

Prospects and Challenges of Artificial Intelligence (AI) For Library Services in the Digital Era

*¹ Dr. B Deenadhayalu

*¹ Assistant Librarian, RGUKT Ongole Campus, Idupulapaya, Y.S.R. Kadapa, Andhra Pradesh, India.

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Abstract

Libraries must be ready to adapt to changing user behaviour that varies with the times, in addition to the quick advancements in technology. Librarians must have efficient skills and capacities to collaborate and adapt if they are to properly manage information and service users using ICT. One of the newer technologies of this era is Artificial Intelligence (AI). In the near future AI plays a key role which will be widely adopted in library services and has the potential to revolutionise the greatest services available in the information age. The purpose of this paper is to illustrate how AI affects library services. This study will assist researchers, policy stakeholders and librarians in the are in addressing these issues prior to the use of AI in library services.

*Corresponding Author

Dr. B Deenadhayalu

Assistant Librarian, RGUKT Ongole Campus, Idupulapaya, Y.S.R. Kadapa, Andhra Pradesh, India.

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Introduction

Most definitions of Artificial Intelligence (AI) centre on the notion that computers can carry out tasks that are ordinarily completed by humans. According to the UNESCO definition, this is an imitation of human comprehension.

“Machines that imitate some feature of human intelligence, such as perception, learning, reasoning, problem-solving, language interaction and creative work.”

“Simply put, AI is collection of technologies that combine data, algorithms and computing power.”

“A suite of technologies and tools that aim to reproduce or surpass abilities in computational systems that would require ‘intelligence’ if humans were to perform them. This could include the ability to learn and adapt; to sense, understand and interact; to reason and plan; to act autonomously; or even create. It enables us to use and make sense of data.”

Libraries in the digital age confront growing difficulties in organising enormous volumes of information, offering effective services and guaranteeing a flawless user experience. By combining automation and information technologies, traditional library systems have undergone tremendous change. AI is one of these ground-breaking technologies that could fundamentally alter how libraries function and offer their services. A subfield of computer

science called AI is concerned with building machines that can carry out tasks that normally call for human expertise. These activities include vision, language comprehension, learning, reasoning, and problem solving. AI seeks to mimic or reproduce human cognitive abilities in machines so that they can evaluate data, make decisions, and adjust to novel solutions. AI is not a novel concept; many of its uses in auto-suggestion, spam filtering, plagiarism detection, audio transcription, text summarisation are already well known. AI powers a lot of well-known search and recommendation functions. In the digital humanities, machine learning and Text and Data Mining (TDM) applied to library and archive collections might be considered AI in the context of libraries. There are several advantageous applications in all spheres of human endeavour despite the controversy. To be more precise, AI improves access to knowledge and information. For instance, access to content published in various languages is improved by better translation technologies. Better summarisation facilitates content accessibility as well.

Components of AI

AI is made up a number of essential elements that cooperate to allow robots to behave intelligently. Every element contributes significantly to the way AI systems work, enhancing their capacity to engage with the outside world and

carry out challenging tasks. Collectively, these components serve as the cornerstone of AI technology and allow for its extensive use in a variety of sectors.

1. **Machine Learning:** A branch of AI called machine learning focuses on teaching algorithms to learn from data and make judgements or predictions without being specifically programmed to carry out predetermined tasks. As machine learning algorithms are exposed to additional data, their performance gradually improves.
2. **Deep Learning:** A subset of machine learning known as deep learning makes use of multi-layered artificial neural networks to learn data representations. In fields including speech recognition, natural language processing, and image recognition, deep learning has demonstrated impressive results.
3. **NLP and Knowledge Representation:** The goal of Natural Language Processing (NLP) is to make it possible for computers to comprehend, interpret, and produce human language. Application for NLP include chatbots, machine translation, sentiment analysis, and text summarisation.
4. **Computer Vision:** Giving machines the ability to perceive and comprehend visual data from the outside world is known as computer vision. In order to accomplish tasks like object recognition, picture classification, and image segmentation, computer vision algorithms may analyse both images and videos.
5. **Robotics and Actuators:** Two closely linked areas of AI that deal with the design and control of robots are robotics and actuators. The study of robots, their building, design and operation, as well as the creation of control system and algorithms are all included in robotics. Conversely, actuators are machines that transform hydraulic or electrical energy into motion. They enable movement and interaction with the environment and are a crucial part of robotics.
6. **Fuzzy Systems:** When making decisions, AI uses Fuzzy logic to deal with uncertainty. With fuzzy logic, AI may make conclusions based on imprecise or partial information, unlike traditional logic that demands a binary “true” or “false”.

Application of AI in Libraries

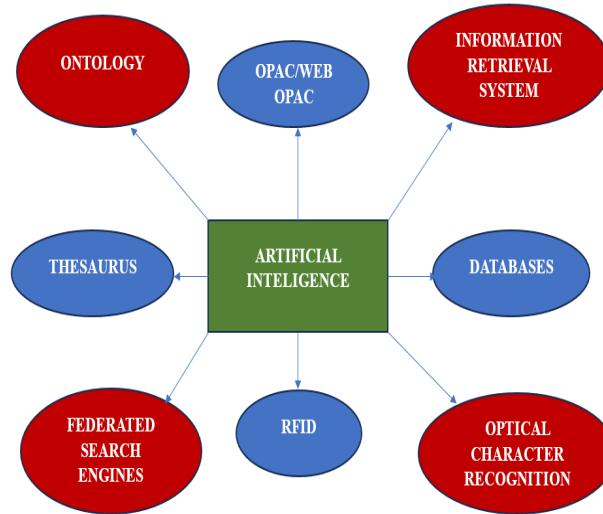
AI has applications everywhere and is continuously growing rapidly. Numerous sectors and businesses, including finance, entertainment, healthcare, education, transportation, and agriculture are home to them. Despite its many benefits such as automation, efficiency, and innovation, AI also raises moral, societal, and financial concerns. Issues regarding algorithmic unfairness, security, privacy, job displacement and the moral application of AI technology are a few of these. It is crucial to ensure that technology is developed and used appropriately AI advances taking into consideration any potential detrimental consequences on society and the environment. Furthermore, greater research and collaboration are essential to overcoming channelling and utilising AI to its full potential for societal benefit.

Artificial Intelligence (AI) significantly affects several business operations in smart libraries. According to the ACRL “Academic libraries have a special opportunity to integrate their information literacy programmes with AI literacy, despite the fact that some would contend that public libraries would be more appropriate for introducing their users to AI.” Several applications have been identified through case studies, a thorough review of both domestic and foreign literature and a real-world implementation.

- Cataloguing and classification
- Reference service
- Collection management
- Security system

AI has become a powerful instrument that is transforming a number of industries. Custodians of knowledge and information libraries are advancing traditional library services into the digital era by utilising AI’s ability to improve accessibility and user experiences. AI is changing the way libraries engage with their users and broadening accessibility in more creative and varied ways.

1. **Smart Book Recommendation System:** The way libraries arrange and display their materials is being revolutionised by AI powered recommendation systems. These systems look at the reading habits and borrowing preferences of the user in order to give personalised reading lists and relevant resources. This method makes material discovery easier and increases user pleasure and engagement.
2. **Virtual Assistants and Chatbots:** AI power-driven chatbots offer users immediate support by responding to their questions, directing them through the library’s resources and help them navigate both its online and physical locations. These virtual assistants guarantee that users can get help and information at any time which greatly increase accessibility.
3. **Automated Administrative Tasks:** Routine administrative duties like scheduling book reservations, managing due dates and sending out past-due alerts can be automated with AI. Because of this automation library employees can devote more of their time to helping users curating collections and creating initiatives that improve the experiences of the user.
4. **Improved Usability for Individuals with Impairments:** AI plays a key role in improving accessibility for people with disabilities. For people who struggle with reading or visually challenged, accessibility is improved via speech-to-text and text-to-speech capabilities. For people with visual impairments AI-driven image recognition makes it easier to describe visual content.
5. **Content Creation with Data Analytics:** Artificial Intelligence power driven data analytics give libraries insights into how different resources are used which helps them grow their collections. The library’s collection is kept current in line with user’s interest by using this data to drive decisions about acquisition and retention.
6. **Material Conservation and Restoration:** AI supports digitisation initiatives like content analysis and Optical Character Recognition (OCR), preserving rare and fragile materials. AI makes it easier to restore outdated or damaged text preserving historical documents for upcoming generations.
7. **VR and AR Technologies:** AI powered Virtual Reality (VR) and Augmented Reality (AR) technologies offer immersive experiences in libraries, enabling users to interact with digital resources virtually explore library spaces and attend events. A wider audience is drawn in and user engagement is increased by these experiences.
8. **Language Translation Services:** Linguistics barriers are removed and contents are made more accessible globally with AI based language translation services in libraries. In order to encourage inclusivity and diversity users can access information in the language of their choice.



The most effective uses of AI in libraries are descriptive applications which can be used to provide description and scale for information retrieval and turn any type of material (photos, videos, sound and manuscripts) in collection into machine readable data using methods like computer vision or sound to text. While certain libraries may benefit more from having access to an infrastructure centred around open or licenced content, others may have unique collections that may be made more accessible through similar methods.

Artificial Intelligence Impact on Libraries

AI has the ability to significantly and profoundly affect library work. While AI is having significant impact on library services, it is just slightly altering others. It makes sense to assume that libraries will utilise AI in ways that emphasize user needs, fit into current functions, or require the fewest resources. Supporting data scientist groups will become increasingly important as more academics employ AI approaches in their work. Regarding data management, data preservation, copyright issues, and data discovery, libraries can provide assistance.

Everyday knowledge tasks like translation, summarisation, and text production are likely to be altered by AI. Professional work in libraries, in particular, can benefit from the widespread use of AI tools and applications. Scite, Elicit, Openread, and Research Rabbit are some of the tools that facilitate literature reviews. The capacity of generative AI to modify text to suit the demands of particular audiences make it useful for library marketing. AI is expected to be used in back-end library systems due to its accuracy in performing complicated routine operations.

Advantages of AI

- Capable of doing demanding and intricate tasks that human could find difficult or impossible to perform;
- Probably able to finish a task more quickly than a human;
- To discover unexplored things;
- Reduced mistakes and flaws;
- An infinite function.

Disadvantages of AI

- Absence of interpersonal interaction;
- Capable of taking the place of human jobs;
- Have the ability to malfunction and perform the opposite purpose of their programming;
- Misuse could result in extensive destruction;
- Potential to corrupt the younger generation.

Conclusion

AI applications are not meant to take the positions of librarians in their entirety. Actually, a lot of librarianship duties have been replaced by ICT, which occasionally even take over library work. Artificial Intelligence is being used to help librarians in their profession. When librarians have a lot of work to do in a short amount of time, AI can be a useful tool. Thus, AI may be a means for librarians to manage information while still providing the greatest possible service to users. Specifically, the use of AI as an automated library guide is a novel and fascinating concept. By delivering information via a system that is directly integrated with library resources, AI librarians will serve as a targeted and effective middleman for library users. Apart from their optimism regarding the application of AI in libraries, the respondents identified facilities, human resources, and management as possible obstacles.

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