

# Application of Artificial Intelligence to Replace Academic Libraries: The Librarian's Perspective

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Libraries have evolved immensely in the years since computer access became extensively available, and the rate of change has quickened. Libraries have embraced, and in some cases facilitated, new technology and procedures that have enhanced their ability to fulfill their basic mission: providing customers with access to as much material as possible for the acquisition of knowledge and enjoyment of reading. The application of Artificial Intelligence in libraries has been giving a breakthrough for the information sector. Technological advancements can fortify numerous human capabilities such as calculating, reading, speaking, grasping, remembering, making judgments, and interactive learning. The application of artificial intelligence in virtual reference services is considered to provide a modern online service model for libraries. Librarians are continuously on the cutting edge of innovation to engage and improve services for their users, a few of the valid additions include virtual realities that engage users with libraries and develop information literacy skills. The application of artificial intelligence within the library has become inescapable. AI can help librarians improve their efficiency, accuracy, and relevance in providing information and resources to their patrons. Libraries and information centers are actively monitoring developments in the usage of AI to satisfy their different service demands. AI can help libraries organize, store, and retrieve information to better manage their digital holdings.

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## 1 INTRODUCTION

Intelligence is the capacity to think and learn facts and skills and also apply them when fundamental. The prospect of creating computers or machines

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that see, learn, reason, and behave like human beings has involved many people. Humans are born with an essential ability to distinguish, reason/think and act, which develops and increases over time as a result of so many factors. Intelligence in humans is measured by the Intelligence Quotient (IQ) obtained through a series of aptitude tests focusing on different aspects of intellectual functioning. Additionally, developing intelligent computers that see, think, and behave like humans is the core of Artificial Intelligence. Intelligence in computers or machines portrays their ability to complete specific tasks in the presence of variability and monitor their environment and suitably adjust their actions based on what it has sensed as prerequisites for intelligence. Artificial intelligence already touches many of our daily computing activities, most of the computer systems and mobile phones being developed today have artificial intelligence features and we have perhaps used them not knowing that they are intelligent machines. Artificial intelligence works based on perceptual acknowledgement, unlike human beings that operate on profound cognition. The power and advantage of Artificial intelligence lie in the fact that computers can recognize patterns efficiently at a scale and speed that human beings cannot.

Academic libraries are changing at a rapid pace in our 21st century. The twenty-first century is a field of rapid revolution and technological advancements; organizations must adapt to evolving technologies to meet consumer demands. The use of Artificial Intelligence in libraries can be seen as a collection of revolutions empowering machines to sense, understand, act, and learn and can perform administrative functions and have provided cutting-edge innovations for libraries. Librarianship is known as a profession known for integrating cutting-edge technologies not just for information dissemination but in terms of technology as well. Artificial Intelligence has become the new emerging trend for libraries. Artificial intelligence's usefulness in academic libraries is critical, based on its basic characteristics. The academic library is the institution's image creator, and integrating innovation into its service delivery will upgrade and create a new driving force that will provide more proficient, successful, and high-quality services to library patrons. With this remarkable endless acceleration witnessed by technology, communication, and knowledge-sharing technologies in various fields of life, it became necessary for libraries and information centers to keep pace with these changes so that they can perform their tasks and services quickly and effectively. Working in artificial intelligence applications will generate knowledge and invest it in an optimal investment, thus facilitating the provision of services to the beneficiaries. AI's imminent impact on academic libraries extends beyond patron assistance; it may moreover optimize the library's day to day operations. By automating routine tasks like cataloging, shelving, and book sorting, librarians could devote more time to research assistance, outreach, and programming. AI could also help in digitizing library collections, improving accuracy and speed in retrieval strategies. The paradigm moves in the format and dynamics of information and knowledge as a result of the quick progression in computer innovation

and software applications particularly artificial intelligence, have shifted libraries to a demand of the commensurate supply of the same technologies. Unless libraries start to exploit the modern technologies and improve their information and services delivery, they may face obsolescence in this era

## 2 REVIEW OF LITERATURE

Norman Jacknis (2017) expressed in his blog that though librarians have acquired many skills to organize information and make it accessible anywhere, libraries can ensure the application of the tools for the new generation of knowledge, which surpasses Google search has been developed for academic purposes. It is explained in Merriam-Webster (2019) that, artificial intelligence is "a part of computer science that deals with giving ability to the machines to look like they have natural human intelligence." Artificial intelligence (AI) is perhaps most familiar to the public in many ways today. According to Kristin Whitehair (2016), many AI applications allow libraries to change their emphasis and attention. The way we direct the information is kept altering. Liu (2010) in her articles gives a complete literature review on the utilization of intelligent agent innovation in the library environment. The researcher here expressed that both AI and librarians reinforce each other in the interest of giving the finest service to patrons. Thus, the application of AI can never be a threat to librarians.

Cox and Pinfield (2018) identified the impacts of Artificial Intelligence on search and retrieval methods, resource delivery, scholarly publishing, and on learning their findings suggest potential roles for academic libraries and gather the observations of the potential impact of Artificial Intelligence on academic libraries and its suggestions for library works. The potential roles for AI in libraries were data acquisition fabrication and curation, information literacy, aiding user navigation, and Infrastructure building.

Mogali(2015) reflected upon the major areas of artificial intelligence i.e. pattern recognition, expert systems, robots, and natural language processing. The application of expert systems in library activities such as reference services, cataloging, classification and has been very promising and proven to improve the productivity of libraries to a great extent.

Lund et al. (2020) demonstrated that academic librarians are generally interested to integrating AI into their operations. They are often early adopters of modern information and communication innovations. The study by Lund et al. (2020) too uncovers that librarians are interested in integrating AI in reference services, cataloging, and improved library search.

Gujral et al. (2019) examines particular roles and applications of AI in academic libraries, including data curation for collection management and digital preservation and exploring modern information environments to better understand the scholarly communication landscape. By automating certain

tasks, AI can move forward librarians' efficiency and productivity

Manjunatha and Patil looked at the use of smart technology in engineering college libraries in Karnataka (2020). The information recommends that most engineering university libraries are already familiar with smart technologies and have embraced block chain, augmented reality, artificial intelligence, and other cutting-edge framework.

Yusuf et al. (2020) surveyed the application of artificial intelligence for proficiency in library service delivery in a study of university libraries in Nigeria. The study has explicitly shown that the adoption of artificial intelligence by librarians in university libraries in Nigeria is generally low as a result of a wide variety of challenges particularly to developing nations.

Cox et al. (2019) highlight the benefits of chatbots, such as 24/7 accessibility, consistency, and patience in answering queries. AI also has the potential to offer personalized assistance and targeted services to students, faculty, and staff. It could offer assistance to discover relevant resources rapidly and efficiently while simultaneously analyzing user behavior to retrieve the most useful materials

### 3 APPLICATION OF AI COMPONENTS IN LIBRARY SERVICES

Expert System in Library Services Library activities related to reading materials, users, and staff. Application of expert systems where dialogue between staff and users, users and databases is promising. The expert system will offer assistance by the librarian to understand the need for productivity improvement and efficiency. A well-programmed expert system will also improve quality.

- 31 Reference service is the foremost activity of any library and the master framework will serve as a substitute for reference librarians. REFSEARCH, POINTER, Online Reference Assistance (ORA), AMSWERMEN, PLEXUS all of these systems are advisory systems for finding reference resources and factual data.
- 32 Cataloging is one of the oldest library strategies. Recent endeavors to automate cataloging through expert systems have focused on descriptive cataloging because it is rule-based (AACR2). There are two ways to apply artificial intelligence techniques in cataloging: (a) Human-machine interfacing, where intellectual work is divided between the intermediary and the support system. (b) An expert system with full cataloging capabilities related with electronic publishing systems. Since the cataloging text is created online, it can be passed through a knowledge-based system, and the intermediary does the cataloging process without any intellectual input.
- 33 Classification is the essential activity of a knowledge organization. Hence, it is prominent in all systems that organize knowledge and

information in libraries and information centers. The application of expert systems in the field of library classification.

- 34 Indexing of periodicals is another area where expert systems are created. Indexing a periodical article includes the identification of concepts, interpreting the concepts into verbal descriptions, and selecting and allotting controlled vocabulary terms that are conceptually comparable to verbal descriptions. The reason for automating the intellectual aspects of indexing is to improve indexing consistency and quality. Based on the information provided by the indexer, the framework can arrive at suitable favored terms automatically to allot relevant subdivisions. The system can make inferences and based on the inference, it can take appropriate action. The 'Med Index' is the best example of a library indexing system. As there is a lack of disclosure to these expert system-oriented services in many libraries, very few library users have interacted with knowledge-based systems. In addition, most of these expert systems-oriented services are evolving over the period and experiencing numerous changes that suit the needs of the library patron.
- 35 Acquisition: The users of the library have a noteworthy role to play in building library collections and online resources in particular. Several systems have been consolidated for the acquisition of these resources. Monograph Selection Advisor, a pioneering effort in applying this emerging technology is another area of building library collection. Particularly, the task modeled is the item-by-item decision that a subject bibliographer makes in selecting a monographic. The prerequisite is that the information needs to be broad enough and the interfacing aspect must be easy enough for the library to induce the required and desired information from the machine

#### 4 AI AND ACADEMIC LIBRARIES

Libraries have obtained and maintained various forms of information resources throughout these times to meet the information needs of their user communities. However, the definition of library today has gone beyond the physical building, it presently centers on the collections and services offered, since virtual libraries have no physical walls and services could be rendered to users from remote locations. Therefore, in the effort to satisfy the dynamic and energetic information needs of its clientele and at the same time uphold its importance and significant in this ever-changing technological society, libraries have explored, incorporated, and transformed through diverse technological revolutions of clay tablets, stones, papyrus, parchments, paper, microforms, computers, Internet, virtual libraries, library 2.0, cloud computing, etc. artificial intelligence is the current technology that has evolved with huge prospects and promising applications in libraries.

Librarians are distinctively and exclusively positioned to rise to the challenge that AI presents to their field. Libraries and their like have existed for centuries; they progress with society, modifying and adjusting their services to meet the information needs of their communities. Academic libraries today have greatly incredibly extended their digital offerings, not just to include electronic books or journal articles but also to support software application discovery and use. Artificial Intelligence (AI) has the potential to revolutionize the way that academic libraries operate and serve their patrons. AI-powered framework can help with the errands such as cataloging, collection management, and reference services, freeing up librarians to focus on more high-level responsibilities such as information literacy instruction and research assistance. AI can also help to improve the availability of library resources. Academic libraries serve as a center for teaching and research activities, enhancing and meeting the demands of its clients for continual academic and intellectual progressions. According to Chalukya (2015), academic libraries are created to meet the teaching and research needs of the institutions they serve, to maximize the use of their information resources and services for the benefit of its users. Academic libraries continuously been entrusted with providing direct service to individuals on an individual basis, independent of the type of material or the purpose for which it would be used by library users. Academic library processes and procedures and services were affected by the period of digital libraries and librarians, as services were relocated to the virtual world of the Internet. This standard shift in artificial intelligence technology has set the library in a technologically progressed position, and unless the library begins to investigate the benefits of artificial intelligence and apply them to its everyday schedule activities in service delivery. The introduction of Artificial Intelligence (AI) into academic library services has enhanced and upgraded the transmission of information services even further. The incorporation of Artificial Intelligence (AI) into academic institutions for the delivery of services has opened doors for serious concerns influencing the conventional traditional library routine services to be addressed promptly. Shelf space for books and other information materials, cataloging and categorization, serials functions, collection development, and procurement of resource materials, among other things, shall be addressed urgently and expeditiously. According to Tella (2020), academic libraries must reposition themselves to make use of the potential of artificial intelligence by improving the quality of library services in this information age. This use in academic libraries will help in the delivery of greater information services as well as better search, which will thrill both library staff and users due to faster access to information. Artificial Intelligence (AI) in library services delivery has helped in the improvement of many librarians' work responsibilities, including cataloging, indexing, information retrieval, reference, and other tasks. It can be used in a assortment of applications, including speech recognition, machine translation, and library robots.

## 5 BARRIERS TO IMPLEMENTING AI IN LIBRARIES

Libraries are working towards adopting AI in libraries. But they need to confront to face certain challenges in creating and deploying them. A few of the challenges the libraries are facing are:

- (i) Management of the organization has to first understand the need for AI in libraries and be willing to create and utilize it.
- (ii) Planning about what is to be done for adopting AI, who will do the work, who will be potential stakeholders, what will be the workflows, proper scheduling, how and when to execute, etc., is to be done with finer details.
- (iii) High-end innovation, coding, large data, servers, databases, communication systems, networking, etc., will be required
- (iv) The execution of an AI framework can be very expensive so aadequatebudget is required. In low-budget the AI system may lack advanced features
- (v) As the field of AI is still an emerging area for library and information professionals, they got to clearly define their requirements to the developers and have to be participative in the planning of the AI framework.
- (vi) As the innovation keeps on changing with fast speed and new versions keep arriving, there will be the necessity of upgradation to complete switch over from obsolete technology
- (vii) There is a necessity for training and upgrading the skills of staff regarding the use of AI systems.

## 6 THE BENEFITS OF ARTIFICIAL INTELLIGENCE IN LIBRARIES CAN BE SUMMARIZED AS FOLLOWS

- (i) According to Ex Libris (2019), artificial intelligence in libraries can make research more discoverable which can enhance research productivity among faculty members,
- (ii) Bridge in Time: Round-the-clock convenience to information resources and services just in time.
- (iii) Bridge in Space: The space engaged by piles of books, journals, bound newspapers, and other information materials has been reduced by the introduction of digitization, electronic copies, and the use of robotic cranes that store and retrieve books from a compact off-site storage location.
- (iv) Maximization of Efficiency: This refers to competence in library operations: selection and acquisition of materials, technical services, circulation services, references services, serial management, etc.



- (v) Maximization of effectiveness in the form of improved service delivery and elimination of human errors in library operations.
- (vi) Minimization of Effort: The effort expended by librarians in technical services, circulation services, references services, serial management, etc., can be minimized by the utilization of artificial intelligence systems in libraries.
- (vii) Enhanced and immersive user experience in library services delivery.

## 7 CONCLUSION

In the event the libraries are to succeed in the new knowledge economy, they must update and overhaul their services and re-examine their practices, a veritable means to achieve this is the application of artificial intelligence in libraries. Libraries will significantly benefit from the development of artificial intelligence systems for technical services, reference services, circulation services, resource management, and information retrieval/dissemination. artificial intelligence is also viewed as a danger to librarians and the touch of humans in libraries, the eventual acceptance and integration of artificial intelligence into library services will no doubt reveal the many numerous promise it has in librarianship. Artificial intelligence will not diminish the human touch in libraries, nor will it dissolve the library's association with its patrons any time soon. Artificial Intelligence innovation has not only improved human presence in terms of service delivery, but it has also permitted academic libraries at higher educational institutions to grow their scope of activities and expand their horizons of service distribution with ease and precision. Artificial intelligence plays an imperative role in library automation, particularly in digital and virtual libraries where their resources and services are fully computerized. As futurist Ray Kurzweil wrote, "The codification of knowledge and the process of enhancing human learning will be the cornerstones of the next phase of human history. In the second industrial revolution, the wealth and power of nations will be based on non-material resources, by the ability to create and facilitate knowledge. Seen in this light, the librarian is a natural leader for the age of knowledge that is now unfolding."

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