CATALOGUING AND CLASSIFICATION IN THE ARTIFICIAL INTELLIGENCE AGE: ADVANTAGES AND CHALLENGES

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Introduction

University libraries refers to those libraries established in universities, aimed at bolstering and enhancing the attainment of academic activities of such educational institutions. The primary roles of university libraries encompass the acquisition, organization, preservation, and dissemination of information, thereby facilitating the attainment of the universities' overarching objectives. In addition to that, university libraries perform a range of information services, including circulation, reference, technical support, serial management, user education, reprographic services, Current Awareness Services (CAS), Selective Dissemination of Information (SDI), referral services, information technology assistance, and document delivery services (Adamu, 2023).

The processes of cataloguing and classification are integral to the effective functioning of library operations. This significance arised from the fact that cataloguing and classification are concerned with the systematic organization and generation of metadata pertaining to the library's collections. The magnitude of library collections, encompassing various informational materials such as books, serial publications, reference materials, journals, audio recordings, visual media, cartographic resources, digital files, and electronic texts in university libraries globally, is substantial. Consequently, in the absence of an organized framework, user access to these resources may become virtually unfeasible. To facilitate access to the informational materials housed within university libraries, cataloguing and classification systems are implemented (Tella *et al*., 2023). This integration simplifies and expedites the processes of retrieving and identifying informational resources in library settings. Historically, cataloguing and classification systems within libraries have undergone several distinct phases. These phases encompass manual cataloguing and classification systems, automated cataloguing and classification methodologies utilizing MARC standards and copy-cataloguing, leading to the current era characterized by advancements in artificial intelligence.

The advent of artificial intelligence has fundamentally transformed our operational methodologies and cognitive approaches (Gundakanal and Kaddipujar (2019). Artificial Intelligence (AI) has the

potential to enhance librarians' efficiency, precision, and pertinence in cataloguing and classifying information resources. AI undoubtedly represents one of the burgeoning applications designed to optimize library services at minimal costs upon implementation (Abdullahi *et al*., 2023). Artificial intelligence (AI) is fundamentally concerned with the replication of human cognitive processes by machines, particularly computer systems. Sarmah (2019) opined that AI research focuses on how machines can replicate the intelligence exhibited by their human counterparts. AI is linked to the capability of a digital computer or a computer-controlled robotic system to undertake tasks typically associated with sentient beings. Similarly, Hassani *et al*. (2020) stated that AI encompasses a computer's capacity to identify patterns and execute actions predicated on available data and statistical methodologies.

AI enables computers and machines to replicate human cognitive processes and problem-solving skills. Furthermore, artificial intelligence can be conceptualized as computer systems proficient in executing tasks that have historically been associated with human intelligence.

Concept of Artificial Intelligence (AI)

The term artificial intelligence (AI) encompasses a spectrum of technological innovations that endow computational systems with the capacity to execute a multitude of intricate tasks, such as auditory and textual comprehension, data interpretation, recommendation generation, and visual perception. By virtue of its descriptive capabilities, image identification facilitated by artificial intelligence (AI) enhances the accessibility of visual materials for individuals experiencing visual impairments. Analytical data for the advancement of library collections, AI-infused data analytics empower libraries to augment their collections by elucidating the utilization patterns of various resources (Tella *et al.,* 2023). AI is permeating libraries through various instruments, such as: Cataloguing.ai, Research Rabbit, ChatGPT, Robotics, Scite, Natural Language Processing, Big Data, Chatbots, Perplexity, Text Data Mining, EndNote, Consensus, Elicit, QuillBot and Semantic Scholar (Abdullahi *et al*., 2023). The primary objectives of Artificial Intelligence (AI) encompasses reasoning, discovery, generalization, manipulation of objects, and natural language processing, among others

Artificial Intelligence (AI) constitutes a significant and progressive phenomenon within the contemporary global landscape. This technological advancement presents an opportunity for university libraries to enhance the educational services offered to their patrons through alternative

methodologies. AI is affecting profound transformations across numerous domains and sectors, particularly within the realm of library services. Consequently, Tella *et al*. (2023) posited that the field of Artificial Intelligence (AI) encompasses a vast and intricate spectrum of inquiry, wherein the objective is to enable machines to emulate human functionality, exhibit human-like behavior, and execute decisions akin to those made by humans. The development and design of computing and ICT devices are progressively oriented towards the replication of human cognitive processes and actions, with the paradigm of Human Intelligence (HI) being transmuted into Artificial Intelligence (AI). In contemporary discourse, Artificial Intelligence (AI) has emerged as a principal catalyst for the reconfiguration of our environment and the manner in which we contemplate, behave, and arrive at decisions. The ramifications of Artificial Intelligence extend across a multitude of academic disciplines, encompassing, but not limited to, medicine, surgical practices, automotive engineering, aviation, commerce, industrial sectors, education, and beyond (Prasad and Rohokale, 2020).

The domain of artificial intelligence (AI) has undergone substantial metamorphosis across various disciplines, notably within the realm of library management. Its integration into library systems enhances the effective allocation of resources, augments user satisfaction, and optimizes operational workflows (Luo, 2018). A central application of AI within library management pertains to cataloging and the management of metadata. AI algorithms possess the capability to autonomously scrutinize and categorize extensive volumes of digital content, assign suitable metadata annotations, and systematically arrange resources with high efficiency. Techniques in Natural Language Processing (NLP) empower AI systems to extract essential information from textual documents, thereby facilitating precise indexing and retrieval (Abdullahi *et al*., 2023).

Artificial intelligence represents the most comprehensive concept of the cognitive capabilities exhibited by machines, particularly computer systems. This domain of computer science investigates and develops methodologies and software that empower machines to perceive their environments and employ cognitive processes and learning methodologies to make decisions that enhance the probability of achieving specified goals. Artificial intelligence (AI) constitutes a swiftly evolving academic discipline that seeks to emulate human cognitive functions within machines (Bassey and Owushi, 2023). Consequently, Babatunde (2024) posited that artificial intelligence (AI) has ushered in a transformative epoch in the realms of data analysis and decision-

making. It operates through mechanisms of pattern recognition, trend analysis, and predictive modeling, all without the necessity of explicit programming. AI can be succinctly conceptualized as intelligent actions performed by machines that emulate human behavior.

Advantages of Using AI in Cataloguing and Classification

Enumerating the advantages of AI, Mogali (2014) cited in Tella *et al*. (2023) stated that the advantages embedded in artificial intelligence encompass the cataloging and classification of library collections, the execution of arduous and intricate tasks that may pose challenges for human operators; the ability to accomplish tasks at a rate surpassing that of human capability; a reduction in errors and defects; and an extensive array of functionalities.

Similarly, Owolabi *et al*. (2022) affirmed that the utilization of artificial intelligence to enhance library service operations has become increasingly evident in the aftermath of the global pandemic that emerged in 2020. As a result, various motivations for the adoption of AI in academic libraries within Nigeria are evolving, including shifts in user behavior and the information landscape, the escalating global health crisis necessitating minimal physical interaction, and advancements in the technological landscape such as the proliferation of intelligent, Internet-connected devices, the utilization of advanced digital technologies in domestic settings, and the incorporation of AI assistants into quotidian activities (Poole, 2020). Similarly, a recent investigation conducted by Ridge (2019) enumerates several advantages, which encompass the enhancement of user experience, collaborative partnerships, improvements to systems, proficiency in processes and digitization, the accumulation of contemporary descriptive metadata as a secondary outcome of project initiatives, and the optimization of operational efficiency within library contexts.

To harness the advantages stemming from the implementation of artificial intelligence, Vysakh and Rajendra (2019) opined that numerous libraries have adopted artificial intelligence and have experienced beneficial outcomes from such deployments. The authors further noted that certain libraries in both the developed and developing nations which have yet to implement artificial intelligence in their operations have included its adoption in their strategic plans, whereas some have not. Furthermore, the authors proposed that academic libraries especially the university libraries which have integrated artificial intelligence into their strategic frameworks may have

done so due to their recognition of its potential benefits, while those that have neither adopted nor planned for its implementation may have refrained from doing so due to the challenges it presents.

Challenges of AI in Cataloguing and Classification

Although artificial intelligence (AI) embodies significant potential, numerous challenges exist that libraries must confront in implementing these advanced technologies in cataloguing and classification processes. These challengesvincludes Cost and Infrastructure - The acquisition and maintenance of AI systems entail considerable financial investment. University libraries are required to allocate sufficient resources towards infrastructure development, staff training, and ongoing maintenance to facilitate the successful integration of AI into library operations especially in the area of cataloguing and classification; Privacy and Data Security - AI systems necessitate access to patron data to furnish tailored recommendations and enhance the cataloguing and classification process. University libraries must prioritize user privacy and data security by establishing and enforcing comprehensive policies and protective measures; Expertise - The implementation of AI within cataloguing and classification demands a high level of expertise, University libraries must ensure they employ staff capable of developing, managing, and refining AI algorithms; they may need to engage in partnerships with external specialists and adapt to user needs (Vijayakumar and Sheshadri, 2019).

A segment of librarians contends that the application of artificial intelligence (AI) in library functions encompasses distinct challenges that necessitate resolution prior to the deployment of this technology in library services. Similarly, a variety of obstacles associated with the implementation of AI in libraries have been underscored by CILIP (2021) which include: Issues related to copyright and intellectual property rights (IPR), compliance with the General Data Protection Regulation (GDPR), the financial implications of scaling operations, the reintegration of project data into existing systems, a deficiency of management or executive endorsement, inadequate budgetary resources and funding, an inability to adapt to the accelerating pace of emerging technologies, and the difficulties inherent in the adoption of novel technologies.

Similarly, Ajani *et al*. (2022) outline other bottlenecks to include financial constraints, which are essential for the successful implementation of artificial intelligence within library services. Frequently, libraries may be characterized by insufficient infrastructural support since the effective

deployment of AI necessitates advanced technological tools; consequently, the authors stated that inadequate infrastructure will invariably impede the integration of AI into library services.

The polarization of the workforce, including potential job displacements, is identified as yet another challenge associated with the adoption of AI in libraries. The automation processes and the application of AI may precipitate a substantial increase in socioeconomic inequality (Korinek and Stiglitz, 2017). According to World Bank (2016), that nations in the developing world may exhibit reluctance towards embracing technology due to the associated risk of substantial job losses. Resistance to transformative change poses a significant concern, as certain librarians exhibit a lack of interest in the adoption of contemporary and innovative technologies. The unfavorable attitudes held by some librarians regarding the perceived inadequacy of their IT competencies can present significant obstacles to the effective implementation of AI, given that a portion of librarians may lack proficiency in relevant IT applications.

Echedom and Okuonghae (2021) also asserted that some other challenges encompass inadequate networking, inconsistent power supply, insufficiently trained personnel, obsolete technologies, economic considerations, and the elevated costs associated with technological tools that must be resolved prior to the integration of artificial intelligence within library operations. Notwithstanding these impediments, artificial intelligence is poised to effectuate beneficial transformations in library operations, such as making cataloguing and classification easier, enhanced information delivery services, significant time efficiency, cost-effectiveness, and expedited services for both current and historical patrons.

Similarly, Yusuf *et al*. (2022) in their contribution posited that the challenges associated with artificial intelligence in libraries encompass a deficiency of appropriate infrastructure, widening skill gaps, potential job displacement, an unpredictable power supply, and a proliferation of alternative information sources. Nonetheless, the integration of artificial intelligence is anticipated to diminish the necessity for human participation in numerous library functions.

Conclusion

The processes of cataloguing and classification are crucial to the optimal operation of library systems. This necessity stems from the understanding that cataloguing and classification are

fundamentally linked to the methodical arrangement and creation of metadata associated with the library's holdings. Artificial Intelligence (AI) represents a significant and evolving entity within the modern global context. This technological progression affords university libraries the potential to augment the educational services provided to their constituents through innovative approaches. AI is catalyzing substantial changes across various fields and industries, especially within the domain of library operations and services. Henceforth, university libraries should ensure that they employ personnel that are capable of developing, managing, and refining AI algorithms or engage in partnerships with external specialists to provide pertinent training and support as necessary for the integration of AI into their operations and services, particularly in the realms of cataloguing and classification.

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