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Artificial Intelligence Applications in Resource Discovery and Information Management in Libraries

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ABSTRACT

Artificial Intelligence (AI) in libraries re-interprets traditional library services and offers new chances to improve users' experience and streamline operations. This article advances in artificial intelligence and its foundations and reviews the literature to see what is happening in this field. AI technology offers library and information professionals new skills to improve library services, maintain users' requirements, and reinvent capability and expertise. Most importantly, it creates a value-added digital transformation, emphasizing the urgency and necessity for adjustment to AI. Adjustment of innovative information services in libraries includes intelligent AI chatbots. Here in this article, it is explained how generative AI revolutionizes academic libraries, learning, and research through the utilization of artificial intelligence in library services.

KEYWORDS: Artificial Intelligence; Information Management; Resources discovery; Libraries**;** Content Management.

INTRODUCTION

Artificial intelligence (AI) is the newest computer technology in library and information science, and it is employed to render information management competent and efficient. Based on these technologies, the user's intelligence can be enhanced. Artificial intelligence technologies such as machine learning, natural language processing, and predictive analytics are transforming the main library functions, i.e., information searching, cataloging, user services, and collection management. The capability of AI to enhance library services should not be questioned, and the future developments are the way to more sophisticated personalization, predictive services, and unmediated convergence of physical and virtual collections.

Background and related studies

There have been few studies in the areas of AI applications in library resource discovery and AI-powered recommendation systems in library management. The Influence of Artificial Intelligence in enhancing access, discovery, and user engagement is observed in library services, where there are observations about revolutionizing medical libraries.

Resource discovery and support

There are vital roles of AI in enhancing discovery, access, and library services for healthcare professionals (Sivasankari, Suriya, Sindhu & Dhilipan, 2024; Rao & Sahu, 2024; Ahmed & Senthilkumar, 2024). AI-powered libraries can enhance user experience and efficiency in knowledge repositories and transform metadata management. There are various insights on challenges, opportunities, and emerging trends in these areas for anticipating AI impact on library services for contemplating the future opportunities and evolutionary prospects (Adewojo, Amzat & Abiola, 2025; Oyighan, Ukubeyinje, David-West & Oladokun, 2024; Lalitha, Ramalakshmi, Gunasekaran, Murugesan, Saminasri & Rajkumar, 2024). The rise of artificial intelligence is being studied in libraries where few ethical and equitable methodologies, and prospects for empowering library users are being sought. The instances of the Impact of conversational and generative AI systems on libraries are being explored in the context of large language models (LLMs) (Hodonu-Wusu, 2024; Khan, Gupta, Sinhababu & Chakravarty, 2024).

Few examples in the literature are mapping the literature on artificial intelligence in academic libraries, where new technological trends and applications in libraries, as well as advantages and challenges of implementing artificial intelligence in academic library services are also discussed (Hussain & Ahmad, 2024; Okwu, Okwu & Oladokun, 2024; Alala, Uzoaru & Odikwa, 2024). The discussion about developing a user-friendly digital library resource discovery tool to mitigate learners' technical hitches and exploring the implementation of artificial intelligence applications among academic libraries provides learning experiences. Such examples are enhancing knowledge of leaders, practitioners, and scientists' awareness of artificial intelligence in libraries (Kato, Temba, Steinhauer, Kisangiri & Kaijage, 2022; Huang, 2024; Harisanty, Anna, Putri, Firdaus & Noor Azizi, 2024).

User experience and accessibility of digital resources

Artificial Intelligence and library machine learning applications are transforming information access and management. The AI-powered libraries are enhancing user experience and efficiency. The studies about artificial intelligence applications in libraries in Nigeria, Taiwan, and Southeast Asia provide facts and experiences. Artificial Intelligence (AI) in Medical Libraries is also shaping the future of Healthcare Information Systems in the European Union (Barman, 2025; Adewojo, Amzat, & Abiola, 2025; Xu & Loo, 2025; Rafiq,2025). Infusing AI for greater impact in academic libraries is pervasive, where there is a need to balance precision and usability. In academic libraries, librarians' perspectives are also significant in abstracting and indexing databases, while comparing the discovery services in academic libraries. Artificial Intelligence implementation in library information systems has certain current trends. There is a need to shift from hype to strategy. Such plans would require navigating the reality of strategic adoption of AI technologies in academic libraries (Malik & Mandal, 2025; Al-Hamad, 2025; Narendra, Dewi, Gunawan & Ardi, 2025; Mosha, 2025; Gupta, 2025). There are examples of AI in academic library strategy in the United Kingdom and Mainland China. Artificial intelligence and ChatGPT are nurturing the knowledge sharing,

ethics, learning environments, and libraries and exploring AI Tools for curating and managing library collections (Huang, Cox & Cox, 2023; Zeb, Rehman, Bin Othayman & Rabnawaz, 2025; Ajakaye, 2025).

AI tools in library operations and services

There are multifarious opportunities through AI applications regarding various housekeeping and routine functions in libraries. The Roles of artificial intelligence in streamlining university library operations are found in published literature. Harnessing Blockchain Technology for the Evolution of Libraries: Prospective Trends and Innovations in Information Resources Management (Visnudharshana & Kishore, 2025; Sonawane, Shekhar, Murab, Pansare, Satonkar & Jha, 2024; Nasir, 2024; Satheesh, Anantharaman & Ashraf, 2024; Abdulsalami, Queeneth & Selma, 2024; Gajbhiye, 2024; BASSEY & Daniel, 2024).

Few examples such as adoption of artificial intelligence for library operations in federal university libraries in North West states of Nigeria and few other African universities libraries are supporting the idea of Artificial intelligence as enabler of future library services (Lalitha, Ramalakshmi, Gunasekaran, Murugesan, Saminasri & Rajkumar 2024; Aminu, 2024; Enakrire & Oladokun,2024). The literature has reflected various examples of the application of generative artificial intelligence in library operations and service delivery. (UDO-OKON, AKPAN, FCICN & AP, 2024; Ajani, Tella, Salawu & Abdullahi, 2022; Mwantimwa & Msoffe, 2025; Olubiyo, 2025).

Content management

Leveraging artificial intelligence for sustainable knowledge organisation is highly possible with AI-powered smart digital libraries (Monyela &Tella, 2024; Meesad & Mingkhwan,2024). To maximise user engagement, leveraging AI for effective content marketing in libraries has been resourceful. AI-Powered Revolution is taking place by automating information management in libraries, and AI-powered libraries are enhancing user experience and efficiency (Sapri, Rashid & Tarmizi, 2024; Kanaujia, Verma, Verma, & Patel, 2024; Adewojo, Amzat & Abiola, 2025). There are various studies on developing countries' current prospects and challenges (Narayanan, 2024; Barsha & Munshi, 2023; Hazarika, Achumi & Konch, 2024). There are numerous opportunities, challenges, and strategies for integrating Artificial Intelligence in medical as well as academic libraries (Jha, 2023; Orubebe, Ijaja, Ogwula, & Oladokun, 2024; Mallikarjuna, 2024).

Information literacy in libraries

Artificial intelligence literacy among various library and information science students might have socio-demographic influences and educational implications. There can be practices and efforts for navigating the landscape of AI literacy education: insights from a decade of research (2014–2024) (Hossain, Biswas, Khan & Khan, 2024; Yang, Zhang, Sun, He & Wei, 2025). There is a need for exploring students' views on information literacy skills training in higher education (Ghosh, Sarkar, Roy, Roy & Podder, 2025; Mwiiyale, Hamutumwa, & Shatona, 2025). Such examples are observed from the British University in Egypt library (Ali & Richardson, 2025; Sayed, Telbany & Ashmawy, 2024).

AI literacy guidelines and policies for academic libraries are the direction for the future. For example, there is a proposed framework for a digital literacy course for artificial intelligence in academic libraries (Chigwada, 2024).

While the industrial and technological revolutions are components of modern progress, reimagining libraries in the fifth industrial revolution (5IR) involves the impact of robotics, artificial intelligence (AI), metaverse, blockchain, and emerging technologies (Oyedokun,2024). Librarians' Views are also significant on AI Support for learning experiences, lifelong learning, and digital literacy. The experiences in Malaysia, Indonesia, South Asia, and the Middle East narrate a nice story of information literacy development. Promoting AI literacy through US academic libraries has informed about the use of LibGuides (Mutia, Masrek, Baharuddin, Shuhidan, Soesantari, Yuwinanto & Atmi, 2024; Hossain, Alwreikat, Khan, Alotaibi, Biswas & Sbeity, 2025; Ru & Tang, 2025; Olubiyo, 2025).

Experiences from India and the globe

In the Indian context, varied applications and efforts in AI-related implementations are occurring. There is a need to embrace AI in libraries with a strategic approach for India's evolving library landscape. A few examples of infusing AI for greater impact in academic libraries. Application of artificial intelligence in libraries is visualised in the research activities (Malik & Mandal, 2025; Malakar, Manavalan, Jain & MS, 2025; Vasishta, Dhingra & Vasishta, 2024). Artificial Intelligence-Based Smart and Secure Applications require AI literacy, whereas the roles of libraries are increasing in promoting digital literacy and information fluency (Ghosh, Sarkar, Roy, Roy & Podder, 2025; Hossain, Biswas & Khan, 2025; Rajagopal, Popat, Meva, Bajeja & Mudholkar, 2025). AI in Indian libraries for transformation is dependent upon positive and welcoming perceptions from library professionals (Subaveerapandiyan & Gozali, 2024; Jayachristrayar & Hemapriyaa, 2023; Naikar & Paul, 2025; Govindaraju, Shanmugam & Govindarajan, 2025; Panda & Chakravarty, 2022).

The adoption and utilization of artificial intelligence in academic libraries are associated with many challenges and opportunities in developed and developing nations (Manoharan & Nivedha, 2024; Kumar & Shankar, 2024; Orubebe, Oloniruha & Oladokun,2024). Embracing AI in libraries definitely depends upon a strategic approach for India's evolving library landscape. Libraries' future is certainly related to intelligent catalogs, digital repositories, and artificial intelligence. Integrating artificial intelligence-based technologies in academic libraries: should be exercised smartly (Malakar, Manavalan & MS, 2025; Sabol, 2025; Ngulube & Vincent, 2025). Revolutionizing Library Services involves the basic aspects, such as using AI for cataloguing and accessing Information. African and European studies provide insights (Ogungbenro, Esse, Olowoporoku & Christopher, 2025; Gmiterek & Kotuła, 2025). There are now technologies and discussions beyond ChatGPT, such as how DeepSeek R1 may transform academia and libraries (Bevara, Mannuru, Lund, Karedla & Mannuru, 2025).

OBJECTIVES AND SCOPE

The present study had the following objectives:

1. To explore the available literature on the AI applications in various areas of libraries and selected services being provided.
2. To find out the gap in available literature in the Web of Science core database and compare it with the available literature in the Google Scholar platform in the literature review.

The specific objectives related to data searches have been confined to the Web of Science core database and Google Scholar due to the following factors:

1. The Web of Science core collection database is a specific and more authoritative database compared to generalised platforms and sources.
2. Google Scholar is a comprehensive, abundant resource listing and a freely available platform.

METHODOLOGY

The data was searched during 29th and 30th January 2025, followed on 25th February 2025, and updated on 26th March 2025 from the Web of Science Core Collection database with the following keywords/phrases:

1. AI applications in library resource discovery
2. AI applications in library operations
3. AI applications in enhancing user experience in the library
4. AI applications in content management in libraries
5. AI applications in information literacy in libraries

The search queries and use of search results were limited to the years 2024 and 2025 (Google Scholars) for specific, latest, and most current applications of AI experiences and implementations in libraries.

DATA ANALYSIS AND FINDINGS

With the specific phrases, the Web of Science core database was browsed and explored, and data was gathered through various visualizations, Excel sheets, and graphical presentations. The results of the searches have been presented as follows:

AI applications in library resource discovery

Visualization-1: AI applications in library resource discovery

Title	Publication Year	Total Citations	Average per Year
Altered bile acid profile associates with cognitive impairment in Alzheimer's disease, an emerging role for gut microbiome	2019	422	60.29
Global maps of soil temperature	2022	173	43.25
Accelerating high-throughput virtual screening through molecular pool-based active learning	2021	160	32
The ReFRAME library is a comprehensive drug repurposing library, and its application to the treatment of cryptosporidiosis	2018	133	16.63
AUTOFOLIO: An Automatically Configured Algorithm Selector	2015	68	6.18
Identification of previously unrecognized antiestrogenic chemicals using a novel virtual screening approach	2006	33	1.65
Computational drug repurposing based on electronic health records: a scoping review	2022	27	6.75
Public-Private Partnerships: Compound and Data Sharing in Drug Discovery and Development	2021	16	3.2
AI-Powered Virtual Screening of Large Compound Libraries Leads to the Discovery of Novel Inhibitors of Sirtuin-1	2023	14	4.67
Sire: An interoperability engine for prototyping algorithms and exchanging information between molecular simulation programs	2024	6	3
End-to-end AI framework for interpretable prediction of molecular and crystal properties	2023	6	2
TinyNS: Platform-aware Neurosymbolic Auto Tiny Machine Learning	2024	5	2.5
The Unified Phenotype Ontology: a framework for cross-species integrative phenomics	2025	0	0
Chemical biology research in RIKEN NPDepo aimed at agricultural applications	2025	0	0
A Decade of Computational Mass Spectrometry from Reference Spectra to Deep Learning	2024	0	0

Table 1: Data of highly cited articles

Title	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Altered bile acid profile associates with cognitive impairment in	0	0	0	0	0	0	0	0	0	0	0	21	47	70	93	65	101	25
Global maps of soil temperature	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	61	67	13
Accelerating high-throughput virtual screening through molecular pool-	0	0	0	0	0	0	0	0	0	0	0	0	0	10	34	45	57	13
The ReFRAME library as a comprehensive drug repurposing	0	0	0	0	0	0	0	0	0	0	0	9	23	33	28	23	15	2
AUTOFOLIO: An Automatically Configured Algorithm Selector	0	0	0	0	0	0	0	0	6	4	7	6	8	11	13	5	7	1
Identification of previously unrecognized antiestrogenic chemicals	7	6	4	1	0	5	1	3	1	1	2	0	1	1	0	0	0	0
Computational drug repurposing based on electronic health records: a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	14	3
Public-Private Partnerships: Compound and Data Sharing in Drug	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	8	5	0
AI-Powered Virtual Screening of Large Compound Libraries Leads to the	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	9	3
Sire: An interoperability engine for prototyping algorithms and	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2
End-to-end AI framework for interpretable prediction of molecular	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1
TinyNS: Platform-aware Neurosymbolic Auto Tiny Machine	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	1
The Unified Phenotype Ontology : a framework for cross-species	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Chemical biology research in RIKEN NPDepo aimed at agricultural	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A Decade of Computational Mass Spectrometry from Reference Spectra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2: Data of highly cited articles

Publications	**Citing Articles**	**Times Cited**	**Average per item**
15 Total	1,061Analyze	1,062 Times Cited Total.	70.8 Average per item.
From 1989 to 2025	Without self-citations 1,061Analyze	1,062 Times Cited Without self-citations.	9 H-Index

Table 3: Citation analysis

According to data from tables, 1, 2, and 3, it is observed that there are few studies found on the topic of AI applications in library resource discovery and citation analysis of the same. The maximum number of citations is 422, and the average citation rate is 60.29% among the 15 articles. Regarding AI applications in library resource discovery, 15 publications were found from 1989 to 2025. Citing Articles were 1061, and 1061 articles were without self-citations, 70.8 average citations per item and 9 H-Index

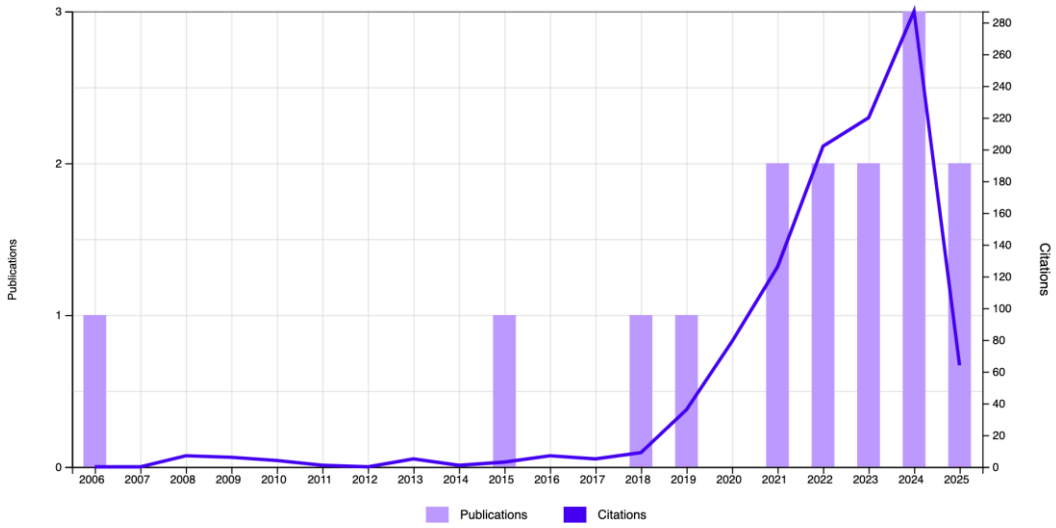


Fig.1: Citation analysis

AI applications in library operations

Visualization-2: *AI applications in library operations*

Title	Source Title	Publication Year	Total Citations	Average per Year
ROBOT: A Tool for Automating Ontology Workflows	BMC BIOINFORMATICS	2019	87	12.43
GPGPU Linear Complexity t-SNE Optimization	IEEE TRANSACTIONS ON VISUALIZATION AND COMPUTER GRAPHICS	2020	44	7.33
Defining artificial intelligence for librarians	JOURNAL OF LIBRARIANSHIP AND INFORMATION SCIENCE	2024	38	9.5

Methodology for Developing an Educational and Research Video Library in Minimally Invasive Surgery	JOURNAL OF SURGICAL EDUCATION	2019	29	4.14
Mission control of the MARIUS autonomous underwater vehicle: system design, implementation, and sea trials	INTERNATIONAL JOURNAL OF SYSTEMS SCIENCE	1998	28	1
An artificial intelligence-driven agent for real-time head-and-neck IMRT plan generation using a conditional generative adversarial network (cGAN)	MEDICAL PHYSICS	2021	27	5.4
FeatherCNN: Fast Inference Computation with TensorGEMM on ARM Architectures	IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS	2020	25	4.17
Learning Models over Relational Data Using Sparse Tensors and Functional Dependencies	ACM TRANSACTIONS ON DATABASE SYSTEMS	2020	19	3.17
Investigation on human rights ethics in artificial intelligence research with a library literature analysis method	ELECTRONIC LIBRARY	2019	19	2.71
Developments and Performance of Artificial Intelligence Models Designed for Application in Endodontics: A Systematic Review	DIAGNOSTICS	2023	17	5.67
ChemistGA: A Chemical Synthesizable Accessible Molecular Generation Algorithm for Real-World Drug Discovery	JOURNAL OF MEDICINAL CHEMISTRY	2022	15	3.75
Agricultural waste rice husk/poly(vinylidene fluoride) composite: a wearable triboelectric energy harvester for real-time innovative IoT applications	ADVANCED COMPOSITES AND HYBRID MATERIALS	2024	12	6
Run Your 3D Object Detector on NVIDIA Jetson Platforms: A Benchmark Analysis.	SENSORS	2023	12	4
Enhancing resilience in agricultural production systems with AI-based technologies	ENVIRONMENT DEVELOPMENT AND SUSTAINABILITY	2024	10	3.33
PySmash: Python package and individual executable program for representative substructure generation and application	BRIEFINGS IN BIOINFORMATICS	2021	10	2
Panoramic Image and Three-Axis Laser Scanner Integrated Approach for Indoor 3D Mapping	REMOTE SENSING	2018	8	1
EQUIPMENT MANAGEMENT THROUGH OPERATIONAL FAILURE COSTS	JOURNAL OF CONSTRUCTION ENGINEERING AND MANAGEMENT-ASCE	1994	8	0.25
Application progress of artificial intelligence and augmented reality in orthopaedic arthroscopy surgery	JOURNAL OF ORTHOPAEDIC SURGERY AND RESEARCH	2023	7	2.33

Industrial Metaverse: A Comprehensive Review, Environmental Impact, and Challenges	APPLIED SCIENCES-BASEL	2024	5	2.5
When Large Language Models Meet Optical Networks: Paving the Way for Automation	ELECTRONICS	2024	4	2
Sparse Stream Semantic Registers: A Lightweight ISA Extension Accelerating General Sparse Linear Algebra	IEEE TRANSACTIONS ON PARALLEL AND DISTRIBUTED SYSTEMS	2023	4	1.33
FinFET 6T-SRAM All-Digital Compute-in-Memory for Artificial Intelligence Applications: An Overview and Analysis	MICROMACHINES	2023	4	1.33
Real-time data processing for ultrafast X-ray computed tomography using modular CUDA-based pipelines	COMPUTER PHYSICS COMMUNICATIONS	2023	4	1.33
Fast Emulation of Fermionic Circuits with Matrix Product States	JOURNAL OF CHEMICAL THEORY AND COMPUTATION	2024	3	1.5
RETRACTED: Artificial Intelligence-Based Recommendation and Application of Public Services in Smart Cities (Retracted Article)	COMPUTATIONAL INTELLIGENCE AND NEUROSCIENCE	2022	3	0.75
Identifying the AI-based solutions proposed for restricting Money Laundering in Financial Sectors: Systematic Mapping.	APPLIED ARTIFICIAL INTELLIGENCE	2024	2	1
The use of artificial intelligence in university libraries in Türkiye: Practices, and perspectives of library directors	INFORMATION DEVELOPMENT	2024	2	1
Exploring Bitslicing Architectures for Enabling FHE-Assisted Machine Learning	IEEE TRANSACTIONS ON COMPUTER-AIDED DESIGN OF INTEGRATED CIRCUITS AND SYSTEMS	2022	2	0.5
Accelerating Tensor Contraction Products via Tensor-Train Decomposition [Tips & Tricks]	IEEE SIGNAL PROCESSING MAGAZINE	2022	2	0.5
Acoustic Droplet Ejection Applications for High-Throughput Screening of Infectious Agents	JALA	2016	2	0.2
From hype to strategy: navigating the reality of experimental strategic adoption of AI technologies in libraries	REFERENCE SERVICES REVIEW	2025	1	0.5
A discrete element solution method embedded within a Neural Network	POWDER TECHNOLOGY	2024	1	0.5
Artificial Intelligence Tools in Pediatric Urology: A Comprehensive Review of Recent Advances	DIAGNOSTICS	2024	1	0.5
Establishment of a differential diagnosis method and an online prediction platform for AOSD and sepsis based on the gradient boosting decision trees algorithm	ARTHRITIS RESEARCH & THERAPY	2023	1	0.33

Beyond Binary Decisions: Evaluating the Effects of AI Error Type on Trust and Performance in AI-Assisted Tasks	HUMAN FACTORS	2025	0	0
DeSAO: A new approach for De Novo Drug using Simulated Annealing Optimization	EXPERT SYSTEMS WITH APPLICATIONS	2025	0	0
Inconsistency-driven approach for human-in-the-loop entity matching	INFORMATION RESEARCH-AN INTERNATIONAL ELECTRONIC JOURNAL	2025	0	0
A review of artificial intelligence applications in libraries in Southeast Asia: where are we now?	REFERENCE SERVICES REVIEW	2025	0	0
Efficient Coarse-Grained Reconfigurable Array architecture for machine learning applications in space using DARE65T library platform	MICROPROCESSORS AND MICROSYSTEMS	2025	0	0
Hey librarian, what can AI and analytics do for you: a systematic literature review and sociotechnical perspective	ASLIB JOURNAL OF INFORMATION MANAGEMENT	2025	0	0
The AutoSPADA platform: User-friendly edge computing for distributed learning and data analytics in connected vehicles	INTERNET OF THINGS	2025	0	0
Adoption of Artificial Intelligence in Public and Private Libraries of China: Determinants, Challenges, and Perceived Benefits	PROFESIONAL DE LA INFORMACION	2024	0	0
Efficient Real-Time Smart Keyword Spotting Using Spectrogram-Based Hybrid CNN-LSTM for Edge System	IEEE ACCESS	2024	0	0
A hardware-independent time estimation method for inference process of convolutional layers on GPU	PERFORMANCE EVALUATION	2023	0	0
VTensor: Using Virtual Tensors to Build a Layout-Oblivious AI Programming Framework	JOURNAL OF COMPUTER SCIENCE AND TECHNOLOGY	2023	0	0
Architecture and modular design of power emergency command system based on association rule algorithm	RAIRO-OPERATIONS RESEARCH	2023	0	0
Performance Analysis of RCU-Style Non-Blocking Synchronization Mechanisms on a Manycore-Based Operating System	APPLIED SCIENCES-BASEL	2022	0	0
General-purpose GPU hashing data structures and their application in accelerated genomics	JOURNAL OF PARALLEL AND DISTRIBUTED COMPUTING	2022	0	0
Establishment and application of the National Parasitic Resource Center (NPRC) in China	NATIONAL INSTITUTE OF PARASITIC DISEASES, CHINA: 70 YEARS AND BEYOND	2020	0	0

Table 4: Data analysis of highly cited articles

Title	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
ROBOT: A Tool for Automating Ontology Workflows	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	5	12	12	22	26	8
GPGPU Linear Complexity t-SNE Optimization	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	13	16	4	7	0
Defining artificial intelligence for librarians	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	25	12
Methodology for Developing an Educational and Research Video	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	10	4	3	5	1
Mission control of the MARIUS autonomous underwater	1	1	3	2	1	0	1	2	5	2	0	1	0	1	3	1	0	0	1	0	1	0	2	0	0	0	0	0
An artificial intelligence-driven agent for real-time head-and-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	7	7	10	0
FeatherCNN: Fast Inference Computation with TensorGEMM	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	5	7	6	0
Learning Models over Relational Data Using Sparse Tensors and	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	6	7	1	2
Investigation on human rights ethics in artificial intelligence	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	4	8	1	3	2
Developments and Performance of Artificial Intelligence Models	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	12	2
ChemistGA: A Chemical Synthesizable Accessible	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	7	4
Agricultural waste rice husk/poly(vinylidene fluoride)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	7
Run Your 3D Object Detector on NVIDIA Jetson Platforms:A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	8	3
Enhancing resilience in agricultural production systems	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	4
PySmash: Python package and individual executable program	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	7	0
Panoramic Image and Three-Axis Laser Scanner Integrated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	1	3	0	0
EQUIPMENT MANAGEMENT THROUGH OPERATIONAL	0	0	0	0	0	0	0	0	0	1	0	2	0	0	0	0	0	0	1	0	0	0	0	0	1	2	1	0
Application progress of artificial intelligence and augmented	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3
Industrial Metaverse: A Comprehensive Review,	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2
When Large Language Models Meet Optical Networks: Paving	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Sparse Stream Semantic Registers: A Lightweight ISA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
FinFET 6T-SRAM All-Digital Compute-in-Memory for	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Real-time data processing for ultrafast X-ray computed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1
Fast Emulation of Fermionic Circuits with Matrix Product	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
RETRACTED: Artificial Intelligence-Based	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Identifying the AI-based solutions proposed for	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
The use of artificial intelligence in university libraries in Türkiye:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Exploring Bitslicing Architectures for Enabling FHE-Assisted	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Accelerating Tensor Contraction Products via Tensor-Train	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0
Acoustic Droplet Ejection Applications for High-	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
From hype to strategy: navigating the reality of	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
A discrete element solution method embedded within a	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Artificial Intelligence Tools in Pediatric Urology: A	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Establishment of a differential diagnosis method and an online	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Beyond Binary Decisions: Evaluating the Effects of AI Error	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DeSAO: A new approach for De Novo Drug using Simulated	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inconsistency-driven approach for human-in-the-loop entity	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A review of artificial intelligence applications in libraries in	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Efficient Coarse-Grained Reconfigurable Array	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hey librarian, what can AI and analytics do for you: a systematic	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
The AutoSPADA platform: User-friendly edge computing for	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Adoption of Artificial Intelligence in Public and Private Libraries of	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Efficient Real-Time Smart Keyword Spotting Using	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
A hardware-independent time estimation method for inference	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VTensor: Using Virtual Tensors to Build a Layout-Oblivious AI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Architecture and modular design of power emergency command	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Performance Analysis of RCU-Style Non-Blocking	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
General-purpose GPU hashing data structures and their	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Establishment and application of the National Parasitic Resource	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 5: Data analysis of highly cited articles

Publications	Citing Articles	Times Cited	Average per item
49 Total	453 Analyze	456 Times Cited Total.	9.31 Average per item.
From 1989 to 2025	Without self-citations 450 Analyze	453 Times Cited Without self-citations.	12 H-Index

Table 6: Citation analysis

According to data from tables, 4,5, and 6, it is observed that there are few studies found on the topic of AI applications in library operations and citation analysis of the same. The maximum number of citations is 87, and the average citation rate is 12.43% among the 49 articles. Regarding AI applications in library operations total 49 publications were found from 1989 to 2025. Citing Articles were 453, and 450 articles were without self-citations, 9.31 average citations per item and 12 H-Index

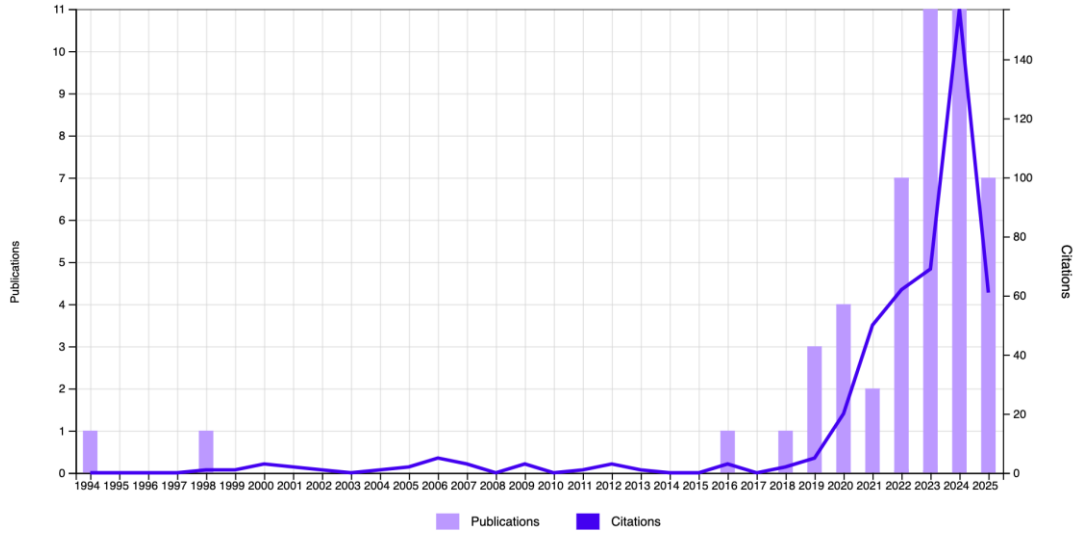


Fig. 2 Citation Analysis

AI applications in enhancing user experience in library

Visualization-3: AI applications in enhancing user experience in library

Title	Publication Year	Total Citations	Average per Year
The Use of Artificial Intelligence-Based Conversational Agents (Chatbots) for Weight Loss: Scoping Review and Practical Recommendations	2022	49	12.25
Culture in the design of mHealth UI An effort to increase acceptance among culturally specific groups	2020	32	5.33
Natural Language Processing-Enabled and Conventional Data Capture Methods for Input to Electronic Health Records: A Comparative Usability Study	2016	32	3.2
ChatGPT in medical libraries, possibilities and future directions: An integrative review	2024	10	5
The role of knowledge graphs in chatbots	2024	1	0.5
Conversational agents in physical and psychological symptom management: A systematic review of randomized controlled trials	2025	0	0
KnowVID-19: A Knowledge-Based System to Extract Targeted COVID-19 Information from Online Medical Repositories	2024	0	0
Towards Embedding Dynamic Personas in Interactive Robots: Masquerading Animated Social Kinematic (MASK)	2024	0	0
PyGeoweaver: Tangible workflow tool for enhancing scientific research productivity and FAIRness	2024	0	0

Table 7: Data analysis of highly cited papers

Title	2017	2018	2019	2020	2021	2022	2023	2024	2025
The Use of Artificial Intelligence-Based Conversational Agents (Chatbots) for Weight Loss: Scoping Review and Practical Recommendations	0	0	0	0	0	3	20	22	4
Culture in the design of mHealth UI An effort to increase acceptance among culturally specific groups	0	0	0	2	6	9	6	7	2
Natural Language Processing-Enabled and Conventional Data Capture Methods for Input to Electronic Health Records: A Comparative Usability Study	1	6	1	3	5	7	5	4	0
ChatGPT in medical libraries, possibilities and future directions: An integrative review	0	0	0	0	0	0	0	8	2
The role of knowledge graphs in chatbots	0	0	0	0	0	0	0	0	1

Conversational agents in physical and psychological symptom management: A systematic review of randomized controlled trials	0	0	0	0	0	0	0	0	0
KnowVID-19: A Knowledge-Based System to Extract Targeted COVID-19 Information from Online Medical Repositories	0	0	0	0	0	0	0	0	0
Towards Embedding Dynamic Personas in Interactive Robots: Masquerading Animated Social Kinematic (MASK)	0	0	0	0	0	0	0	0	0
PyGeoweaver: Tangible workflow tool for enhancing scientific research productivity and FAIRness	0	0	0	0	0	0	0	0	0

Table 8: Data analysis of highly cited articles

Publications	**Citing Articles**	**Times Cited**	**Average per item**
9 Total	124Analyze	124 Times Cited Total.	13.78 Average per item.
From 1989 to 2025	Without self-citations 124Analyze	124 Times Cited Without self-citations.	4 H-Index

Table 9: Citation analysis

According to data from tables, 7, 8, and 9, it is observed that there are few studies found on the topic of AI applications in enhancing user experience in library and citation analysis of the same. The maximum number of citations is 49, and the average citation rate is 12.25% among the 9 articles. Regarding AI applications in enhancing user experience in library total 9 publications were found from 1989 to 2025. Citing Articles were 124, and 124 articles were without self-citations with 13.78 average citations per item and 4 H-Index

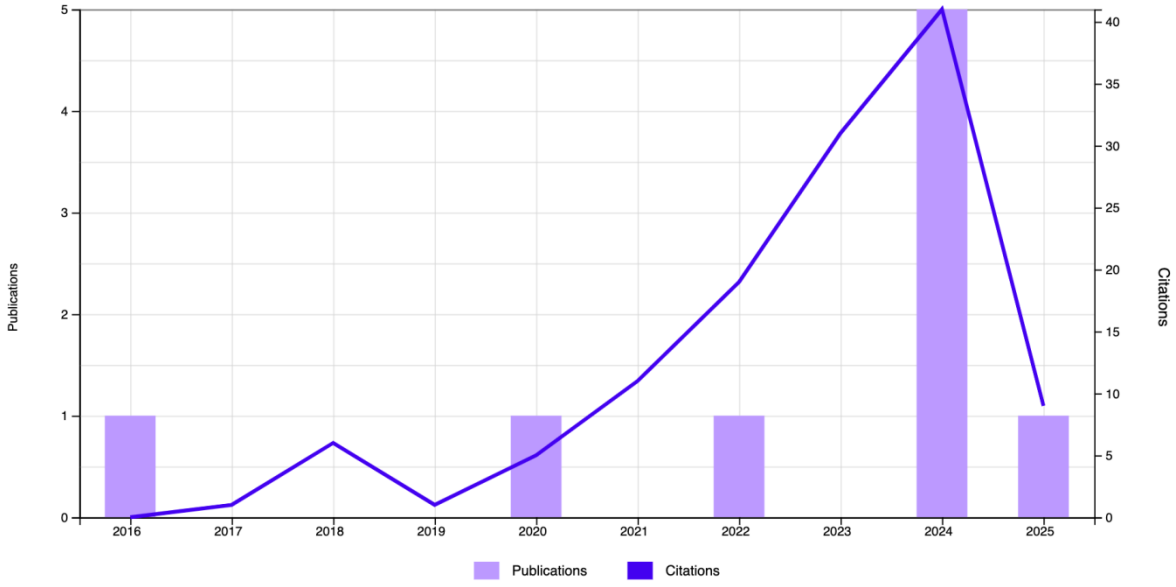
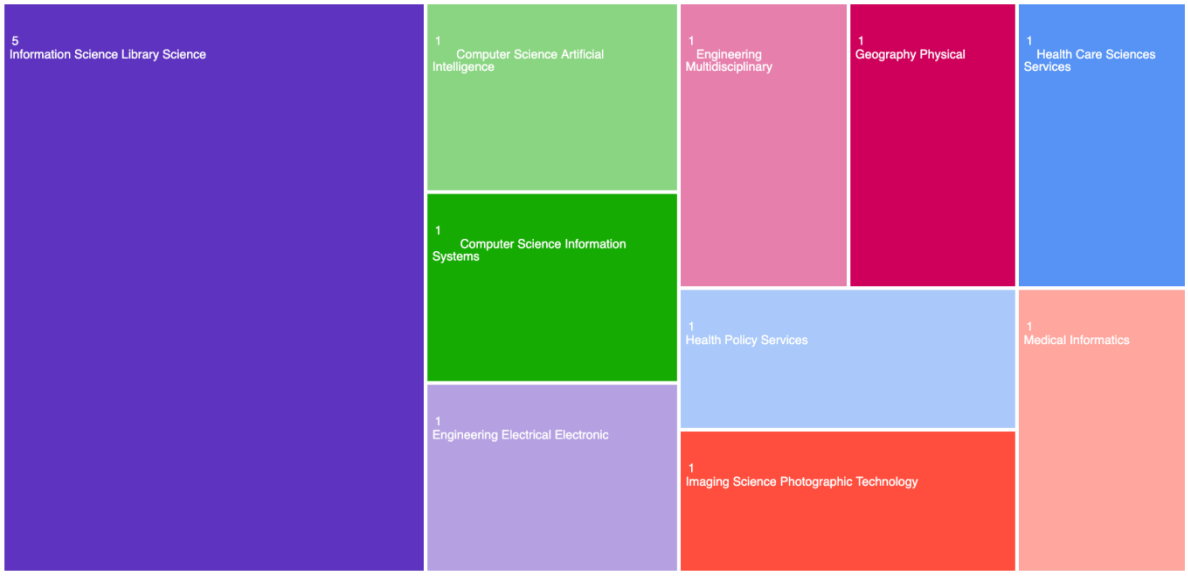


Fig. 3 Citation Analysis

AI applications in content management in libraries



Visualization-4: AI applications in content management in libraries

Title	**Publication Year**	**Total Citations**	**Average per Year**
Artificial intelligence (AI) library services innovative conceptual framework for the digital transformation of university education	2022	83	20.75
Intelligent libraries: a review on expert systems, artificial intelligence, and robot	2021	62	10.33
The Use of Artificial Intelligence-Based Conversational Agents (Chatbots) for Weight Loss: Scoping Review and Practical Recommendations	2022	49	12.25
Artificial intelligence for BIM content management and delivery: Case study of association rule mining for construction detailing	2021	21	4.2
Artificial Intelligence (AI) applications and usage among the LIS professionals of Pakistan	2024	4	2
Machine Learning-Enabled NIR Spectroscopy. Part 3: Hyperparameter by Design (HyD) Based ANN-MLP Optimization, Model Generalizability, and Model Transferability	2023	4	1.33
The use of artificial intelligence in university libraries in Türkiye: Practices, and perspectives of library directors	2024	2	1
Integrated Service Composition Approach Based on Transparent Access to Heterogeneous IoT Networks Using Multiple Service Providers	2021	2	0.4
Super-Resolution AI-Based Approach for Extracting Agricultural	2025	1	1

Cadastral Maps: Form and Content Validation			
Identifying and assessing the risks of artificial intelligence applications in smart libraries: Perspective of technostress	2025	0	0
Development of an Evidence-Based Cognitive Training Application for Elderly Individuals with Cognitive Dysfunction	2025	0	0

Table 10: Data analysis of highly cited articles

Title	**2021**	**2022**	**2023**	**2024**	**2025**
Artificial intelligence (AI) library services innovative conceptual framework for the digital transformation of university education	0	5	17	43	18
Intelligent libraries: a review on expert systems, artificial intelligence, and robot	3	12	14	21	12
The Use of Artificial Intelligence-Based Conversational Agents (Chatbots) for Weight Loss: Scoping Review and Practical Recommendations	0	3	20	22	4
Artificial intelligence for BIM content management and delivery: Case study of association rule mining for construction detailing	0	9	3	8	1
Artificial Intelligence (AI) applications and usage among the LIS professionals of Pakistan	0	0	0	3	1
Machine Learning-Enabled NIR Spectroscopy. Part 3: Hyperparameter by Design (HyD) Based ANN-MLP Optimization, Model Generalizability, and Model Transferability	0	0	0	3	1
The use of artificial intelligence in university libraries in Türkiye: Practices, and perspectives of library directors	0	0	0	1	1
Integrated Service Composition Approach Based on Transparent Access to Heterogeneous IoT Networks Using Multiple Service Providers	0	0	1	1	0
Super-Resolution AI-Based Approach for Extracting Agricultural Cadastral Maps: Form and Content Validation	0	0	0	0	1
Identifying and assessing the risks of artificial intelligence applications in smart libraries: Perspective of technostress	0	0	0	0	0
Development of an Evidence-Based Cognitive Training Application for Elderly Individuals with Cognitive Dysfunction	0	0	0	0	0

Table 11: Data analysis of highly cited articles

Publications	Citing Articles	Times Cited	Average per item
11Total	210Analyze	228 Times Cited Total.	20.73 Average per item.
From 1989 to 2025	Without self-citations 208Analyze	226 Times Cited Without self-citations.	4 H-Index

Table 12: Citation analysis

According to data from tables, 10,11, and 12, it is observed that there are few studies found on the topic of AI applications in content management in libraries and citation analysis of the same. The maximum number of citations is 83, and the average citation rate is 20.75% among the 11 articles. Regarding AI applications in content management in libraries total 11 publications were found from 1989 to 2025. Citing Articles were 210, and 208 articles were without self-citations, 20.73 average citations per item and 4 H-Index

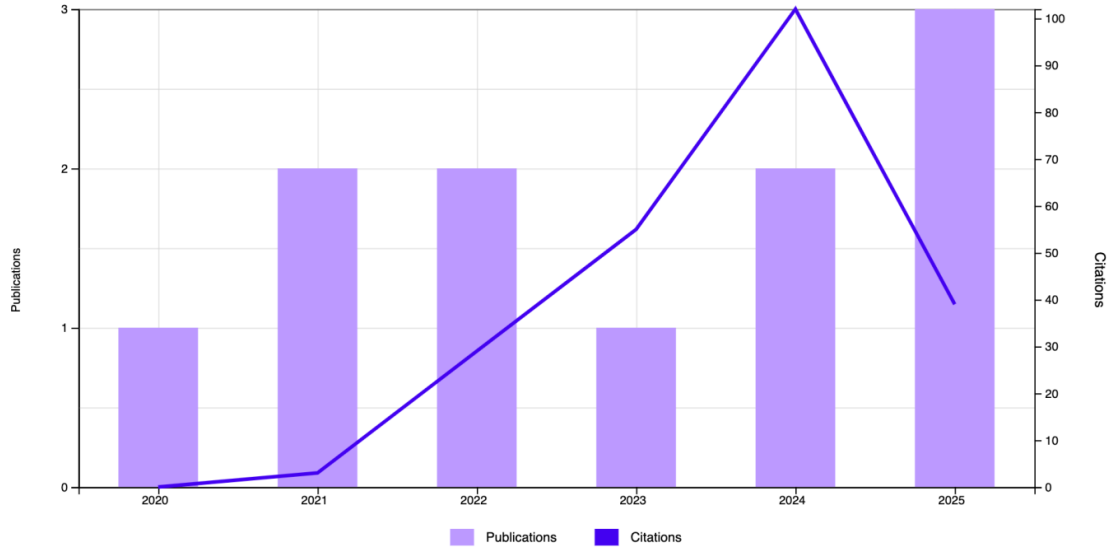
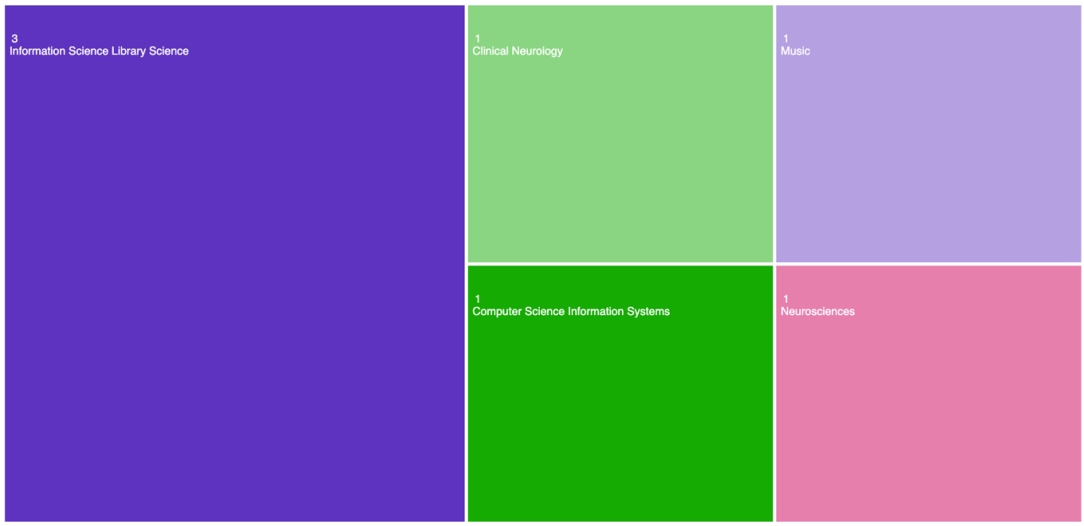


Fig. 4 Citation analysis

AI applications in information literacy in libraries



Visualization-5: AI applications in information literacy in libraries

Title	Publication Year	Total Citations	Average per Year
Defining artificial intelligence for librarians	2024	38	9.5
Is adopting artificial intelligence in libraries an urgency or a buzzword? A systematic literature review	2025	19	6.33
From traditional to emerging technologies in supporting smart libraries. A bibliometric and thematic approach from 2013 to 2022	2023	14	4.67
Towards A Critical Music Information Literacy Praxis	2022	6	1.5
Transforming Alzheimer's Digital Caregiving through Large Language Models	2024	0	0

Table 13: Data analysis of highly cited articles

Title	2023	2024	2025
Defining artificial intelligence for librarians	1	25	12
Is adopting artificial intelligence in libraries urgency or a buzzword? A systematic literature review	3	8	8
From traditional to emerging technologies in supporting smart libraries. A bibliometric and thematic approach from 2013 to 2022	0	9	5
Towards A Critical Music Information Literacy Praxis	3	3	0
Transforming Alzheimer's Digital Caregiving through Large Language Models	0	0	0

Table 14: Data analysis of highly cited articles

Publications	Citing Articles	Times Cited	Average per item
5Total	73Analyze	77 Times Cited Total.	15.4 Average per item.
From 1989 to 2025	Without self-citations 73Analyze	77 Times Cited Without self-citations.	4 H-Index

Table: 15 Citation Analysis

According to data from tables, 13, 14, and 15, it is observed that there are few studies found on the topic of AI applications in information literacy in libraries and citation analysis of the same. The maximum number of citations is 38, and the average citation rate is 9.5% among the 5 articles. Regarding AI applications in information literacy in

libraries total 5 publications were found from 1989 to 2025. Citing Articles were 73, and 73 articles were without self-citations, 15.4 average citations per item and 4 H-Index

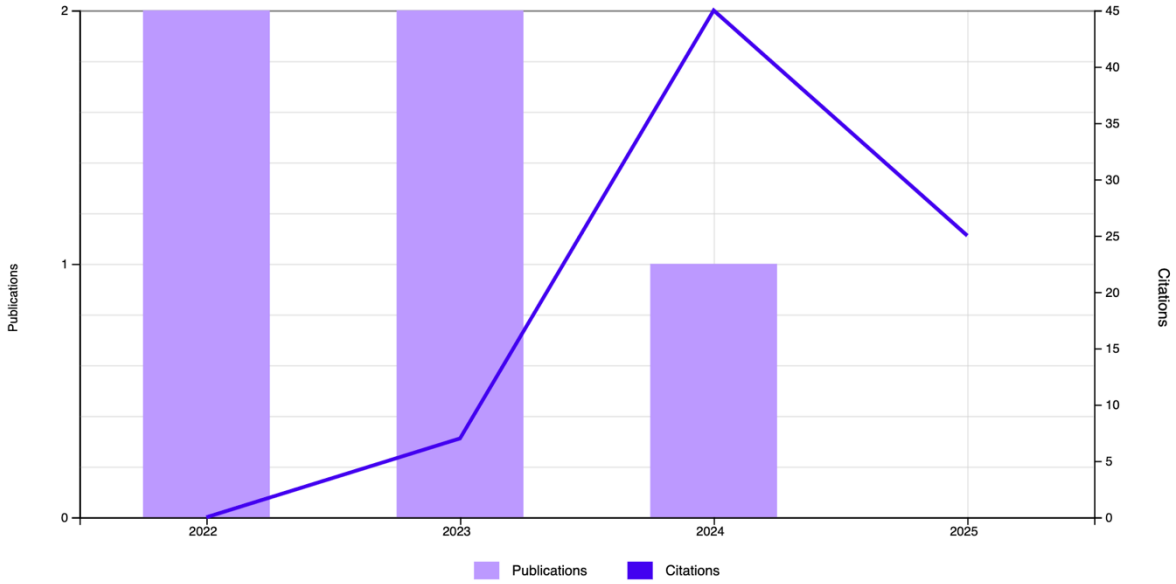


Fig. 5 Citation analysis

FINDINGS AND DISCUSSION

1. Anticipating AI's impact on library services may be concerned with future opportunities and evolutionary prospects.
2. Optimizing the use of artificial intelligence (AI) in library services in the 21st century has been a vast area of learning, experiments, and achievements.
3. The role of artificial intelligence tools is being observed in enhancing accessibility and usability of electronic resources in academic libraries.
4. The era of generative AI is transforming academic libraries, education, and research by implementing artificial intelligence in library services.
5. Use of AI tools in library operations and services is creating a path for increased access, operational Efficiency, thus enhancing the overall user experience.
6. Role of Libraries are significant in promoting digital literacy and information fluency. AI-driven transformations are advancing information literacy.

Adapting intelligent information services in libraries involves smart AI chatbots. Promotion of Intelligent resource management in the Indian context requires information technology infrastructure and connectivity at a significant level. The future role of smart libraries in the 21st century is far-reaching across all components of society and learning areas.

CONCLUSION

Artificial intelligence in academic libraries has an impact on library services and operations, especially the library management, where various processes and prospects are being explored. Certainly, there are challenges of artificial intelligence in library management systems, whereas perspectives of librarians on awareness and readiness of academic libraries to integrate artificial intelligence for library operations and services are very insightful. A futuristic perspective involves the utilization of AI in the field of library management. Such approaches require a comprehensive framework for defining and implementing artificial intelligence for librarianship.

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