



# Pros and Cons of Artificial Intelligence in 21<sup>st</sup> Century Library and Information Service Delivery

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## Abstract

Artificial intelligence is a new wave of technology that is currently invading every spheres of social institutions. Libraries are dynamic social institutions that changes as the society grow and develop. With advanced technology like artificial intelligence, the library has no choice than to keep abreast of the impending achievement that the new trend will usher in. Artificial intelligence is the property of machines, computer programs and system, created to perform the intellectual and creative functions, solve problems, draw conclusions, and take decision with human intelligence. The paper gives an overview of Artificial Intelligence emergence, its applications in library and information service delivery, utilization of Artificial Intelligence by librarians and users, and benefits of Artificial Intelligence. Some impending challenges of Artificial Intelligence utilization in the library are discussed. The paper suggested that libraries as information centre should strategize and create an enabling workplace to accommodate Artificial intelligence “Robotics”.

**Keywords:** Pros, Cons, Artificial, Intelligence, Library, Information, Service, Delivery

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## INTRODUCTION

The emergence of technologies have revolutionized the world and directly changed the way people do things. Technology has gone beyond the limited capacity of man to delivering accurate

and efficient outcome in any organization. This amount to the reason emerging technologies continue to replace the services of human resources in all spheres of the society and the library is not excluded.

The library is chiefly concerned with the collection, processing, storage and dissemination of information for use. Omehia (2019) posits that the global trend emerging technologies have enabled significant changes from traditional repository, manual service delivery to a more dynamic technology driven environment where information is transmitted instantaneously. The emergence of various Information and Communication Technology tools such as computers, multimedia tools, retrieval facilities, e-materials among others have re-shaped the delivery of information services of the library in the 21<sup>st</sup> century.

In addition to the foregoing, Artificial Intelligence (AI) is a new wave of technology that has become the “centre of attraction” in the 21<sup>st</sup> century. The library as an entity has been influenced by this current trend called Artificial Intelligence. Okpokwasili (2019) described AI as a quasi-magical thing. The OECD AI Experts Group (AIGO), (2017) defined artificial intelligence as the machine based system that can predict, capture, recommend and influence decisions for real or virtual environments, because it uses human-based inputs to perceive real and virtual environments, abstract such perceptions into models in an automated manner using models inference to formulate options for information or action. In a simple term, artificial intelligence (AI) is the area of computer science focusing on creating machines capable of mimicking human behaviors and intelligence. AI encompasses the whole conceptualization of a machine that is intelligent in terms of both operational and social consequences. The functionality of artificial intelligence lies in its perception of imputed information and carries out a specified task based on that information with or without supervision.

In the 21<sup>st</sup> century society, artificial intelligence is a modern technology which is now being utilized in both homes and various organizations. For instance, in today's' financial institutions AI systems has taken the role of manpower in customer service and certain areas of decision making. In our homes, AI are found in the form of dry cleaning machines, robot vacuum cleaners among others. AI machines could comfortably perform the duties of man in almost all the spheres of the society today.

In this current trend the library as part of the society is not left behind. The libraries are information centre's equipped to source, acquire, store, organized, disseminate information materials in print and non-print for users satisfaction and educational development. It can also be viewed as a collection of sources, resources, and services, and the structure in which it is housed. The emergence of information and communication technology has influenced the library as an institution, with rapid changes from print to virtual or digitized documents that can be accessed from anywhere, to the introduction of Web 1.0, Web 2.0 and other emerging technologies and the application of Artificial intelligence AI to library service delivery in the 21<sup>st</sup> century is awesome. The utilization of AI will lead to great breakthroughs in library service delivery from robots to Tesla (TSLA) in fact the future of predictive technology.

## **Overview of Artificial Intelligence**

Artificial intelligence is the general name for the technology for the development of machines, which are created entirely by artificial means and can exhibit behaviors like human beings, without taking advantage of any living organism (Asada, 2015).The term artificial intelligence was first coined by John McCarthy in 1955 academic conference in Dartmouth on the subject,

where major advances in all areas of artificial intelligence were first launched, with significant demonstrations in machine learning, intelligent tutoring, case-based reasoning, multi-agent planning, scheduling uncertain reasoning, data mining, natural language, understanding and translation, vision, virtual reality, games and other topics. These advances have long gained credence like automatic computers that can typically teach, unsupervised, and sometimes beats human records.

The prospect of AI cannot be over emphasized. McConduck (2004) asserts that science fiction writers have used the intelligent machines to advance the fantasy of intelligent non-humans, as it relates to human characteristics. Asada (2015), equally affirms that the AI, is a commonly employed appellation to refer to the field of science aimed at providing machines with the capacity of performing functions such as logic, reasoning, planning, learning, and perception. However, current AI technologies are not limited to specific applications because the information architecture is expanding and changing. Rather, it gives useful shortcuts to apply this knowledge and products for better outcomes especially for the library institution. Machines can often act and react like humans only if they have abundant information to enable it have access to objects, categories, properties and relate between all of them to implement knowledge engineering, initiate common-sense, reasoning and problems solving power (Castrounis, 2017).

Although, AI machines are difficult and tedious to manage, they are simply the next wave of automation, where machines will do the tasks that previously required attention and human intelligence. It is likely that artificial intelligence will soon replace jobs involving repetitive or basic problem-solving tasks, and even go beyond current human capability (Vishal, 2019). In support of this, Penfield (2015) opined that AI has both long and short terms, the latter can replace people by changing the nature of the work that humans do, while the long term, will create more and different types of new jobs.

The advantages of automation in libraries are vast. It enhance the availability and accessibility to information, and providing relevant answers to enquiries is apt. Consequently, the introduction of artificial intelligence in libraries should yet improve the quality of library and information service delivery more efficiently. Mogali (2015) asserts that AI can:

- Take on stressful and complex work that humans may struggle or cannot do
- Complete task faster than human being can.
- Discover unexplored things. i.e. outer space.
- Reduce errors and defects.
- Assist in accessing research jobs in any part of the world with ease.

Based on the foregoing, the introduction of Artificial intelligence (AI) in library and information services will help to improve service delivery significantly. The features of artificial intelligence such as expert systems, fuzzy logic, artificial neural networks, revolutionary algorithms, case-based reasoning, image processing, natural language processing, speech recognition and robotics encompasses the necessary tools for efficient academic research in the library. The most popular artificial intelligence programs are the experts systems, which are computer programs that embody human mention of artificial intelligence which creates vision of electro-mechanical devices replacing human beings (Mogali, 2015).

## **Application of AI in Library and Information Service Delivery**

Computers have long been used in libraries for typical procedures such as acquisition, cataloguing and classification. The introduction of AI open position for another dimension for machine intelligence in library services. Information services such as; reference services, descriptive cataloguing, technical services and collection development, subject indexing, reference services, database searching and document delivery has created underlying design issues of knowledge representation and natural language processing. There is increasing popularity of AI in industries, schools, hospitals libraries, among others, utilizing intelligent system instead of classic system in libraries have come to stay. Mogali (2015) assert that artificial intelligence (AI) framework is the application of computer and utilization of computer based programme and software in the performance of different library operations and functions. While Library Automation according to Senthikumaran and Sreeja (2017) is the use of computer to automate the typical procedures of the library, such as cataloguing, acquisition, charging and discharging among others.

Buttressing the importance of automating library collections, Umahi (2018) opined that AI gives prompt and quick response to requests as well as easy access to information. The integration of AI in library operations will no doubt boost service delivery because AI consists an embodiment of specified information for certain task, but can be difficult for non-specialist to understand. Its ultimate goal is to create computer systems that rival human intelligence, which clearly has major implications for librarianship and information services such as; reference services, descriptive cataloguing, technical services and collection development; subject indexing; reference services, database searching and document delivery. The emphasis is on experts system with computers to provide expert advice and decision like Artificial intelligence (AI) that can be applied in the following library services.

### **Application of Expert System in library Cataloguing**

Cataloguing is a technical process, that is rule based (AACR) designed by librarians for all print and non-print resources in all library or information center in order to provide information access to library patrons. It is referred to as an interpreter or index to library collections. Recent attempts to automate cataloguing through expert systems have focused on descriptive cataloguing because it is considered rule-based (AACR2). Mogali (2015) highlighted two approaches for applying artificial intelligence techniques to cataloguing which are:

- Human–machine interface, where the intellect effort is divided between the intermediary and the support system; and
- An expert system with full cataloguing capability linked to electronic publishing system, so that as a text is been generated on-line, it passes through knowledge base systems and cataloguing process is done without any intellectual input from an intermediary. Thus, this system would provide a means for retention of complex knowledge and scarce expertise.

## **Application of Expert System in library classification**

Classification is the fundamental activity in the organization of knowledge. It is the grouping of knowledge into usable terms. It is one prominent task in all systems for organizing knowledge in libraries and information centers. Application of Expert system in the area of classification in libraries includes the following:

- **Coal Sort:** it is a conceptual browse, designed to serve either as a search or an indexing tool. Coal Sort consists primarily of frame-based semantic network and the software needed to allow users to display portions of it and to move around in the conceptual structure. The expert knowledge in the system is embodied almost entirely in the semantic network.
- **EP-X:** the environmental pollution Expert (EP-X) has certain things in common with coal SORT because both enhances interface using a knowledge based approach. The knowledge base of EP-X consists of hierarchical frame-based semantic networks of concepts and a set of template that express the patterns called the pragmatic relationships among concepts.
- **BIOSIS:** Biosis also an expert system that uses knowledgebase, combine within significant amount of procedural knowledge, to assign documents to categories automatically. It is designed as an indexer aid. BIOSIS uses the information in the titles of documents to assign as many categories as possible of those that would be assigned by human indexers. The indexing languages are structural and practical representation of information that can be used to a very good advantage of AI application.

## **Application of Expert Systems in Reference Service**

Reference service is a prime and sensitive activity of any library and the expert system will work as a substitute for a reference librarian. The following are some of the examples of Expert systems used for reference services:

- **Research:** It is a system that supplies patrons, the recommended sources to lookup for certain questions. The system can be used to teach students reference skills or as a computerized and for practicing reference librarians and information specialists.
- **Pointer:** This is one of the earliest applications of computer system in the area of reference service called computer assisted reference program, it directs the users to the reference sources.
- **Online Reference assistance (ORA):** This system intended to stimulate the services of an academic reference librarian for questions of low and medium level by using several technologies, a videotext like database, computer assisted instruction modules and knowledge based system. It is a 24/7 response services currently utilized by big companies.
- **Answer man:** This is also knowledge based system to help users for reference questions on topics. It uses series of menus to narrow down the subject of the questions and the type of tool needed. It can function as either a consultation system or as front end to external databases and CD-ROM reference tools.

- Plexus: This is a referral tool used mostly in public libraries. It provides knowledge about the reference process, information retrieval about all subject areas, reference sources and library users.

### **Benefits of Artificial Intelligence to Library Service Delivery**

Libraries in the western world have long benefitted from AI “Robotics”. These new technologies have the capacity to imitate human intelligence by performing various tasks that require thinking and learning, solving problems and making various decisions without human interference. There is an increasing popularity of AI in various sectors such as industries, hospitals, schools, military, music, gaming, information sharing among others. Nilsson (2014) affirms that artificial intelligence is creeping into our daily lives like the use of GPS navigation, smart phones and check scanning machines. Application of AI in libraries will promote creativity and innovation as well as adopt new roles and services. Its benefits are immeasurable to library service and can be summarized thus:

- Artificial intelligence will enhance marketing information products and services, from email, voice mail, video conferencing, natural language processing, machine vision, voice recognition for users’ accessibility to information, language translations
- Artificial intelligence in libraries will enhance new services and new goals by reducing the manual daily routine explore and do references operations like on the desk enquires, reduce human errors and fatigue.
- Artificial intelligence can handle multi task like “Avatar” to interact with users to borrow books, check collections.
- Artificial intelligence can improve operational efficiency because of its capacity to accommodate huge information, create seamless exchange of data and research in multiple disciplines
- Artificial intelligence can help libraries to detect fraud, theft, mutilation and others, forensic detector for the eye, finger, and face to admit only registered users’. It definitely attracts funds to the library because of the value and express information service delivery.
- Artificial Intelligence can add value to the institution and aid self research because it can work for long hours giving consistent results.
- Artificial Intelligence can save cost of providing services, by integrating analytics and feedback loops into services and operations, this will help management in improving on service delivery and efficiency.
- AI improves operational efficiency, with workflow becoming easier and flexible. AI maximize operational performance, it is a known fact that computers are faster than human and make less errors, it is perfect for information search and add value to the library.

### **Challenges of AI Utilization in Libraries**

The challenges of AI utilization in libraries are enormous if compared to utilization in other sector like business, medicine, aeronautics and engineering that has long enjoy the gains of AI. Dinesh, Kashmira and Vaishanvi (2019) stated that the following challenges of AI utilization in libraries to include:

**Building Trust: librarians have not built trust on AI,** the tendency for total reliance on the system breeds in challenge of trust on its capability, efficiency and delivery mechanism.

**AI Human Interface:** as the advancement of AI is rising, libraries and information scientist lack skilled professionals who can match the requirement and work with this technology.

**Investment:** AI is an expensive technology globally, for libraries can hardly invest such huge amount of money in computing power. Though adoptability of AI is surging high, but due to huge funds required for its full integration it is not yet dominant in the library and information sphere especially in developing countries.

**Software Malfunction:** AI decision making ability is automatically ceded to code driven Black Box tools with machines and algorithms controlling, these tools can be complex for human understanding. Moreover, due to the lack of ability of human beings to learn and understand how these tools work they have little or no control over the system which is further complicated as automated systems become more prevalent and complex. When software malfunctions it brings down the whole system.

**Data Security:** AI may not guarantee data privacy because the machine learning and decision makes capability of AI and its application too voluminous with classified data, often sensitive and personal in nature. Consequently, makes it vulnerable to serious issues like data breach and identity theft. The data and the decision making of AI could be interfered with high knowledge of computer programming.

**Algorithms bias:** AI is all about data and algorithms. It is already built, trained by using authentic and unbiased data and programme for accuracy in decision making. It is interesting to note that unethical and unfair consequences are inherent in vital decision making, when cases like this arises AI becomes bias because it can be used to promote racism, hate speeches, misinformation, gender inequality among others.

**Lack of common sense:** The ability to judge information beyond its acquired knowledge. AI is limited to the information that is being fed with. It has no capacity to perform any operations beyond its programming.

### **The Way Forward**

AI is playing significant role in all sectors of the globe and the libraries and information specialist must key into the space and tap the benefits before they are relegated to the background. Librarians are known to be defenders of privacy and intellectual property for a very long time, and any data collection in the library either through Artificial intelligence (AI) or Human intelligence (HI) must be treated with caution. For libraries in developing countries there is need to fund such ventures, built infrastructure, re-shape libraries to create workplaces that are flexible and responsive to interactions, fund capacity building to leverage on expertise for the benefits of this technology.

## CONCLUSION

AI and the emerging technologies are playing an increasingly important role in the library and information service delivery. Although still novel and fully untapped in librarianship, the benefits of this happening are widely recognized and beneficial, based on the above, AI should be incorporated into the library systems, libraries should provide a set of principles that guide intellectual growth to facilitate advancement in research machine, self-learning and influence massive volume of data, skilled manpower should be considered in the development of AI as well. Lastly, libraries should be re-shaped to create workplaces that are flexible, and responsive to interactions with external sources of ideas.

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