

# Prospects for the Application of Artificial Intelligence in Algerian Libraries

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## Abstract:

Artificial Intelligence's Applications have an enormous use these days in all aspects of life, in medical, military purposes, smart technologies, economic sectors, etc as well as we can see this technology in the library to guarantee the availability and efficiency of the library services. The aim of this paper is to study how Artificial Intelligence technology could be used in Algerian Libraries according to our presented Literature works related to AI study. We summarize that AI could be applied in Algerian library services such as Reference Services using Expert Systems, Indexing, Technical, Acquisition in Natural Language Processing, Robotics and, Pattern Recognition in library activities. In addition, we have a present flow chart system of describes in detail the use of IA in the services of the library.

**Keywords:** Artificial Intelligence, library services, library information systems, Algeria.

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## Introduction

The wish to build thinking artifacts is very ancient and is reflected in legends and myths in addition in the creation of lifelike art and clockwork automatons during the Renaissance age. AI as we know is a relatively new field these days. Even though some groundwork had been set previously, AI started in earnest with the emergency of the modern computer during the 1940s and 1950s. It was the ability of these new electronic machines to save large amounts of information and treat it at very high speeds that gave researchers the vision of constructing systems that may emulate some human capabilities. AI requires an understanding of related concepts among them intelligence, reasoning, knowledge, thought, cognition, learning, and a

number of computer-related concepts.

The adoption of Artificial Intelligence and machine learning in the private and public sectors is fastly growing and libraries are part of this revolution. To develop a system that will automate the library system utilizing artificial intelligence for more sophisticated and easy handling of library resources in an intelligent manner, that inflates both users and librarians. With the use of Artificial intelligence, a system will be able to increase its functional complexity and overhead from each stakeholder. Artificial intelligence provides a reliable and sophisticated way to communicate with the system.

This paper aims to outline key considerations for the use of these technologies in the library sector in Algeria and suggest the roles that libraries should strive to take on in a society with growing AI integration.

AI technologies can have deeply transformative capabilities, and their power can be put to the service of public welfare and innovation. With necessary preparations – and regard for ethical concerns and current limitations – libraries can responsibly use AI technologies to advance their social mission.

## **I. Related Works**

Information and Librarian specialists have several skills to organize the information and make it accessible anywhere, libraries can guarantee the application of tools for the new generation of knowledge, which surpasses Google search that has been developed for academic objectives [2]. Libraries focus attention on ending access to information with the application of AI. We have been monitoring the evidence of this transformation toward AI applications with deferents libraries initiating and providing Make competencies tenses [1]. [3]in her papers, provided a comprehensive literature review on the use of intelligent agent technology in the library area. The researcher here expressed that both AI and librarians needed to help each other in order to provide the best service to patrons [10] [9] [11].

## **II. The Application Of Ia In Libraries**

### **A. ARTIFICIAL INTELLIGENCE**

Artificial Intelligence is The science and engineering of making intelligent machines, especially intelligent computer programs.. Artificial Intelligence is a way of making a computer, a computer-controlled robot, or a software think intelligently, in the similar manner that intelligent humans think. AI is accomplished by studying how the human brain thinks, and how humans learn, decide, and work while trying to solve a problem, and then using the outcomes of this study as a basisof developing intelligent software and systems[1].

### **B. APPLICATION OF ARTIFICIAL INTELLIGENCE**

AI has been dominant in various fields such as:

### **1-Gaming**

AI plays crucial role in strategic games such as chess, poker, tic-tac-toe, etc., where machine can think of large number of possible positions based on heuristic knowledge.

### **2- Natural Language Processing**

It is possible to interact with the computer that understands natural language spoken by humans.

### **3- Expert Systems**

There are some applications which integrate machine, software, and special information to impart reasoning and advising. They provide explanation and advice to the users. Building an ES first involves extracting the relevant knowledge from the human expert such knowledge is often heuristic in nature. ESs have been used to solve a wide range of problems in domains such as medicine, mathematics, engineering, geology, computer science, business, law, defiance, education[2].

### **4-Vision Systems**

These systems understand, interpret, and comprehend visual input on the computer. For example, A spying aeroplane takes photographs which are used to figure out spatial information or map of the areas. Doctors use clinical expert system to diagnose the patient. Police use computer software that can recognize the face of criminal with the stored portrait made by forensic artist.

### **5- Speech Recognition**

Some intelligent systems are capable of hearing and comprehending the language in terms of sentences and their meanings while a human talks to it. It can handle different accents, slang words, noise in the background, change in human's noise due to cold, etc.

### **6- Handwriting Recognition**

The handwriting recognition software reads the text written on paper by a pen or on screen by a stylus. It can recognize the shapes of the letters and convert it into editable text.

### **7-Intelligent Robots**

Robots are able to perform the tasks given by a human. They have sensors to detect physical data from the real world such as light, heat, temperature, movement, sound, bumps, and pressure. They have efficient processors, multiple sensors and huge memory, to exhibit intelligence. In addition, they are capable of learning from their mistakes and they can adapt to the new environment.

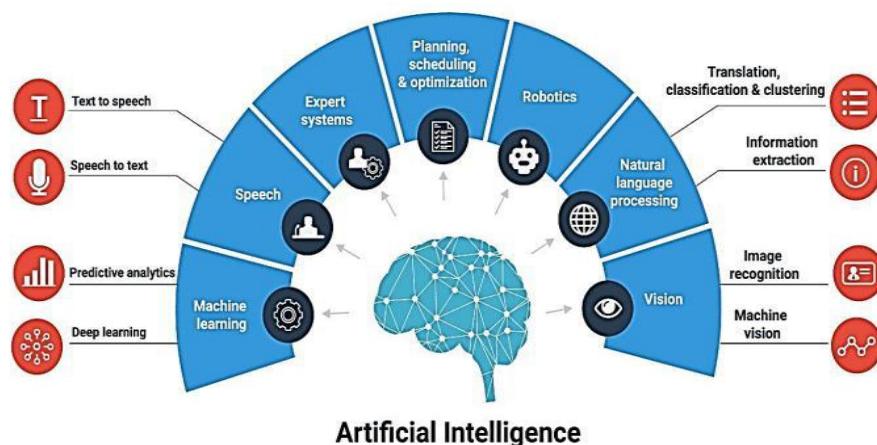


Fig. 1. Artificial Intelligent Component Diagram (Source: Vijayakumar & Sheshadri, 2019) [3].

#### C. THE FACTORS EFFECTIVE IN USING ARTIFICIAL INTELLIGENCE IN LIBRARY SYSTEMS[4]:

- (1) Understanding the nature of the information needs and defining this need for the system,
- (2) Identifying information resources that are relevant to information needs,
- (3) Evaluation of existing information resources, evaluation of retrieved information,
- (4) Organizing existing information resources, organizing selected information from items retrieved,
- (5) Managing existing information resources, managing retrieved information,
- (6) Using existing information resources, using retrieved information,
- (7) Information and knowledge analysis,
- (8) Converting information to knowledge,
- (9) Dissemination and transfer of information and knowledge,
- (10) Interaction and exchange of information and knowledge.

#### D. APPLICATIONS OF ARTIFICIAL INTELLIGENCE IN LIBRARIES :

A lot of literatures discussed various applications of artificial intelligence (AI) in libraries [5]. they highlights the use of expert systems in library activities such as reference service, cataloging, classification, indexing, and acquisition. Expert systems are designed to assist librarians and users in tasks such as recommending sources, directing users to reference materials, assigning categories to documents, and automating the process of selecting library materials [6]. The text also

mentions the application of natural language processing (NLP) in library activities, particularly in searching databases and improving indexing precision and recall. NLP allows library patrons to interact with electronic catalogs using natural language queries. Additionally, the text briefly mentions the application of pattern recognition techniques in information retrieval, semantic analysis, and summarization of multimedia information. Finally, the text introduces the concept of robotics in libraries, specifically the use of robots for scanning and digitizing printed materials to provide real-time browsing and searching capabilities [7].

The application of artificial intelligence (AI) in libraries encompasses a wide range of areas and activities. Here are some additional examples:

**Recommendation Systems:** AI-powered recommendation systems can help users discover relevant books, articles, and other library resources based on their interests and preferences. These systems analyze user behavior, such as borrowing history or search patterns, and employ machine learning algorithms to provide personalized recommendations. By suggesting items that align with a user's preferences, recommendation systems enhance the browsing experience and promote the exploration of new materials.[8].

**Intelligent Search and Information Retrieval:** AI techniques, including natural language processing and machine learning, can be utilized to improve the search and retrieval of information within library catalogs and databases. Advanced search algorithms can understand user queries in natural language, interpret their intent, and retrieve relevant results. AI can enhance search precision and recall by considering factors such as semantic meaning, context, and user feedback[9].

**Metadata Creation and Enhancement:** AI can assist in the creation and enrichment of metadata, which is crucial for organizing and accessing library resources. Techniques such as text mining and natural language processing can automatically extract metadata from documents, classify resources into relevant categories, and assign appropriate subject headings. AI can also analyze and link related resources, enabling better discovery and navigation within library collections[10].

**Preservation and Conservation:** AI technologies, such as image recognition and machine learning, can aid in the preservation and conservation of physical materials in libraries. For example, AI-powered systems can automatically detect and flag deteriorating or damaged books, manuscripts, or photographs, allowing librarians to take proactive measures for preservation. Additionally, AI can assist in the digitization of archival materials, making them accessible and searchable in digital formats.

**User Engagement and Virtual Assistants:** AI-driven virtual assistants or chatbots can be employed in library websites or applications to provide personalized assistance to users. These virtual assistants can answer frequently asked questions, guide users through library services, provide

recommendations, and offer real-time support. They enhance user engagement, reduce wait times, and provide 24/7 assistance.

**Data Analysis and Decision Support:** AI techniques can be utilized to analyze library data, including circulation statistics, user behavior, and resource usage patterns. This analysis can provide valuable insights for collection development, resource allocation, and strategic decision-making. Machine learning algorithms can identify trends, predict demand, and optimize library operations.

These are just a few examples of how AI is applied in libraries. As technology advances and AI capabilities continue to evolve, new applications and opportunities for AI in libraries are likely to emerge. Figure 2: A diagram of the use of artificial intelligence in libraries :

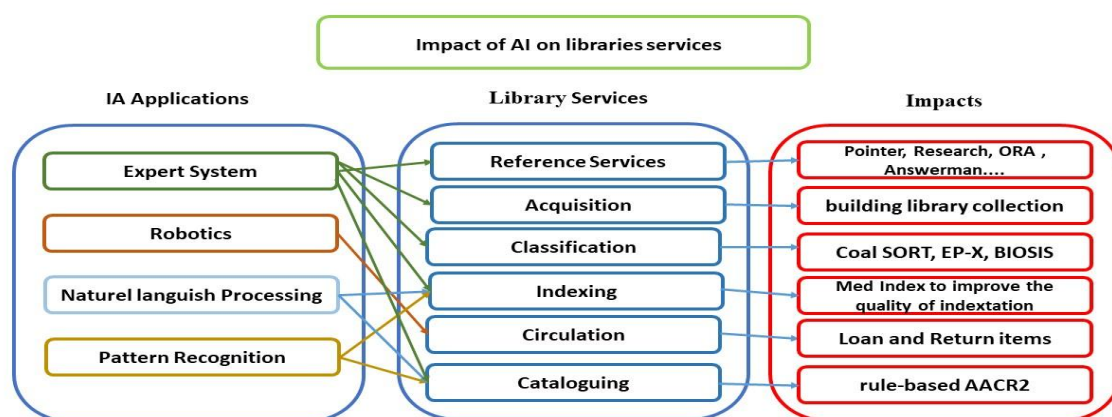


Fig. 2. Impact of Artificial Intelligent on libraries.(source: Achieved by researchers)

As AI continues to advance, there are several potential future applications of AI in libraries. Here are a few possibilities:

**Intelligent Chatbots and Voice Assistants:** Virtual assistants and chatbots in libraries can become more sophisticated and capable of understanding complex user queries and providing in-depth information and recommendations. They may incorporate natural language understanding and generation capabilities to engage in more natural and conversational interactions with library users. Additionally, with the growing popularity of voice-controlled devices, libraries may explore the integration of voice assistants to provide hands-free access to library resources and services[13].

**Personalized Learning and Adaptive Systems:** AI can be leveraged to develop personalized learning systems within libraries. These systems can assess users' knowledge levels, learning preferences, and goals, and provide tailored recommendations for resources, tutorials, and learning pathways. AI algorithms can track user progress, provide adaptive feedback, and adjust

the learning experience based on individual needs, optimizing the effectiveness of library resources as educational tools.

**Content Curation and Knowledge Graphs:** AI can aid librarians in curating and organizing vast amounts of digital content. Using machine learning and natural language processing techniques, AI algorithms can analyze the content of documents, identify relationships between concepts, and automatically generate knowledge graphs or ontologies. These knowledge graphs can facilitate semantic search, contextual recommendations, and more efficient navigation within digital collections.

**Data-driven Decision-making:** Libraries can leverage AI to make data-driven decisions in areas such as collection development, resource allocation, and user services. Advanced analytics and predictive modeling can be used to analyze historical data, user preferences, and emerging trends to forecast demand, identify gaps in collections, and optimize resource utilization. AI can provide insights that enable librarians to make informed decisions and enhance the overall user experience.

**Augmented Reality (AR) and Virtual Reality (VR):** AR and VR technologies can be integrated into library spaces to enhance the learning and research experience. AI algorithms can be utilized to recognize and augment physical objects, such as books and artifacts, with additional digital information. VR can enable immersive experiences within virtual libraries, allowing users to explore digital collections, attend virtual lectures, or participate in collaborative research projects.

**Ethical and Bias Mitigation:** As AI becomes more prevalent in library services, addressing ethical concerns and mitigating algorithmic biases will be crucial. Libraries can play a role in ensuring that AI systems are fair, transparent, and respect user privacy. This may involve developing ethical guidelines for AI usage, conducting audits of AI systems, and implementing mechanisms to detect and mitigate biases in recommendation algorithms or search results.

These are speculative examples, and the actual implementation and adoption of AI in libraries will depend on technological advancements, ethical considerations, and user needs. Nonetheless, AI has the potential to revolutionize libraries by augmenting services, improving access to information, and enhancing the user experience.

### III. Results And Discussion

Libraries of all types have barely settled and found their place amidst the challenges of rapidly advancing technology, particularly in keeping up with developments on the web, when they found themselves facing new challenges related to artificial intelligence and its applications. However, this time their ability to survive and continue providing their services is at stake, in addition to the ongoing debate about the effectiveness of artificial intelligence technologies when

used to deliver information services in libraries and information institutions. This also relates to the potential impact on information specialist in terms of the possibility of new roles for them in the era of artificial intelligence. The subject also concerns the philosophy and nature of the library, as it has always been a trusted intermediary between the user and information, even before the advent of artificial intelligence.

As for the libraries in Algeria, they suffer greatly from the weakness of the information systems used, which would affect the quality of the services provided, this problem highlights especially through the weakness of the technological infrastructure and the nature of standards and laws which support the integration of artificial intelligence technology in the development of the performance of the library.

The majority of libraries in Algeria have started using documentary software in managing library services very late, especially open-source software such as PMB software.

It can be said that the reality of Algerian libraries is still far from the application of artificial intelligence technology, as access to this stage requires many steps, most notably: the development of technological infrastructure and the skills of library workers.

The libraries in Algeria in their various forms, including university, public, and national libraries, according to the literature that has addressed the application of information and communication technology in libraries, most of them acknowledge the lack of complete and comprehensive success in implementing many digital tools that emerged before artificial intelligence, such as documentary software, digital libraries, and digital repositories. How will it be when attempting to apply the latest artificial intelligence techniques, given the numerous obstacles and problems, the most prominent of which are related to the technological infrastructure of equipment and software, in addition to the scarcity of skills of human resources in the field of modern technologies?

The shift towards using artificial intelligence techniques urgently remains elusive, according to a number of Algerian professors specialized in the field of information and some librarians. They believe that success in adopting these techniques depends on addressing what was originally in the pre-artificial intelligence era, as mentioned above, which prevented the use of many applications, especially greetings related to improving the infrastructure of information and communication technology, human resources skills, in addition to the required administrative and financial support.

The environment surrounding Algerian libraries urgently requires them to consider the shortcomings related to their technological infrastructure, financial and human resources, and to seek to provide quality information services with a focus on the strategy of marketing services and jobs by keeping pace with beneficiary behaviors that are constantly changing according to changes in technological applications, by being present in various digital platforms such as social



networking sites and creating dynamic interactive sites to attract and get closer to the largest number of users. Algerian libraries also need to diversify their sources of information, especially the promotion of digital formats, which will provide more efficient information services that help beneficiaries reach their information needs in a timely and appropriate place, especially in light of the challenges of knowledge inflation and pollution, in addition to the problem of great reluctance to visit libraries spaces among a wide range of beneficiaries due to digital sources over the Internet and informational and mental fragmentation due to the negative effects of technology and its applications.

The availability of the aforementioned aspects in Algerian libraries enhances their readiness for various transformations, including artificial intelligence and its applications. These aspects are important steps that enable keeping up with rapid technological advancements. However, if these aspects are weak, the prospects of adopting and keeping up with artificial intelligence applications remain unclear. Despite the inevitability of keeping up with these advancements to ensure the position and role of Algerian libraries amidst digital changes.

As a conclusion, it can be said that the ill-considered approach towards services and jobs based on artificial intelligence may lead to the cancellation of the library's status permanently, which will inevitably have a negative impact on the beneficiaries community, who will find themselves lost in obtaining their information needs in light of digital information inflation. The profession of information specialist will also become a victim of artificial intelligence. Therefore, Algerian libraries must balance their socio-cultural role in developing information awareness skills and a culture of lifelong learning, in addition to keeping pace with constantly renewed technologies by focusing on developing human resources skills and being constantly vigilant regarding the needs, behaviors, environments and attitudes of beneficiaries.

#### IV. Conclusion And Suggestion

Through the application of artificial intelligence technologies, numerous prototype intelligent library systems have been created for cataloging, indexing, information retrieval, reference, and other purposes; however, relatively few of these systems have evolved into production systems that are used in the day-to-day operations of libraries. Fox reminds us that: "While AI research has been underway for more than three decades, it is only in the past six years that AI's impact has been measurable."<sup>85</sup> To some degree, the lack of penetration of AI technologies in libraries is due to the fact that appropriate tools and techniques have only been widely available for a relatively short time. However, there were other theoretical, technological, fiscal, and human resource barriers as well, and these significant problems are ongoing.

This paper has outlined some of the major limitations of selected AI technologies of particular interest to libraries and suggested some possible strategies for making progress in building intelligent library systems in Algeria. It is critical that we seek the middle ground

between the view that AI will revolutionize Algerian libraries in the foreseeable future and the view that it will have little or no effect. AI offers us a powerful set of tools, especially when they are combined with conventional and other innovative computing tools. However, it will not be an easy task to master those tools and employ them skillfully to build truly significant intelligent systems.

Algerian Libraries and vendors who have ambitious system development goals are likely to need to invest substantial resources in achieving those ambitions. The use of intelligent library systems is unlikely to be widespread until we move from the current era of hand-crafted intelligent systems to a future era of turnkey intelligent systems. To accomplish this goal, vendors and a small number of progressive libraries will need to create powerful, transportable, and marketable intelligent library systems, based on the continuing advances made in the commercial AI marketplace.

## V. Suggestion

Based on this paper's content it is recommended that all libraries in Algeria should key into the application or adoption of Artificial Intelligence in their library operational system.

- Artificial Intelligence should be introduced in all the sections of libraries so as to ease efficient and faster library operation and service delivery in the contemporary Information and Communication (ICT) Technology era.
- All libraries are enjoined to train and retrain all their members of staff on the use of artificial intelligence in the library system.
- Annual budgetary allocation on training should be included in tertiary institutions' budgets so that staff in all other departments could be trained on the use of artificial intelligence in their departments as this would encourage prompt service delivery.

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