ETHICAL ISSUES IN THE APPLICATION OF ARTIFICIAL INTELLIGENCE (AI) IN ACADEMIC LIBRARIES – A STUDY

P. Pologanathan[1]

[1]M.LIS., Bharathidasan University, Trichy. poologan@univ.jfn.ac.lk

INTRODUCTION

Artificial Intelligence (AI) technology refers to the development of computer systems that can perform tasks typically requiring human intelligence, such as learning, reasoning, problem-solving, perception, and decision-making. These systems leverage techniques like machine learning, natural language processing, and computer vision to analyze data, recognize patterns, and make decisions or predictions. AI technology enables machines to continuously improve their performance through experience and adapt to new information, making it widely applicable variety of disciplines such as healthcare, finance, education, Agriculture, Smart Cities, manufacturing, and more. Its goal is to enhance efficiency, automate processes, and offer intelligent, data-driven solutions.

In the high education sector, Academic libraries are specialized libraries that support the educational and research needs of institutions of higher learning, such as Universities, colleges, and research institutes. They provide a vast collection of academic resources for the facilitate study, teaching, and research. Their primary role is to support the academic goals of students, faculty, and researchers by providing relevant resources.

Today, academic libraries use numerous technologies to provide the satisfactory service to their readers. Artificial intelligence (AI) technology is one of them. The application of Artificial Intelligence (AI) in academic libraries offers many benefits, such as enhanced user experience & Information Retrieval, streamlined operations, streamlined research support, learning path recommendations and data analysis capabilities. However, challenges loom large, several ethical dilemmas arise when AI is employed in academic libraries such as Bias in AI Algorithms, Privacy Concerns, transparency and accountability, intellectual Property Rights, job displacement, quality of service and human touch, data ownership and consent, access inequality and ethical Use of AI for Decision-Making. Therefore, this study mainly examines the ethical challenges associated with application of AI in academic libraries, and provides the possible suggestions for the issues.

1.1 Objective of the research:

- To identify and analyze an important ethical issues by application of AI technologies in academic libraries.
- To provide the possible suggestions for ethical challenges associated with AI technology.
- To understand which all are the main areas of library where AI can be Applied
- To identify which AI techniques are to be applied in libraries.
- To examine the impact of AI technologies on the roles of human resource in academic libraries.

METHODOLOGY

This study is mainly used the descriptive method. For this study, data is taken from primary and secondary sources. For the primary sources, some origin books are used related to this study and different database are used for the secondary sources. Specially, this research is conducted by a systematic literature review was adopted to examine ethical challenges associated with the application of AI in academic libraries.

LITERATURE REVIEW

Review of the related literature is an essential part of the research. In the recently, many studies have been carried out on the usage of artificial intelligence (AI) in academic libraries. But this study particularly related "Ethical challenges in the application of artificial intelligence (AI) in academic libraries". So far, only few numbers of researches conducted. Therefore, the author of this research found that a research gap exists, which was necessitated for this research.

Naikar et al. (2024). Explain that applications of artificial intelligence in academic libraries have revolutionized in the industrials. Technological advancements can promote many human talents, including calculation, reading, speaking, grasping, remembering, making judgments, and interactive learning. Virtual reference services driven by AI technology are expected to give libraries a new online service paradigm. Virtual reality is invaluable resource that engages readers with libraries and also it enhances the information literacy skills.

Udo-Okon et al. (2024). The study covered the integration of artificial intelligence (AI) into library management systems and how it has significantly contributed in the library automation services. The study also explains the various obstacles that artificial intelligence in library management systems, and library must overcome these challenges. These obstacles include inadequate content digitization procedures, job displacement, a lackluster maintenance culture, inadequate network connectivity, and problems with ethics, law, society, technology, and finances. Additionally, this study provided a range of solutions for every issue.

Ogwo et al. (2023). The study clarifies that the usages of artificial intelligence (AI) in academic libraries in Nigeria. AI technology completely transforms the resources and services offered by libraries such as Natural language recognition, robotics, big data, data mining, chatbots, machine learning, pattern recognition, and expert systems are a few examples of AI techniques. Furthermore, this study delves into a few of the difficulties that come with implementing AI technologies in Nigerian academic libraries, including poor ICT knowledge and experience, high implementation costs, job displacement, an epileptic power supply, a low maintenance, resistance to change, poor network connectivity, privacy concerns, and ethical considerations, among other issues.

DISCUSSION

4.1 Application of artificial intelligence in varies disciplines

Today, Artificial intelligence is applied numerous fields. Some key applications of AI are followings:

I. HealthCare:

- *Medical Diagnosis:* AI systems analyze medical data likes X-rays, and MRI scans to detect diseases such as cancer, heart disease and diabetes.
- *Drugs Discovery:* AI accelerates drug discovery by predicting how different compounds will affect diseases.
- *Treatments:* AI tailors treatments based on individual patient data, improving precision medicine.
- *Health Assistants:* AI assistants provide basic medical advice and patient monitoring.

II. Finance:

- *Fraud Detection:* AI algorithms detect unusual patterns and potential fraudulent transactions.

- *Risk Assessment:* AI evaluates credit risk by analyzing financial histories, improving decision-making in lending.
- *Customer Support:* AI Chabot handle routine customer inquiries, freeing human agents for more complex tasks.

III. Manufacturing:

- *Quality Control:* AI uses computer vision to detect defects in products, improving quality assurance.
- *Robotics and Automation:* AI powers autonomous robots that work alongside humans in factories, increasing productivity.
- *Supply Chain Optimization:* AI analyzes supply chain data to improve efficiency and reduce operational costs.

IV. Education:

- *Learning:* AI systems adapt lessons to students' individual learning styles.
- Automated Grading: AI speeds up grading processes, especially for standardized tests and objective answers.
- *Tutoring Systems:* AI-powered tutors provide assistance and learning resources tailored to student needs.
- *Administration:* AI helps in managing administrative tasks like scheduling, enrollment, and record-keeping.

V. Agriculture:

- *Precision Farming:* AI analyzes soil data and weather patterns to optimize planting, watering, and harvesting schedules.
- *Crop Monitoring:* AI-powered drones and sensors monitor crop health and detect pests or diseases.
- *Autonomous Farming Machinery:* AI powers tractors, harvesters, and other machinery to operate autonomously, increasing efficiency.
- *Yield Prediction:* AI models predict crop yields based on environmental conditions.

VI. Smart Cities:

- *Public Safety:* AI helps monitor public areas using cameras and sensors, detecting suspicious activities and alerting authorities.
- *Waste Management:* AI systems can optimize waste collection routes and processes to reduce costs and environmental impact.
- *Smart Infrastructure:* AI-powered systems control lighting, traffic signals, and utilities, improving efficiency and sustainability.

VII. Security

- *Cyber security:* AI detects and responds to cyber threats in real-time, analyzing network traffic and identifying malicious activities.
- *Facial Recognition:* AI-based facial recognition is used for surveillance, identity verification, and access control.
- *Behavioral Analysis:* AI monitors user behavior to detect anomalies.

4.2 Application of Artificial intelligence in Academic libraries:

Artificial Intelligence (AI) is significantly transforming academic libraries, improving efficiency, enhancing user experience, and optimizing library management. Here are key applications of AI in academic libraries:

I. Smart Cataloging & Indexing:

- *Automated Metadata Creation:* AI helps in creating and assigning metadata for library resources (books, research papers, and multimedia), making the indexing process faster and more accurate.
- *Semantic Search:* AI improves search functionality by understanding the query and delivering more relevant results, beyond traditional keyword-based searches.
- *Data Integration:* AI links library data with other related datasets to enhancing the discoverability of academic resources and creating a rich knowledge network.

II. Learning Path Recommendations:

- AI can help students and researchers by recommending relevant academic materials based on their progress, research interests, and learning goals.

III. Virtual Assistants & Chatbots

- *User Support:* AI chatbots provide the answering common questions, helping with catalog searches, and guiding users in navigating digital resources.
- *Research Assistance:* Virtual assistants can assist with advanced tasks like citation management, research topic suggestions, and guiding users through complex databases.

IV. Administrative Tasks

- *Acquisition & Budgeting:* AI analyzes the user needs and resource, usage to recommend acquisitions and optimize library budgets, reducing manual workload.
- *Resource Management:* AI helps libraries manage their physical and digital collections more effectively, and handling interlibrary loans.
- *Library analytics:* AI can be employed to analyze library data and provide insights into user behavior, service effectiveness, and operational efficiency.

V. Digital Preservation & Archiving:

- *AI-Powered Digitization:* AI assists in the digitization of physical documents, automating tasks such as text recognition (OCR), image enhancement, and metadata generation.
- *Content Preservation:* AI monitors digital content to detect and prevent degradation, ensuring the long-term preservation of materials in digital repositories.

VI. Plagiarism Detection and Academic Integrity:

- *Plagiarism Detection Tools:* AI-powered tools scan academic works for potential plagiarism, checking against vast databases of scholarly content and other online sources.
- *Academic Integrity Support:* AI systems help libraries uphold academic integrity by analyzing research papers for originality.

VII. AI-Enhanced Research Support:

- *Data Mining & Analysis:* AI tools assist researchers by analyzing large datasets, automating data mining, and providing insights for academic research projects.
- *Research Impact Analysis:* AI systems evaluate the impact of research publications by analyzing citation data and other metrics. Through this, libraries support to faculty in showcasing their academic contributions.

VIII. Library Security and Privacy:

- *Facial Recognition for Access:* AI-based facial recognition can enhance security by controlling access to restricted areas within the library or protecting sensitive collections.
- *Data Privacy Management:* AI helps libraries manage user privacy by monitoring data usage and securing personal information.

IX. Text and Data Mining (TDM) Services:

- *Automated Text Analysis:* AI assists students and researchers in performing text and data mining, extracting valuable information from vast amounts of academic literature and datasets.
- *Research Discoveries:* AI tools can identify patterns, trends, and hidden relationships within academic literature, accelerating new discoveries across disciplines.

X. Accessible Services

- *AI-Powered Assistive Technologies:* AI aids visually or physically impaired individuals by converting text to speech, offering voice search capabilities, and helping with resource navigation through specialized interfaces.
- *Multilingual Support:* AI can translate documents or interfaces into multiple languages, helping non-native speaker's access academic content in their preferred language.

XI. Web Designing:

- The main purpose of libraries' websites is to provide users with information about the resources and services they offer. The website for the library attests to its existence on the internet, enhancing its visibility. However, coding knowledge is necessary for designing or building a website. In this case, a library expert can construct a website with minimal coding knowledge by utilizing a combination of artificial intelligence, machine learning, and content management systems such as WordPress, Joomla, Drupal, Google Sites etc.

XII. Predictive Analytics

- *Collection Development:* AI analyzes usage data and academic trends to predict future needs, helping libraries proactively develop collections that align with emerging research areas and disciplines.
- *Usage Prediction:* AI models can predict which resources will be in demand during different periods, allowing libraries to adjust availability and resources accordingly.

4.3 Ethical issues in applying the artificial intelligence in academic libraries:

While AI can bring efficiency and innovation, it can also lead to issues related to privacy, bias, transparency and accountability. Below are some of the key ethical concerns when implementing AI in academic libraries.

I. Privacy and Data Security:

- *User Data Collection:* AI systems often collect and analyze vast amounts of user data, such as search histories, borrowing patterns, and reading preferences. This raises concerns about how much personal information is being tracked and how it is used.
- *Informed Consent:* Libraries must ensure that users are aware of the data being collected and obtain their informed consent, especially when AI systems analyze user behavior to offer personalized services.
- *Data Breaches:* AI systems managing personal data can become targets for cyber-attacks. Ensuring robust security measures to protect sensitive information is essential to avoid breaches that could compromise user privacy.

II. Bias and Fairness:

- *Algorithmic Bias:* AI systems can inherit biases from the data they are trained on. For instance, if a recommendation system is based on historical data, it may reflect or reinforce existing biases in access to resources, favoring more popular or well-established fields over less represented ones.
- *Discriminatory Access:* AI could inadvertently limit access to resources for certain groups of users. For example, if the algorithm over-prioritizes materials for majority user groups, minority researchers or interdisciplinary fields may receive fewer relevant recommendations.
- *Underrepresented Voices:* There is a risk that AI systems may disproportionately prioritize materials published by dominant or privileged communities, sidelining underrepresented voices and alternative perspectives.

III. Transparency and Accountability:

- *Opaque Algorithms:* Many AI systems function as "black boxes," where the decision-making process is not transparent to users or even librarians. This lack of transparency makes it difficult to explain or justify AI-driven decisions, such as why certain materials are recommended over others.
- *Lack of Accountability:* When AI systems make errors—such as recommending inappropriate resources, categorizing items incorrectly, or failing to respect privacy—there may be confusion about who is responsible for addressing these issues: the library, the AI developers, or the system itself.
- *Impact on Intellectual Freedom:* If AI systems are used to filter or recommend content, there is a risk that they could unintentionally limit access to diverse viewpoints or suppress controversial ideas, compromising the library's commitment to intellectual freedom.

IV. Loss of Human Expertise:

- *Erosion of Professional Roles:* As AI takes over tasks like cataloging, reference assistance, and resource recommendations, there is concern that the role of librarians as knowledge mediators and subject matter experts could be diminished.
- *Over-Reliance on Technology:* Relying too heavily on AI could lead to a situation where users no longer engage critically with the search process, trusting AI recommendations without questioning the underlying assumptions or algorithms driving those suggestions.

V. Intellectual Property and Copyright:

- *Unauthorized Use of Data:* AI systems may access and use copyrighted works (e.g., for text and data mining) without proper licensee or permissions, raising legal concerns regarding the use of proprietary content.

- *Fair Use Issues:* The use of AI in digitizing and making content accessible must navigate the complex landscape of fair use and copyright law. Libraries need to ensure that their AI-driven services comply with these legal frameworks, especially when providing access to digital materials or recommending research resources.

VI. Autonomy & User Manipulation:

- *Manipulation through Personalization:* AI systems can personalize recommendations based on user behavior, but over-personalization may lead to effect, where users are only exposed to materials that align with their existing interests or biases. This can limit intellectual exploration and discovery, restricting users' academic autonomy.
- *Influence on Research Choices:* If AI systems prioritize certain kinds of resources based on popularity rather than quality or relevance, there is a risk that academic work could be unduly influenced by the system's choices, impacting the diversity and depth of research.

VII. Ethical Use of AI in Research Assistance:

- *Accuracy of AI Recommendations:* AI tools that assist researchers by recommending articles, citations, or sources may sometimes offer incomplete or inaccurate suggestions. If users rely solely on these AI-driven tools without critical evaluation, it can negatively impact the quality of their research.
- *AI in Plagiarism Detection:* AI-powered plagiarism detection tools must balance between thoroughness and fairness. Over-reliance on such systems can result in false positives, where legitimate work is flagged as plagiarized, potentially harming a student's academic reputation.
- *Environmental Impact of AI:* AI systems, particularly those that rely on large-scale data processing and machine learning, require significant computational power, leading to concerns about their environmental impact.

VIII. Equity of Access:

- *Digital Divide:* AI-driven services require significant technological infrastructure and user access to digital tools. Students or researchers from less affluent backgrounds, or those with limited access to technology may be at a disadvantage if AI becomes a core part of library services.
- *Accessibility Issues:* While AI can improve accessibility for some users, it can also introduce new barriers. AI tools may not be optimized for users with individuals unfamiliar with advanced technology, thus exacerbating inequities in library services.

IX. Sustainability:

- *Environmental Impact:* The use of AI systems, particularly those requiring large-scale data processing, can consume significant computational resources, contributing to higher energy usage. Libraries adopting AI must consider the environmental sustainability of their digital infrastructure.

X. Censorship & Control:

- *Algorithmic Censorship:* AI systems, if not carefully designed, may inadvertently suppress certain types of content, leading to biased knowledge curation. This could limit academic freedom by restricting access to controversial or diverse materials.

- *Content Filtering:* AI-powered content filtering tools, if used inappropriately, could lead to censorship by blocking or de-emphasizing access to resources that are deemed inappropriate or irrelevant by the algorithm but are valuable for academic research.

4.4 Mitigate the Ethical Challenges in Academic Libraries:

To mitigate above mentioned ethical challenges, academic libraries should follow the following steps,

(i) *Transparent AI systems:* It allows users to understand how decisions are made.
(ii) *Data protection:* Adhering to strong data security policies and regulations.
(iii) *Promote inclusivity:* by designing AI systems that account for the diverse needs of all library users.
(iv) *Maintain human oversight* by combining AI tools with human expertise to enhance, rather than replace, personalized library services.
(v) *Establish clear policies* on how AI is used, including consent mechanisms and accountability structures.

CONCLUSION

In conclusion, the application of AI in academic libraries presents both opportunities and ethical challenges. While AI technology can significantly improve library services, enhance resource accessibility, and streamline operations, it also raises important ethical concerns related to privacy, data security, algorithmic bias, transparency, and the potential displacement of human roles. Addressing these issues requires thoughtful consideration of how AI impacts users, ensuring that technologies are implemented in ways that promote fairness, inclusivity, and accountability. By adopting transparent policies, prioritizing user consent, and maintaining human oversight, academic libraries can harness the power of AI while safeguarding ethical standards and preserving their core values of equitable access to information and academic integrity.

REFERENCES

Das,R.K.,& Islam,M.S.U. (2021). Application of artificial intelligence and machine learning in libraries: a systematic review. Retrieved from arXiv preprint arXiv:2112.04573.

Mannino, A., Althaus,D., Erhardt,J., Gloor,L., Hutter,A. & Metzinger,T. (2015): Artificial Intelligence: Opportunities and Risks at the Effective Altruism Foundation (2): 1-16.

Naikar, S.,Hatti,S., Paul,M.,& Swamy,R. K.(2024). Artificial Intelligence (AI) in Academic Libraries: A Theoretical Study. In Multidisciplinary Approach to Information Technology in Library and Information Science (pp. 81-97). IGI Global.

Ogwo, U., Ibegbulem, F., & Nwachukwu, V. N. (2023). Applications and perceived impact of artificial intelligence in academic libraries in Nigeria. Library Philosophy & Practice.

Omame,I.M., & Juliet C. Alex-Nmecha. (2020). Artificial Intelligence in Libraries Chapter 3 · January 2020DOI: 10.4018/978-1-7998-1116-9.ch008 Retrieved from : https://www.researchgate.net/publication/338337072_Artificial_Intelligence_in_Libraries

Russel, S., & Norvig. P.(2022). Artificial Intelligence: A Modern Approach. Person publisher.

Subaveerapandiyan A (2023): Application of Artificial Intelligence (AI) In Libraries and Its Impact on Library Operations Review at DMI-St.Eugene University (Zambia): Library Philosophy and Practice (e-journal).7828.

Udo-Okon, T. N., Akpan, E. E., Fcicn, P. D., & Ap, P. (2024). The challenges of artificial intelligence in library management system. Information science, 6(1).