations and service delivery. This can be further verified by reviewing the current state of knowledge existing in the world in relation to AI and libraries. Therefore, the present study focused on the empirical literature published during the period from 2002 to 30 April 2024. The study aimed to discover the current state of knowledge on the application of AI in library services and identify areas where further research studies are needed. At present, the application of AI-driven technologies for library services is becoming a new level of accuracy and effectiveness in library service delivery in the world and a number of research

studies have been carried out across the world. However, no study was conducted on a systematic literature review on the application of AI for libraries in the context of Sri Lanka. Therefore, the present study involved a systematic literature review along with a bibliometric analysis of AI-powered library services. The findings of the study will significantly contribute to libraries in Sri Lanka by helping them apply AI tools for effective service delivery and formulating policies to promote the ethical use of AI. The objectives of the study were (1) To find the current status of knowledge regarding the application of artificial intelligence (AI) for library services, and (2) To investigate the research gaps in the application of artificial intelligence (AI) for library services through the literature review.

Methodology

Study selection process and methods

The study employed the Systematic Literature Review (SLR) methodology to explore the application of AI tools in library services. The article selection procedure was performed using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram. The steps followed during the article selection were “Identification”, “screening”, and “included”. Figure 1 illustrates the steps carried out during the study using the PRISMA flow diagram.

The initial stage “identification stage” includes determining the search terms and search strategy, identifying relevant databases for searching scholarly articles and the data extraction method. The key search terms used for the article retrieval were “artificial intelligence”, “AI” and “library services”. Search terms “artificial intelligence”, and “AI” were combined using OR operator and the term “library services” was added with AND operator. LENS. ORG and Google scholar were used for retrieving articles.

LENS. ORG is an open access platform which covers research articles across many subject disciplines. Similarly, Google scholar indexes a vast amount of scholarly literature from various disciplines and sources. Therefore, LENS. ORG and Google scholar were used for the study.

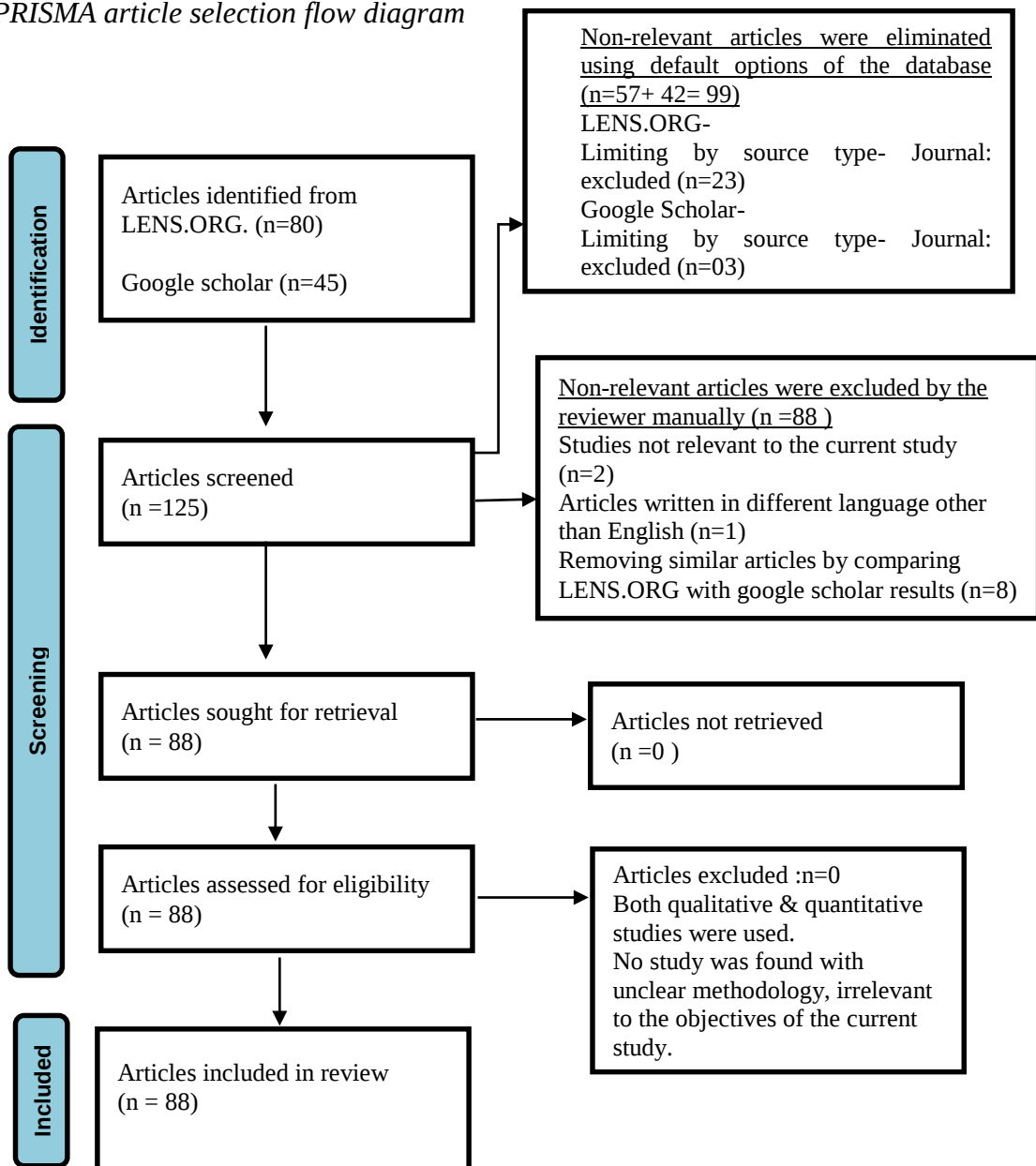
The initial search identified 80 publications from LENS.ORG and 45 publications from Google Scholar. According to the PRISMA (2020) flow diagram, the articles identified should be screened based on inclusion/exclusion criteria. The inclusion criteria for screening the publications were empirical studies published in English in Journals relating to artificial intelligence and library services from 2002 to 30 April 2024. Though the application of AI tools in library services has seen significant development and adoption over the past two decades, only 01 research paper was found from LENS.ORG & Google Scholar before 2002. Therefore, articles published during 2002 to present (30 April 2024) were considered for the study.

Screening was performed through the default options of LENS.ORG and Google Scholar, and manually. The articles that met the inclusion criteria “empirical studies” published in “English” in “Journals” from 2002 to 30 April 2024 were extracted using the default options of LENS.ORG and Google Scholar. The other types of publications such as books, book chapters, research notes, book reviews, conference papers unpublished data, etc., non-English articles were excluded using default options of LENS.ORG and Google Scholar. Duplicate records identified by comparing results from both databases were excluded manually. This resulted in 88 publications for the eligibility assessment. The eligibility assessments were conducted manually by the authors. Both qualitative and quantitative studies were taken for the present study. No article was found with unclear methodology and irrelevant

to the objectives of the current study. Therefore, all 88 articles were included for data extraction and review.

Figure 1

PRISMA article selection flow diagram



Methods of analysis

The method of data analysis for the research was bibliometric analysis which was employed using two software programs: Biblioshiny and VOSviewer. Biblioshiny of R package was used for evaluating the data extracted from the LENS.ORG scholarly database and generating metrics like annual scientific productions, average citations received, and identification of the most relevant source articles and sources. VOSviewer, a dedicated visualization software, was employed to create scientific maps. These maps visually represent the intellectual landscape of the research area. One map that can be developed from VOSviewer is a keyword co-occurrence network.

The keyword co-occurrence network map illustrates how frequently keywords appear together in the analyzed articles, providing insights into the most prominent research themes and their relationships. This map visually depicts the relationships between keywords based on how frequently they appear together within the articles analyzed in the area of investigation. Keywords that co-occur frequently are positioned closer together in the network, with the size and thickness of the connecting lines indicating the strength of the association. Prominent research themes represented by clusters of interconnected keywords can be identified by analyzing this map. This allows the present study to not only understand the core research areas but also explore potential emerging trends and knowledge gaps within the field of AI applications in library services. Therefore, a keyword co-occurrence network map was used to find the current knowledge of the application of AI tools in library services which was the first objective of the study.

Additionally, VOSviewer was used to generate a density visualization map based on the keyword co-occurrence analysis. This visualization helps in

identifying areas of high and low research activity separately and potential emerging trends within the field. This was used to achieve the second objective of the study: to investigate the areas where research studies are lacking in the application of AI tools in library services. According to [Van Eck & Waltman \(2023\)](#), each point in the density visualization map has a colour that indicates the density of items and by default, colours range from blue to green to yellow. The colour of a point closer to yellow indicates a large number of items in the neighborhood of a point and the higher its weight. The colour of a point closer to blue indicates the smaller the number of items in proximity to a point and the lower its weight.

Additionally, results on annual article publications, average citations received, and most relevant sources where articles published were generated by the Biblioshiny of R software.

Results and Discussion

Study Selection

Based on the PRISMA flow diagram, 88 articles published during the period from 2002 to 30th April 2024 in English were selected for the study after a rigorous screening process. Keywords used during the retrieval process of articles were “artificial intelligence”, “AI”, and “library services”. The important bibliographic details such as article title, abstract, keywords, author names, publication year, journal name, and number of citations of selected articles were extracted to an MS Excel sheet.

Study Characteristics

The study characteristics were assessed using Biblioshiny of R software, and only the articles extracted from LENS.ORG were analyzed since the Biblioshiny software doesn't support analyzing Google Scholar results.

Totally, the research study reviewed 88 articles published between 2002 and 30th April 2024. However, the analysis was done for 57 articles published across 35 different journals, which were extracted from LENS.ORG. A total of 57 articles were analyzed, and they had an average citation count of 5.614 per article, indicating a significant influence from AI-related studies to the field of library and information science. In total, there were 155 author-identified keywords and 594 references, providing a well-rounded picture of the research landscape. With contributions from 113 authors, the study appears to have incorporated a diverse range of perspectives. Overall information about the articles obtained from LENS.ORG was given in Table 01.

Table 1

Overall information of the articles obtained from Lens. Org

Description	Results
Timespan	2002:2024
Journals	35
Number of articles	57
Average citations per doc	5.614
References	594
Author's Keywords	155
Authors	113
journal articles	57

Figure 2 illustrates the annual scientific production of articles, created by Biblioshiny for 57 articles extracted from LENS.ORG. It indicates that fewer articles were published on AI and libraries between 2003 and 2019. But the number of articles published increased significantly from 2020 to 2024. The highest number of 26 articles have been published in 2023. Furthermore, a few more articles (14) were published in 2024 as the SLR was focused until 30 April 2024.

Figure 2

Annual article publications in Lens. Org

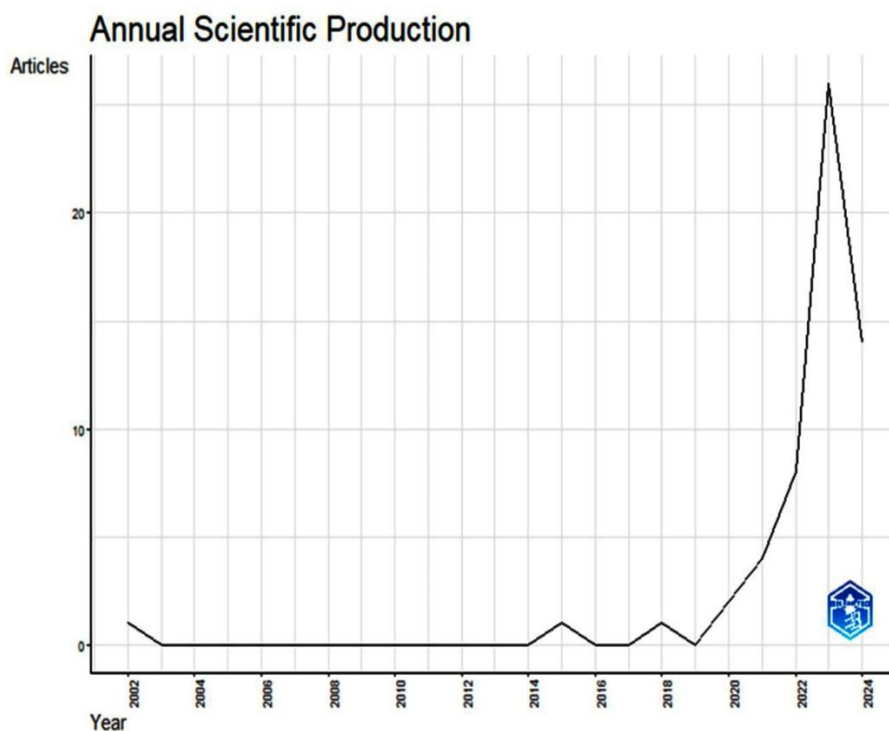


Figure 3 shows the average citations per article. The number of citations indicates the impact and significance of AI for the field of library and

information science. The figure indicates that the average number of citations per year has fluctuated over time, showing an overall increasing trend.

Figure 3

Average citations per year for publications in Lens. Org

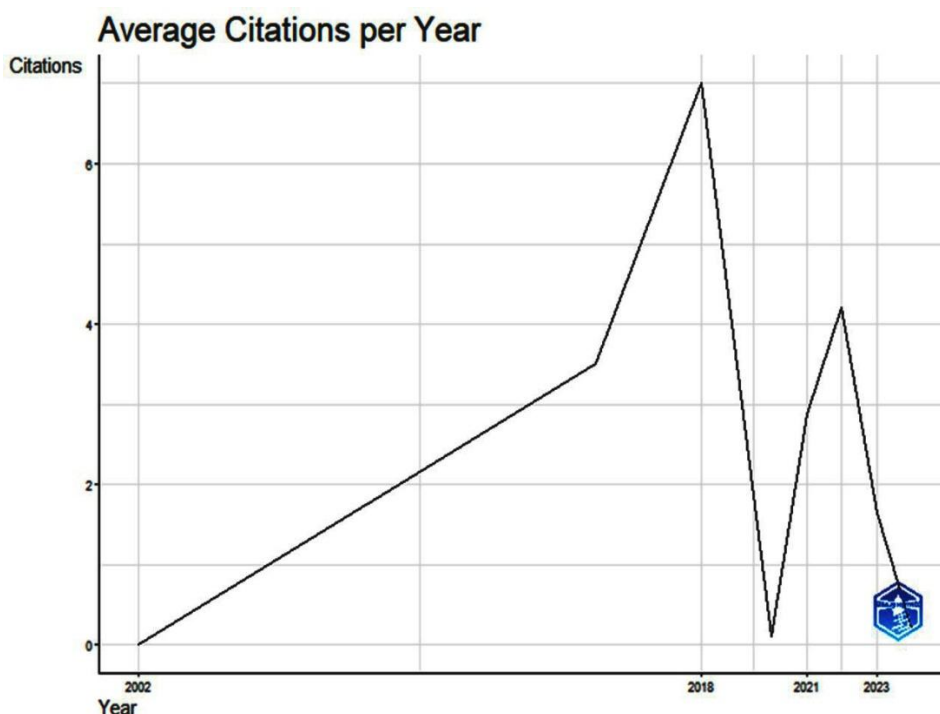
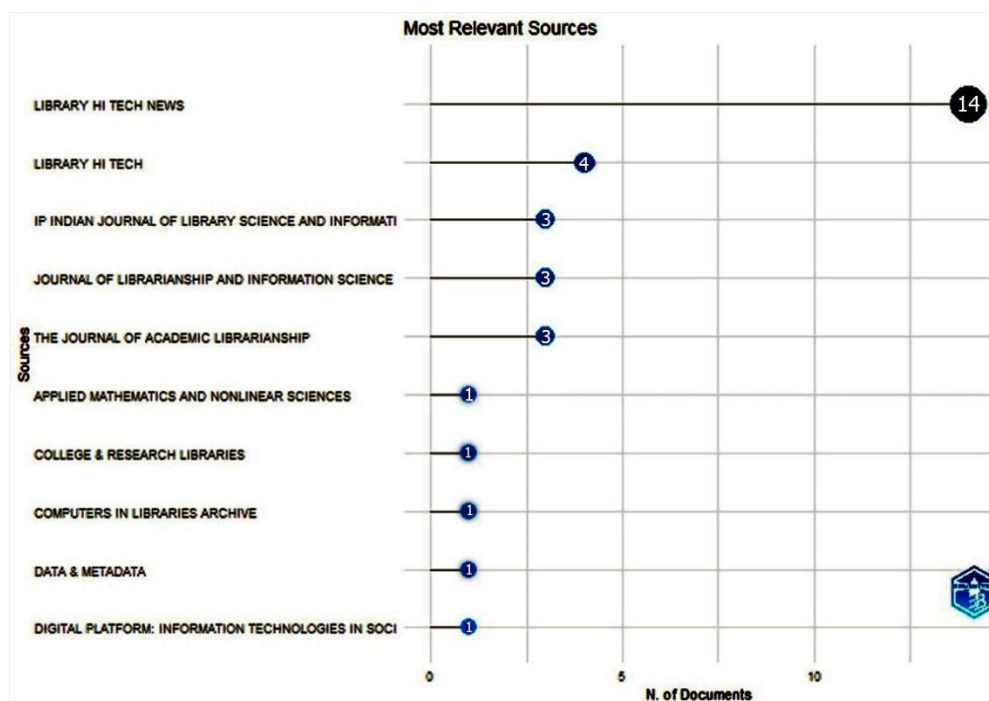


Figure 4 is a Biblioshiny visualization of the most relevant sources of the articles. It shows 10 journals that have published the highest number of articles. The journal of Library Hi Tech News is recognized as the top and most relevant source where 14 articles have been published. Only five sources were identified where 3 or more than 3 articles were published. These 05 source journals were Library hi tech news, Library hi tech, IP Indian Journal of Library Science and Information Technology, Journal of Librarianship and Information Science, and The Journal of Academic Librarianship.

Figure 4

Source journals of articles of Lens. Org



Results of the Study aligning with the objectives

This section explains the findings of the study in relation to the research objectives. The data extracted from both LENS.ORG and Google Scholar were used for the analysis. The findings were obtained using VOSviewer software through keyword co-occurrence analysis. Keywords network visualization and density visualization were mainly used in achieving 02 research objectives. The keyword co-occurrence network visualization was used to address the 1st research objective i.e. to find the current state of knowledge regarding the application of AI for library services. The keyword co-occurrence density visualization addressed the second objective i.e. to investigate the research gaps in the application of AI for library services.

Current knowledge of the application of AI for library services

The keyword co-occurrence network visualization developed by the VOSviewer software was used. The frequency of occurrence and co-occurrence of keywords indicate the areas where investigations were frequently conducted. Therefore, a higher occurrence of a specific keyword is considered an area frequently investigated.

Accordingly, Table 2 lists how many times each keyword appears across the articles. The left column, "Minimum keywords occurrences," indicates the threshold for counting a keyword. The right column, "Threshold keywords level," indicates the number of articles containing keywords that meet the respective minimum occurrence threshold in the left column. Therefore, according to Table 2, 228 keywords appear at least once in the articles. There are 55 keywords with two-time occurrences and only 17 keywords occurred 4 times. This suggests that some keywords are more common than others, with a higher number appearing only once in the articles, while a smaller number of keywords appear multiple times. 17 keywords that appear in a minimum of 04 articles were selected for further review.

Table 2
Occurrence of keywords in articles

Minimum keywords occurrences	Threshold keywords level
1	228
2	55
3	25
4	17

Table 3 depicts 17 keywords and the number of times each keyword appeared in articles. According to the table, "Artificial intelligence" stands out as the most frequent term, appearing 50 times in articles. Other prominent

keywords include "Library services" (16 times), "Academic libraries" (13 times), and "Machine learning" (10 times). These terms suggest a focus on the intersection of technology and libraries, particularly in the context of artificial intelligence and machine learning. The table also reveals interest in specific technologies like "RFID" (Radio-Frequency Identification) and "Chatgpt". Overall, table 3 provides an overview of the key themes and areas of interest within the analyzed articles.

Table 3

Keywords with a minimum of 04 occurrences in articles

Keyword	No. of occurrences
Artificial intelligence	50
Library services	16
Academic libraries	13
Machine learning	10
Robotics	5
Nigeria	5
Technology	7
Library	7
RFID	6
Smart libraries	4
Developing countries	4
Librarians	5
Libraries	8
Natural Language processing	6
Education	4
Library Science	4
Chatgpt	4

Figure 5 illustrates a keywords co-occurrence network visualization created using VOSviewer. It visually represents how frequently certain keywords appear together across a set of articles. Circles represent keywords, and their size indicates how often a particular keyword appears in the

documents. Lines connect circles (keywords) that co-occur frequently, meaning they appear together in the same articles. The thickness of the line indicates the strength of the co-occurrence association. Thicker lines suggest stronger connections between keywords. Accordingly, in Figure 5, “artificial intelligence”, “library services”, and “academic libraries” are denoted in larger circles, representing the most frequent keyword. The remaining keywords are represented in circles depending on the frequency of their occurrences. The circles in the map are visualized in three red, green, and blue clusters. The keywords that appear close together in a cluster suggest that they are frequently discussed together in articles. Therefore, 03 clusters red, green, and blue represent 03 common themes in relation to the application of AI in libraries. These three themes are given in Table 4, which are 1). Application of AI for libraries and challenges need to be addressed 2). Integration of AI Technologies in Academic Libraries 3). Different AI Tools that can be used in library service delivery, are explained in detail as follows.

Figure 5

Keyword co-occurrence network visualization. Note: total keywords-228, total keywords more than 4 occurrences-17, clusters-3

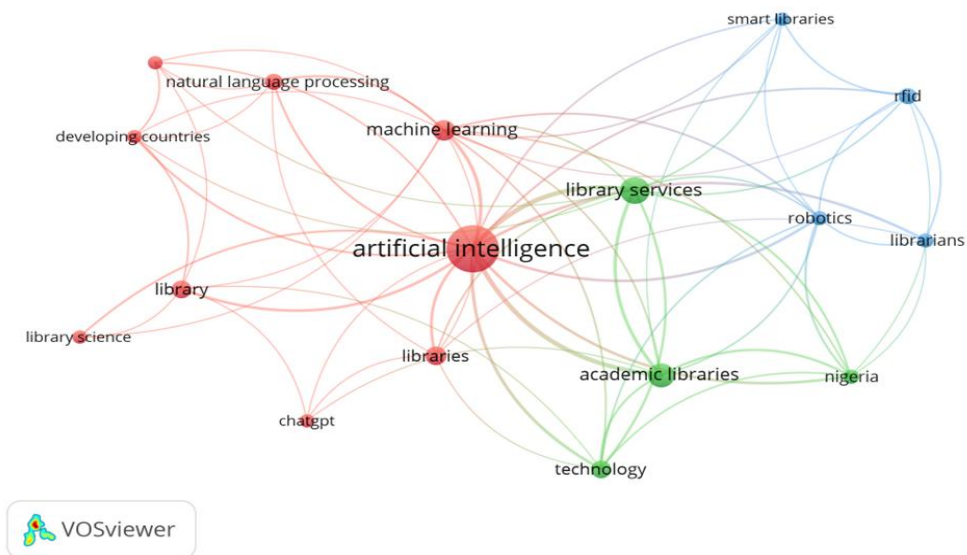


Table 4

Keywords categorized into clusters

Cluster	Common theme	Keywords
Cluster 01 (09 items, Red cluster)	Application of AI for libraries and challenges need to be addressed	Artificial Intelligence, ChatGPT, Developing Countries, Education, Libraries, Library, Library Science, Machine Learning, Natural Language Processing
Cluster 02 (04 items, Green cluster)	Integration of AI Technologies in Academic Libraries	Academic Libraries, Library Services, Nigeria, Technology
Cluster 3 (04 items, Blue cluster)	Different AI Tools that can be used in library service delivery	Librarians, RFID, Robotics, Smart Libraries

Cluster 01: Application of AI for libraries and challenges need to be addressed

[Manjunatha \(2023\)](#) stated that there is a substantial association between AI and libraries. The application and utilization of AI in libraries have become widespread ([Alala et al., 2024](#)). A study done by [Eiriemiokhale & Sulyman \(2023\)](#) discovered that librarians in university libraries in Kwara State, Nigeria perceived that AI is beneficial as it provides patron-tailored recommendations to items, reduces manual and repetitive tasks performed by librarians and facilitates the discovery of new knowledge. Among different AI tools, [Khan et al. \(2023\)](#) recognized ChatGPT as a conversational AI system that can provide quick answers to user’s queries, Perplexity as a language model that can assist tasks such as cataloguing and content classification and

iAsk.Ai (natural language processing system) that can assist with research and reference inquiries. Regarding ChatGPT, [Zakaria & Sani \(2024\)](#) presented different themes such as information retrieval, reference assistance, language support, user engagement, personalization, information literacy, collection development, and cataloging and classification where libraries can get use of artificial intelligence (AI), specifically ChatGPT.

[Alala et al.](#) in 2024 mentioned that technologies such as expert systems designed for reference services, book reading and shelf-reading robots, and virtual reality for immersive learning are prominent in libraries among other applications. Libraries use artificial intelligence and machine learning to enhance and automate various library operations and strengthen user services through effective search and discovery, personalized recommendations, automated cataloguing, and virtual assistance ([Jain, 2023](#); [Mahmud, 2024](#)). AI chatbots are a good solution for libraries to implement a virtual assistance service to fulfill user needs 24/7 with minimal or without human intervention ([Nawaz & Saldeen, 2020](#); [Panda & Chakravarty, 2022](#)). [Oyelude \(2021\)](#) presented a different set of areas where AI can be applied to enhance library services such as content indexing, document matching, content mapping, and content summarization. As another different application, [Semeler et al.](#) in 2024 highlighted the ability of creating Python code with AI which can help data librarians work more efficiently with various types of data sources. [Isiaka \(2023\)](#) discovered that AI cataloguing, AI classification, AI indexing, information retrieval tools, and robotics referencing as the purpose applications of AI for service delivery in libraries. [Ali et al. \(2024\)](#) presented that natural language processing, voice searching, and chatbots are the most familiar and popular tools currently used in university libraries in Pakistan. [Stafford \(2021\)](#) suggested chatbots, text mining, and automatic metadata generation as possible ways to improve the efficiency of library services

through AI. According to [Sudhakara & Naik \(2023\)](#), AI and machine learning play a significant role in digitization efforts, automating the process of digitizing and archiving historical documents and rare collections. [Akinola \(2023\)](#) recognized various AI tools such as natural language recognition, robotics, big data, and machine learning to improve library operations and services.

The above findings indicate the different areas where AI is applied by libraries in automating library operations and providing enhanced library services. However, some studies have identified the challenges that need to be addressed to ensure its effective and ethical use. Therefore the challenges that the libraries face in utilizing AI technologies include inadequate technology infrastructure ([Barsha & Munshi, 2023](#); [Mahmud, 2024](#)), funding limitations ([Alam et al., 2024](#); [Bello & Abdulsalam, 2023](#); [Jha, 2023](#); [Mahmud, 2024](#)), high costs ([Akinola, 2023](#); [Barsha & Munshi, 2023](#)), shortage of AI-skilled expertise ([Alam et al., 2024](#); [Bello & Abdulsalam 2023](#); [Barsha & Munshi, 2023](#); [Isiaka, 2023](#); [Mahmud, 2024](#)), lack of technical skills by library staff ([Isiaka, 2023](#); [Jha, 2023](#)), data privacy risks and concerns ([Akinola, 2023](#); [Balasubramanian & Tamilselvan, 2023](#); [Barsha & Munshi, 2023](#); [Mahmud, 2024](#)), potential biases ([Mahmud, 2024](#)), staff resistance to change ([Akinola, 2023](#); [Alam et al., 2024](#)), attitudes of librarians ([Jha, 2023](#)), poor network connectivity ([Akinola, 2023](#)), erratic power supply ([Bello & Abdulsalam 2023](#)), ethical implications ([Akinola, 2023](#)). Therefore, it is important to address these challenges in offering AI-driven services for library users.

Cluster 02: Integration of AI Technologies in Academic Libraries

Academic libraries integrate AI technologies into library services and operations to enhance their efficiency and effectiveness. Utilization of these technologies in academic libraries makes them adapt to the changing

technological landscape while meeting the main aim of any library which is meeting the needs of library users. Clark & Lischer-Katz (2023) mentioned that a rapid increase in the application of AI, immersive technologies (XR), big data, and other technologies to library services has been observed since 2015. Though academic libraries offer a range of traditional library services to support the academic and research needs of students, faculty, and researchers, AI-powered library services transform the way of accessing and utilizing information resources by students and researchers (Jain, 2023). Amzat & Adewojo (2023) stated that the application of AI and the metaverse in academic libraries provides opportunities for personalized learning experiences, efficient resource management, and global collaboration. Lo (2023) concluded that academic libraries should focus on taking a proactive approach to AI, ensuring its effective, ethical, and responsible use in library services and operations.

Cluster 03: Different AI Tools that can be used in library service delivery

The literature presented different AI tools that can be used in delivering quality library service and enhancing library operations. Oyetola et al. (2023) recommended that academic libraries should utilize AI technologies like chatbots, barcodes, RFIDs, and robots in quality service delivery and libraries should take the benefits of artificial intelligence in reconnecting library's remote users and thereby re-establishing their relevance among the user community. Asim et al. (2023) identified text-to-speech and speech-to-text technologies, Google Assistant to search by voice command, Radio Frequency Identification (RFID) system for self-checkout, check-in, and security purposes, and intelligent data analysis for collection management as the commonly using AI-based library services in university libraries of Pakistan. Abba (2024) found that AI technologies such as Chatbot, ChatGPT,

LibKey from ThirdIron, robots, RFID technology, and Grammarly were some popular tools used by university libraries in Africa. Ali et al. (2021) discovered facial recognition, RFID, self-check-in checkout out, and pattern recognition i.e, Thumb Impression, QR code and Barcodes, data visualization lab, and AI-based discovery search interfaces were popular among different types of libraries in Pakistan. Ali et al. in 2024 recognized natural language processing, voice searching, and chatbots as the most popular tools while robotics technology is a rarely used AI-based tool in university libraries in Pakistan. Oyetola et al (2023) recommended that academic libraries in Nigeria should utilize AI technology such as chatbots, barcodes, RFIDs, and robotics to provide effective services to their library users.

Research gaps in the application of artificial intelligence (AI) for library services

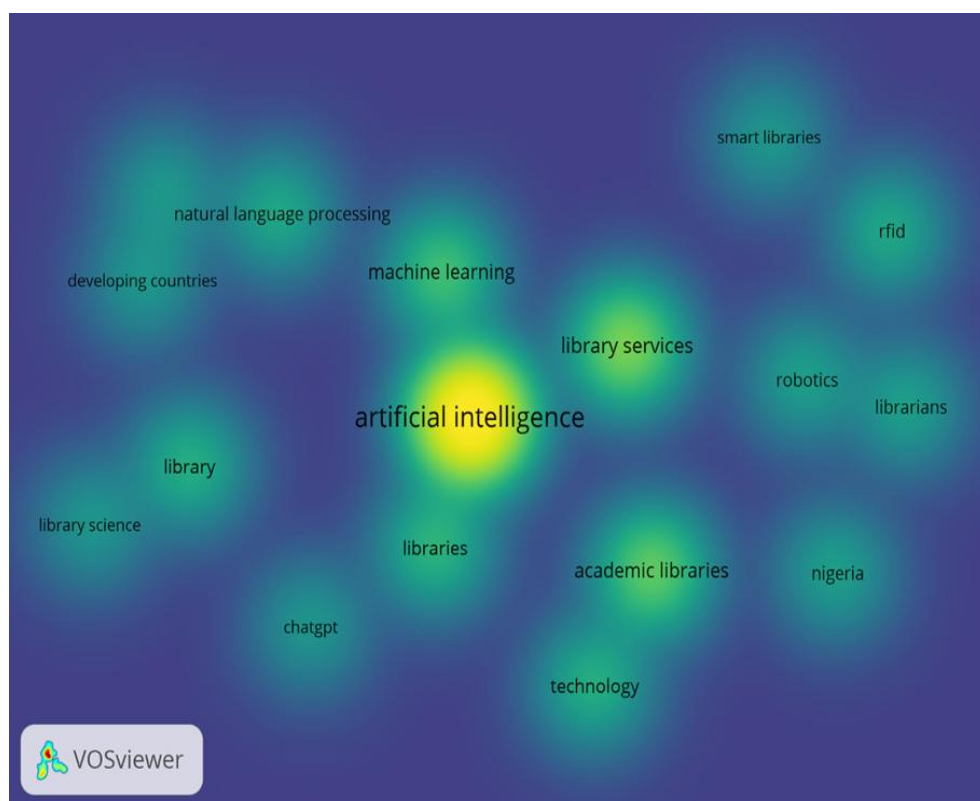
The results relevant to the 2nd research objective of the study are given next. Figure 6 is the density visualization map of keywords related to artificial intelligence and libraries, created by VOSviewer. The density visualization map shows a yellow background at the center. According to the VOSviewer manual, yellow nodes indicate sufficient research for established knowledge. However, keyword nodes with green to blue backgrounds indicate that there were fewer studies on those keywords. Thus, keyword points with a green background indicate insufficient research. Therefore, different AI tools for library service delivery, smart libraries, and natural language processing could be recognized as areas where empirical studies are lacking.

Additionally, keywords that occur a minimum of 3 times and less than that were used in identifying areas where potential gaps in the research studies. Based on that, AI-powered chatbots, ethical considerations of AI, education

and personalized learning, digital library, and Distributed Artificial Intelligence, AI for participatory library service, the future of libraries in the age of AI, and AI Literacy were identified as areas with an insufficient level of research studies.

Figure 6

Density visualization map of keywords



Conclusion

Most libraries tend to integrate AI technologies into library services and operations resulting in a transition from the traditional library services to AI-powered library services. AI has great potential to enhance library services and operations by improving efficiency, personalizing services, and providing

better access to resources. The present study followed the SLR methodology to discover (1) the current state of knowledge regarding the application of artificial intelligence (AI) for library services, and (2) the research gaps in the application of artificial intelligence (AI) for library services. Based on the inclusion and exclusion criteria, the study reviewed 88 articles published during the period from 2002 to 30th April 2024. LENS.ORG and Google Scholar were used in retrieving articles relevant to the study, and PRISMA guidelines were applied for selecting articles and reporting the findings.

Based on the literature, the study discovered that most of the research studies on the application of AI for libraries were focused on presenting different library services and operations where AI can be utilized to enhance the effectiveness and efficiency of service delivery and challenges faced by libraries in using AI. Virtual assistance service to fulfill user needs 24/7 with minimal or without human intervention, book reading and shelf-reading robots, virtual reality for immersive learning, effective search and discovery, personalized recommendations, document matching, content mapping, content summarization, working more efficiently with various types of data sources, AI cataloguing, AI classification, AI indexing, information retrieval tools, robotics referencing, natural language processing, voice searching, text mining, automatic metadata generation, automating the process of digitizing, archiving historical documents and rare collections, big data analysis, supporting remote library services, efficient administration of library resources, enhancing information accessibility for differently abled users, and futuristic collection development are recognized as different library services and operations where AI is applied. However, some studies have identified the challenges that need to be addressed in utilizing AI technologies. The challenges are inadequate technology infrastructure, funding limitations, high costs, shortage of AI-skilled expertise, lack of technical skills by library staff,

data privacy risks and concerns, potential biases, staff resistance to change, attitudes of librarians, poor network connectivity, erratic power supply, and ethical implications. It is important to address these challenges to ensure the effective and ethical use of AI during library service delivery. The literature presented some tools that can be used for the effective delivery of library services which include chatbots, barcodes, RFIDs, robots, text-to-speech and speech-to-text technologies, Google Assistant to search by voice command, Radio Frequency Identification (RFID) system for self-checkout, check-in, and security purposes, intelligent data analysis for collection management, ChatGPT, LibKey from ThirdIron, Grammarly, facial recognition, QR code, Barcode, data visualization lab, AI-based discovery search interface natural language processing, voice searching tools.

The study recognized different AI tools for library service delivery, smart libraries, natural language processing, AI-powered Chatbot, ethical considerations of AI, education and personalized learning, digital library and Distributed Artificial Intelligence, AI for participatory library service, future of libraries in the age of AI, and AI Literacy as areas with insufficient level of research studies. The findings encourage to leverage more AI tools and areas where AI can be applied to enhance the efficiency of library service delivery.

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