Rethinking Ranganathan's Five Laws of Library Science in the Artificial Intelligence Era

Parbat Chhetri
MLIS Student
DLIS, University of North Bengal, Darjeeling, West Bengal, India
Email: pravatchhetri1@gmail.com

Abstract

Purpose: The purpose of this paper is to explore the significance of Ranganathan's Five Laws of Library Science in the era of AI and provide insights into how artificial intelligence (AI) has transformed library and information services.

Design/methodology/approach: This paper was carried out through a documentary analysis of existing documents available on the internet.

Findings: It is found that the rapid growth of information in the current digital age has made it increasingly difficult for LIS professionals to manage and organise information effectively. With the introduction of AI technologies, the way we manage and organise information is changing rapidly.

Research Limitations: The scope of this paper is to examine how the five laws of LIS guiding principles would need to change to reflect the role that AI plays in libraries and information management, as well as how AI can be utilised to offer users tailored recommendations based on their reading preferences and interests. In exploring these and other concerns, the scope of the paper would be to offer suggestions for how libraries might effectively adjust to the role of AI in the modern period while still respecting the fundamental principles of the Five Laws of LIS.

Practical Implications: The practical implications of this paper are to provide guidance for the implementation of AI technologies in libraries and other information sectors. By reinterpreting the Five Laws of Library Science in the context of AI, libraries can make sure that their AI systems are created to satisfy the demands of a variety of users, are inclusive, simple to use, and save time.

Originality/value: The paper explores the relevance of Ranganathan's laws in the current context of AI and provides practical implications for their application in libraries and the information sector. This paper also highlights the relevance of adapting to new technologies in libraries.

Keywords: artificial intelligence in library science; AI and libraries; information and communication technologies (ICT); machine learning; academic libraries.

1. Introduction: Artificial Intelligence (AI), machine learning, and other technologies have significantly changed how we think about making decisions, interacting with others, and solving problems during the last few decades. Several major players have incorporated various aspects of artificial intelligence (AI) to enhance their services, including Tesla, Google, Amazon, Netflix, and IBM, among others. AI has emerged as a game-changer across a range of industries, including education, healthcare business, agriculture, government, and non-government organisations worldwide, as it streamlines and optimises workload, increases productivity, reduces human interaction, and most importantly, gives them the ability to lead the digital world with intelligence and sophistication.

To satisfy the growing demand for processing huge volumes of data, sometimes known as big data, libraries and information centres are adopting a variety of fascinating technologies. These sectors are at the cutting edge of technology because of the demand for real-time data processing and result generation, as well as the variety of needs of library users. The rapid increases in computer processing speed and capacity, as well as the adoption

of networked settings for data processing, provide an ideal opportunity for real-time data mining and delivering customised information outputs (Johnson et al., 2015). For instance, the use of AI can promote improved communication across intelligent technologies to increase the efficacy of various libraries, ultimately changing conventional library services into intelligent library systems. For the development of really intelligent libraries that offer configurable and ubiquitous information services, irrespective of time, place, or location, AI systems that automatically acquire new knowledge are crucial.

2. Related Literature: Librarians are equipped with a variety of skills that allow them to organise information and make it accessible from anywhere. Libraries can adopt cutting-edge tools that meet the changing information needs of the present age by making use of these skills. These tools are superior to Google search, which was originally created for academic purposes (Jacknis, 2017). Libraries are focusing more and more of their efforts on enhancing information access through the incorporation of AI technologies. According to Liu (2017), in her papers, she claims to have offered a thorough overview of the literature on the application of intelligent agent technology in the library environment. In order to give patrons the greatest service possible, the researcher stated that librarians and AI should complement one another.

a) Artificial Intelligence: AI is the theory and development of computer systems able to perform tasks that normally require human intelligence, such as visual perception, decision making, speech recognition, translation languages, and emotional feelings (Singh, n.d.). Accordingly, Liu (2017) viewed artificial intelligence (AI) as the practise of simulating human intelligence and decision-making processes in machines using cutting-edge computing technology. Based on capabilities, AI can be divided into three types (Singh, n.d.): artificial narrow intelligence (ANI), artificial general intelligence (AGI), and artificial superintelligence (AGI). Artificial Narrow Intelligence comprises basic or role-based tasks such as those performed by chatbots and personal assistants like Alexa by Amazon and Siri by Apple. Artificial general intelligence involves continual learning by machines such as Autopilot by Tesla, and self-driving cars by Uber. Artificial superintelligence consists of intelligent machines way smarter than humans, such as robots, missiles, and satellites.

b) Five Laws of Library Science and Their Different Interpretations: There has been growing curiosity about how Ranganathan's Five Laws of Library Science can be used in the age of artificial intelligence (AI) as libraries continue to change and adapt to the digital era. Ranganathan's Five Laws need to be rearranged in light of users evolving behaviours and priorities. New rules are required in order to properly represent the requirements and expectations of contemporary users (Connaway, 2005). The needs of users and advancements in technology drive ongoing evolution and change in libraries, which are not static things. In order to stay current and effective in serving their communities, libraries should embrace change and innovation and be adaptable (Stilwell et al., 2010). In the age of the information society and virtual libraries, it is essential to put the needs and expectations of users first, as well as to educate and advise users on information literacy, save users time and effort, make it easier for readers to connect with books, and be flexible in order to stay relevant and effective (Satija, 2003). There is an increasing need for people to have the skills necessary to navigate and critically assess the media and information that are available in the digital age. The study by Norouzi (2004) explores how Ranganathan's five laws of library science might be applied to the creation and administration of websites. He contends that the five laws, which were initially created for actual libraries, may be utilised in the web's digital environment.

c) Application of Artificial Intelligence in Libraries: The application of AI in libraries is crucial as it makes it easier to organise and access huge amounts of information (American Library Association, 2019). According to Sridevi and Shanmugam (2017), artificial intelligence plays a significant role in administering digital libraries as it provides cutting-edge technology to handle large information collections. AI has the potential to develop computer systems or machines that can mimic and even outperform human intelligence, which has important implications for the profession of librarianship. Rather than being just a software programme or intelligent system, AI is a field of technology inspired by biology that seeks to emulate human ways of perceiving and processing information. Libraries are increasingly using artificial intelligence-based intelligent automation systems to provide staff and patrons with knowledge-based services. It is important to make a distinction between typical library automation and the idea of artificial intelligence in libraries. While normal library chores are often automated using technology, artificial intelligence goes a step further and develops intelligent systems that can act and make decisions on their own, mimicking human librarians and requiring little to no human involvement. AI systems have the capacity to replicate humans and may eventually take their place in library-related duties. Although this invention will never completely replace librarians; Li, Huang, Kurniawan, and Ho (2015) predicted that it will focus on time-consuming and tedious library tasks like shelf reading and free up librarians to interact with patrons.

3. Understanding Artificial Intelligence: Artificial intelligence (AI) is the field of study that focuses on the creation of computer systems that are capable of learning, reasoning, problem-solving, perception, and natural language processing—all functions that are traditionally only performed by intelligent people. In order to analyse and handle massive volumes of data, AI systems use statistical models and algorithms. Based on user feedback, these systems can adjust and enhance their performance over time. According to prominent scholars and textbooks in the field, AI involves the creation and advancement of a "fully conscious, intelligent, computer-based entity" that surpasses humans in its capacity to comprehend the world and carry out difficult activities (Raynor, 1999). John McCarthy, who coined the term in 1955, defines AI as "the science and engineering of making intelligent machines" (McCarthy, 2007). The Oxford Dictionary defines artificial intelligence (AI) as "the theory and development of computer systems able to perform tasks normally requiring human intelligence, such as visual perception, speech recognition, decision-making, and translation between languages" (Oxford University Press, n.d.). AI tries to accomplish a number of goals, including object manipulation, generalisation, logical reasoning, knowledge discovery, and natural language processing. AI has recently attracted a lot of interest in a variety of fields, including computer science, information science, mathematics, linguistics, psychology, and other specialised domains. The most significant use of AI in the discipline of library and information science (LIS) has been the development of expert systems. Expert systems have been shown to be helpful not just in performing routine library activities but also in boosting productivity and assisting library professionals' decision-making processes (Guliciuc et al., 2017).

4. Five Laws of Library Science: Dr. S.R. Ranganathan is widely recognised for his significant contributions to the field of library and information science, one of which is the development of the Five Laws. These laws were initially presented by S.R. Ranganathan during the Provisional Educational Conference held in Chidambaram, Tamil Nadu, in December 1928. The formal exposition of the Five Laws was later provided by S.R. Ranganathan himself, and they have since become an important guiding principle in the organisation and management of libraries. These laws are considered to be the fundamental principles that guide librarianship and library service. They are as follows:

i) Books are for use: The first law, "Books are for use," highlights how crucial it is to make library materials available to and usable by their intended users. This means that librarians should strive to make their collections as user-friendly as possible and to offer resources and services that satisfy the demands of their clients.

ii) Every reader his or her book: The second law, "Every reader has his or her book," highlights the value of customised assistance. In order to provide resources and services that are specifically catered to each user's needs, librarians should work hard to understand their wants and interests.

iii) Every book its reader: The third law, "Every book has its reader," highlights how crucial it is to pair users with the appropriate resources. In order to ensure that users can quickly and easily discover the materials they need, librarians should work to create a diverse and comprehensive collection of resources.

iv) Save the time of the reader: The fourth law, "Save the time of the reader," emphasises the importance of efficiency. Librarians should work to make their collections and services as effective and efficient as possible by providing users with tools and resources that save them time.

v) The library is a growing organism: The fifth law, "The library is a growing organism," emphasises the importance of continuous improvement. Librarians should strive to continuously improve their collections and services and adapt to the changing needs and interests of their users.

These laws serve as fundamental principles for librarianship, emphasising the importance of providing access to information and resources for all users, as well as the need to constantly evolve and improve library services.

5. Re-interpreting Five Laws of Library Science in the Context of AI: The current era of artificial intelligence (AI) is significantly different from the time when Dr. S.R. Ranganathan formulated his laws, which were based on a world of limited material. The values connected to readers and books have grown more nuanced and varied as a result of the enormous range and number of information sources and contributors in the modern period. The Five Laws of Library Science are still applicable despite this change, but they need to be reinterpreted in the context of AI (Table 1) to solve the difficulties brought by the abundance of information available. In light of the Five Laws of Library Science, their application to artificial intelligence (AI) emphasises the necessity for adaptation to the evolving information environment as well as the difficulties brought on by the wealth and diversity of resources.

	Ranganathan's Original Conception	**New Conceptions in the AI Era**
First Law	Books are for use.	AI is for use.
Second Law	Every readers his or her book.	Every citizen his/her AI.
Third Law	Every book its reader.	Every AI is for citizen usage.
Fourth Law	Save the time of the reader.	AI saves the time of user.
Fifth Law	A library is a growing organism.	AI Systems are constantly evolving.

Table 1: Ranganathan's Five Laws: Original Vs. New Conceptions

i) First Law: AI is for Use: The first law of artificial intelligence, "AI is for Use" emphasises how crucial it is to employ AI technology as effectively as possible to satisfy a variety of changing user needs. Libraries can employ AI as a tool to give consumers access to enormous volumes of material in a way that is helpful to them. This law highlights the significance of utilising AI to improve search and discovery, personalise the information experience, and improve the user experience as a whole.

ii) Second Law: Every Citizen's his/her AI: The second law of AI, "Every citizen's his/her AI" recognises that every citizen must have access to AI technologies. This means that libraries must ensure that AI systems are accessible to everyone, regardless of their age, gender, ability, or background, and that they are created with inclusivity in mind. This law emphasises the value of democratising AI access and making sure that all citizens may take advantage of its possibilities.

iii) Third Law: Every AI is for Citizen Usage: The third law of AI, "Every AI is for citizen usage" emphasises that AI systems must be designed with the user in mind. Libraries must make sure that AI systems are user-friendly, intuitive, and beneficial to users. This law emphasises the relevance of designing AI systems that are committed to accommodating users' requirements and that offer citizens tangible advantages.

iv) Fourth Law: AI Saves the Time of the User: The fourth law of AI, "AI saves the time of the user" emphasises the significance of providing users with information as quickly and effectively as possible. By giving users fast access to information, automating repetitive chores, and streamlining complex procedures, AI can help users save time. This law emphasises the significance of adopting AI to enhance the user experience and conserve users' time.

v) Fifth Law: AI Systems are Constantly Evolving: The fifth law of AI recognises that AI technologies are constantly evolving. To remain relevant and fulfil the changing demands of users, libraries must adopt new technologies and methodologies, such as machine learning and natural language processing. This regulation emphasises how crucial it is to keep up with the most recent advancements in AI and to constantly change in order to satisfy the shifting requirements of the information world.

6. Application of AI in Libraries: Artificial intelligence has a significant impact on the various business activities of smart libraries. Through case analysis and a systematic review of domestic and foreign literature and practical applications, several application areas have been identified:

a) Cataloguing and Classification: AI-Based Cataloguing and Classification refers to the use of AI technologies to automate and streamline the process of classifying and organising library materials. This includes the use of machine learning (ML) algorithms to find patterns and relationships in the data, NLP methods to decode text, and other AI methods to automate the cataloguing and classification process. The goal is to increase cataloguing and classification accuracy and efficiency, and to make it simpler for users to find the resources they require. Additionally, AI-based cataloguing and classification can assist libraries in keeping up with the complexity and number of information resources that are developing, as well as in making more individualised and pertinent recommendations to users.

b) Reference Service (User Service): AI can be used in reference services to offer users creative and effective solutions. Chatbots and virtual assistants that engage with users in real-time, responding to their questions and delivering pertinent information, can be made using natural language processing (NLP). The accuracy and relevancy of search results can be increased by using AI-powered recommendation systems that suggest relevant resources based on the user's search history and preferences. AI can also be applied to data analysis and text mining to find new study subjects, popular topics, and user behaviour patterns. Additionally, AI-powered speech recognition and translation can increase accessibility for users with hearing and language impairments, enhancing the diversity of library materials.

c) Collection Management: Collection management in libraries using AI technologies involves using machine learning algorithms to analyse and forecast how users will use the

materials available to them. This can help libraries make informed decisions about the selection, acquisition, and deselection of materials for their collections. For instance, AI algorithms can analyse circulation data to forecast which resources will be in high demand and adjust the collection accordingly. AI can also be used to analyse user feedback and reviews to discover trends and preferences in readers reading habits, which can guide the development of collections.

7. Conclusion: Conclusively, the application of artificial intelligence in libraries has brought about significant improvements in various areas of library services, including cataloguing and classification, reference service, collection management, recommender systems, virtual assistants, digital preservation, security systems, and text and data mining. With the help of AI-powered tools and techniques, libraries can improve their efficiency, provide better services to users, and make data-driven decisions for collection development. As technology continues to advance, we can expect to see even more innovative uses of artificial intelligence (AI) in libraries in the future.

References

American Library Association. (2019). *Artificial intelligence*.
        http://www.ala.org/tools/future/trends/artificialintelligence/

Connaway, L.S, & Faniel, I.M. (2014). *Reordering Ranganathan: Shifting user behaviors, shifting priorities*. OCLC Research.
        http://www.oclc.org/content/dam/research/publications/library/2014/oclcresearch-reordering-ranganathan-2014.pdf.

Guliciuc, V. (2017). *Libraries with minds and souls (Complexity vs artificial intelligence vs library science?)*. IFLA WLIC. https://library.ifla.org/id/eprint/2095

Jacknis, N. (2017). *The AI- enhanced library*. https://norman-jacknis.medium.com/the-ai-enhanced-library-a34d96fffdfe

Johnson, L., et al. (2015). *NMC horizon report: 2015 higher education edition*. The New Media Consortium.

Li, R., Huang, Z., Kurniawan, E., & Ho, C. K. (2015). AuRoSS: An autonomous robotic shelf scanning system. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 6100–6105. DOI: 10.1109/IROS.2015.7354246

Liu, G. (2011). The application of intelligent agents in libraries: A survey. *Electronic Library & Information Systems, 45* (1), 78-97. https://scholar.uwindsor.ca/leddylibrarypub/4

McCarthy, J. (2007). *What is artificial intelligence?*. Stanford University. http://www-formal.stanford.edu/jmc/

Noruzi, A. (2004). Application of Ranganathan's laws to the web. *Webology, 1*(2), Article 8. http://www.webology.org/2004/v1n2/a8.html

Oxford University Press. (n.d.). Artificial intelligence. In *Oxford English Dictionary*. https://www.oxfordlearnersdictionaries.com/definition/english/artificial-intelligence

Ranganathan, S.R. (1931). The five laws of library science. *Digital Library of Information Science & Technology*. http://dlist.sir.arizona.edu

Raynor, W. (1999). *International dictionary of artificial intelligence* (1st ed.). Routledge. https://doi.org/10.4324/9781315074108

Satija, M.P. (2003). The five laws in information society and virtual libraries era. *Dr SR Ranganathan memorial lecture*. http://www.dlaindia.org/srr3.htm

Singh, K.P. (n.d). *Application of artificial intelligence and machine learning in library operations and services*. https://library.iitd.ac.in/arpit_2020-2021/Week%207%20-%20Module%2018%20-%20PPT-%20Application%20of%20Artificial%20Intelligence%20and%20Machine%20Learning%20in%20Library%20Operations%20and%20Services.pdf

Sridevi, P. C., & Shanmugam, A. P. (2017). Artificial intelligence and its applications in Libraries. In *E- Resources Management*. https://www.researchgate.net/publication/327831852_Artificial_Intelligence_and_its_applications_in_Libraries

Stilwell, C., Kwanya, T., & Underwood, P.G. (2010). Library 2.0 principles and Ranganathan's fifth law. *Mousaion, 28*(2), 1-16. https://ukzn-dspace.ukzn.ac.za/bitstream/handle/10413/10974/Stilwell_Christine_2010..pdf?sequence=1&isAllowed=y