

The Ethical Issues Associated with Using AI Technologies in Libraries

القضايا الأخلاقية المرتبطة باستخدام تقنيات الذكاء الاصطناعي في المكتبات

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Abstract:

This study aims at uncovering the ethical challenges related to the employment of Artificial Intelligence in libraries by analyzing its implications on information services and beneficiaries. AI has become a key tool in developing library work by means of multiple applications that have improved service quality and facilitated information sources access. Despite AI's major benefits in libraries, its use raises critical ethical challenges: algorithmic transparency, intellectual property, data protection and the impact on users' trust.

The study adopted the analytical descriptive methodology to review literature and analyze these issues. It found that AI is a real opportunity to develop library services and enhance their efficiency. Nevertheless, its intensive employment has resulted ethical challenges impacting trust in libraries.

Keywords: Artificial Intelligence, Libraries, Ethics, Privacy, Transparency.

ملخص:

هدفت هذه الدراسة إلى الكشف عن التحديات الأخلاقية المرتبطة بتوظيف الذكاء الاصطناعي في المكتبات، وذلك من خلال تحليل انعكاساته على خدمات المعلومات والمستفيدين، فقد أصبح الذكاء الاصطناعي أداة أساسية في تطوير العمل المكتبي عبر تطبيقات متعددة أسهمت في تحسين جودة الخدمات وتسهيل الوصول إلى مصادر المعلومات. ورغم الفوائد الكبيرة للذكاء الاصطناعي في المكتبات، إلا أن استخدامه يثير تحديات أخلاقية بارزة مثل قضايا الشفافية في الخوارزميات، الملكية الفكرية، حماية البيانات، وتأثيرها على ثقة المستفيدين.

اعتمدت الدراسة المنهج الوصفي التحليلي لمراجعة الأدبيات وتحليل هذه القضايا. وتوصلت الدراسة إلى أن الذكاء الاصطناعي يمثل فرصة حقيقية لتطوير خدمات المكتبات وتحسين كفاءتها، كما أن توظيفه المكثف أفرز تحديات أخلاقية مؤثرة على الثقة بالمكتبات.

كلمات مفتاحية: الذكاء الاصطناعي، المكتبات، الأخلاقيات، الخصوصية، الشفافية.

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1. Introduction

The world, today, is witnessing an unprecedented knowledge transformation alongside different types of technology. Artificial Intelligence comes at the forefront as a fundamental element that contributes to digital transformation and reshaping various fields. Libraries, as knowledge and service entities, have prominently begun the introduction and utilization of this technology to enhance their services, facilitate individuals' access to information sources, and improve the user experience.

AI capabilities, founded upon algorithms that mimic human thinking and assist in decision-making, have affected library activities in various areas such as automated cataloguing, intelligent recommendation systems, interactive chat services, and virtual and smart libraries, in addition to robots that provide assistance and support to users. This technological trend has increased the efficiency of library operations, expanded access to resources, and delivered modern services that meet the needs of the knowledge society.

Despite the multiple advantages of this transformation, it has produced a set of ethical problems related to the employment of AI in library services, which necessitates attention and addressing, most prominently the issues of privacy protection and data security, the degree of algorithmic transparency, intellectual property problems, fairness in information accessibility for all, in addition to concerns related to the loss of certain jobs because of the increasing reliance on automation. These issues have imposed on libraries the necessity of establishing clear ethical frameworks and principles to use AI technologies in their activities, to achieve balance between leveraging the advantages of this technology on one hand, and preserving professional values and user rights on the other.

2. Study Problem:

Libraries have recently witnessed an increasing trend towards adopting AI applications aiming at developing their services and improving their efficiency in line with the requirements of the knowledge society. Yet, this deployment, despite its many advantages, has produced ethical challenges associated with privacy protection and data security, ensuring transparency and fairness, alongside issues of intellectual property and concerns about the loss of certain jobs due to automation. Therefore, the study's main problem revolves around: What are the most prominent ethical issues associated with AI applications in libraries? How can they be addressed to ensure achieving a balance between benefiting from these technologies and preserving the profession's ethical values?

2.1 Sub-Questions:

Based on this problem, we can formulate a set of sub-questions as follows:

- What are the main AI applications used in the modern library environment?
- What are the positive impacts achieved by using AI at the level of library services and users?
- What are the ethical challenges and problems brought up by the use of AI in libraries?
- How can these challenges impact users' privacy and intellectual property rights on one hand, and their right to access information on the other?
- What ethical frameworks and principles can libraries adopt to ensure the responsible use of AI?

- How can a balance be achieved between employing AI and benefiting from its advantages, and preserving the human and professional dimension of library services?

3. Importance of the study:

The importance of this topic lies in its focus on a contemporary and vital aspect of the library environment. It is the deployment of AI technologies, which have brought about a qualitative shift in different sectors and have had a profound impact on the methods of organizing and providing access to information. This importance is increasing due to that libraries, as knowledge institutions, are supposed to adopt the latest technological tools to improve their services and meet their users' increasing needs. Nevertheless, the integration of AI into library work faces ethical challenges, making their study a scientific and professional necessity to ensure the responsible use of these technologies. Hence, researching this topic enriches the theoretical knowledge on one hand, and offers practical recommendations to help libraries formulate sound ethical policies and frameworks, on the other.

4. Study Methodology:

The study adopted the analytical descriptive method. It used description to present the different applications of AI in the library environment, such as automated cataloguing, recommendation systems, and smart chats. Meanwhile, the use of analysis allowed for deconstructing the ethical challenges resulting from these applications, including issues of privacy, data security, intellectual property, and fairness in access to information. This methodology also enabled benefiting from previous literature and relevant theoretical and applied studies. All this helps building a comprehensive perspective highlights the benefits of AI in libraries on one hand, and sheds light on the risks and ethical problems on the other. Accordingly, the analytical descriptive method provided a solid scientific framework to achieve the objectives of the study, namely: understanding the phenomenon, identifying its implications, and proposing solutions and ethical principles that ensure the responsible use of modern technologies in the field of libraries.

5. Definition of Artificial Intelligence:

Artificial Intelligence is defined as the ability of a machine to simulate the human mind and its way of functioning, such as its ability for thinking and exploration. With the major developments in computers, it has become clear that they can perform more unusual complex tasks, such as exploring and proving complex mathematical theorems, and playing chess skilfully. Artificial Intelligence is characterized by its speed in performing tasks accurately and its large storage capacity. Some applications have managed to match the performance level of experts and professionals in performing specific tasks, such as: medical diagnosis, computer search engines, and the ability to recognize speech and handwriting. (Idā'āt, 2021, p. 01)

It is also defined as a new science aimed at giving machines and computers full and literal intelligence, and automating activities associated with human intelligence, such as decision-making, problem-solving, and learning. (Jabr, 2024, p. 06)

6. Key Applications of AI in the Field of Libraries:

Recently, the use of AI in the field of libraries and information has become increasingly active. All fields are interested in integrating and benefiting from its applications. Many different uses of AI have emerged in the field of libraries, the most important of which include:

6.1. Smart Libraries and AI: The deployment of AI in building and designing smart libraries is a prominent modern and advanced trend. These libraries represent the next generation after digital libraries. AI, with its diverse applications, endows them with unique advantages, making them an integrated environment for managing library institutions and developing their infrastructure and services. This encompasses hardware, furniture, and dedicated management systems. It also contributes to developing the skills of the smart librarian capable of meeting the needs of the smart user.

6.2. Expert Systems and AI in Libraries: Expert systems are among the most important and highly successful applications of AI. It is expected that these systems will permeate all fields requiring the work of specialized experts. Expert systems based on natural languages have been developed, and through these systems, data can be analyzed, and programmes for crisis management can be designed. (Ahmed, pp. 12-13)

Hence, expert systems in libraries are viewed as a type of solution for all problems faced by information institutions. They act as the interface or face of AI, aiming to facilitate access to databases and information retrieval. They can be utilized to provide consultations, make decisions, or propose solutions for specific situations, in addition to many other library tasks such as storage, retrieval, cataloguing, indexing, abstracting, and reference work. (Hindi & Hindi, 2022)

6.3. Smart Robots in Libraries: Various libraries have adopted automated systems for retrieving, storing, and organizing various collections. Many countries have also sought to exploit AI applications in this field by designing smart robots that undertake some services mimicking the tasks of information specialists. For example, in the United States, the American Library Association (ALA) has provided numerous resources to help library professionals understand AI and its applications. This is done by encouraging the acquisition of library materials that reflect this technology and issuing reports exploring AI and machine learning technologies in libraries. The ALA also participates in many discussion sessions alongside the conferences and seminars it organizes, which cover everything related to AI.

One of the most notable experiences presented by the ALA in collaboration with Google to serve libraries is the Books to Talk project. This project allows users to type a question, inquiry, or keywords, and the system retrieves complete sentences from related books. (American Library Association, 2019)

Additionally, the University of Santa Clara library uses automated systems to store, organize, and retrieve library collections. At the Westport Public Library in Connecticut, USA, training classes are dedicated where the robots "Nancy" and "Vincent" teach children computer programming skills, with the ability to speak in 19 different languages. (Sardouk, 2020)

Libraries at the University of Oklahoma, USA, opted for the automated bibliographic assistant, while the University of North Carolina library uses the Book Bot system for retrieving books within the library and returning them to shelves. Similarly, the University of Minnesota library utilizes an automated storage system that allows for retrieving materials and making them available to users within one minute.(Abdelkader, 2021)

Academic libraries in the United States also use Chatbots to provide services related to answering inquiries and questions posed by users. The University of Nebraska-Lincoln was the first to start using a Chatbot; its library's automated chat programme answers approximately 700 questions per month.(Ghuloum, 2022)

6.4.Smartphone Applications in Libraries: Smart mobile applications are considered a branch of AI. They have become one of the most used tools for accessing the internet, even more than computers. Therefore, libraries relying on smartphone applications have become a necessary and inevitable matter. They are used in delivering library services, facilitating some technical tasks and communication with users, and broadcasting content through smartphone platforms. Undoubtedly, they have been used to bridge the gap between the virtual and physical environments of libraries.

Smartphones have enabled modern applications that the library can invest in to develop its services and provide information to users in the easiest and simplest ways. The mobile library in the internet age is defined as the library that provides its services anytime and anywhere using mobile devices and the internet via mobile phones.

Other technologies used in libraries include Quick Response (QR) Codes. These are distinguished from traditional barcodes by their ability to store a larger amount of data in a two-dimensional format, allowing for the addition of text, electronic links, phone numbers, and other information. This technology is employed in libraries in several ways, such as placing them on book covers to link them to sources or bibliographic lists, including them in catalog records to facilitate direct access to sources, affixing them to shelf labels, and adding them to flyers and introductory lists.

As for reference services, despite their historical importance and evolution over time, the digital transformation and the spread of smartphones necessitate their redesign to become faster and more effective. This includes providing the possibility for immediate response to inquiries and delivering remote reference service, achieving maximum benefit for users in a mobile environment. (Hafez, 2019)

7. Areas of AI Application in Libraries:

The practical benefits of AI are as follows:

7.1 In the Field of Cataloguing and Classification:

Machine learning contributes to the process of extracting bibliographic data with high accuracy through a set of recently developed open-source software. These systems extract bibliographic data and metadata from articles, research papers, and scientific documents, then convert these raw and heterogeneous sources into standardized, structured documents based on the TEI/XML format(Ahmed M. , 2022). The importance of AI in cataloguing and classification lies in the following:

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7.1.1. Automatic Generation and Enrichment of Metadata: AI systems can extract, generate, and enrich metadata from digital sources using machine learning techniques, reducing the need for manual entry.

7.1.2. Automatic Subject Heading Assignment: Natural Language Processing techniques are used to automatically assign subject headings to library materials, contributing to more accurate content organization.

7.1.3. Authority Control: AI can help maintain consistency in names and distinguish between similar names. Some experts have shown that machine learning algorithms can significantly improve name authority control.

7.1.4. Support for Cataloguing Materials in Multiple Languages: AI technologies facilitate cataloguing in multiple languages. The role of machine translation in supporting catalogers working with materials in languages they are not proficient in is being explored, including translating book titles, descriptions, and full texts. This benefits libraries that hold materials in different languages.

7.2. Enhancing the Classification Process: Machine learning algorithms can be used to automatically assign classification numbers to library materials. They can also enhance existing systems and develop more flexible and usable systems. AI supports the implementation of faceted classification systems, where machine learning can generate and apply facets to enhance the multi-dimensional representation of library resources. In classification, machine learning algorithms can analyze texts, images, and metadata to create categories for materials.

7.3. Subject Indexing:

The process of assigning terms to documents to indicate the subject headings they cover is an activity that can benefit from AI. Although subject indexing is not as rule-based as descriptive cataloguing, it must follow certain guidelines. For example, a set of rules might determine which subheadings can be used with which categories of main headings.

7.4. Personalized Recommendations:

Personalized recommendations are among the most prominent applications of AI in digital libraries. They rely on advanced algorithms to analyze user behavior and preferences by studying previous searches, resources viewed, and interaction duration with each item. This allows for the creation of dynamic user profiles that are continuously updated with each new activity, enabling the system to suggest highly relevant knowledge materials aligned with the reader's interests. These recommendations help introduce users to new resources they were previously unaware of, broadening their intellectual horizons and encouraging them to explore new fields.

7.5. AI-Powered Chatbots and Virtual Reference Services:

AI-powered chatbots and virtual reference services are innovative solutions that have brought about a qualitative shift in library services. They provide immediate reference support to users 24/7, without being bound by traditional working hours. These chatbots can interact with users via text or voice, answer their inquiries, guide them to appropriate sources, and assist them in searching for information accurately and quickly. They are also

distinguished by their ability to learn continuously from previous interactions, which increases the quality and accuracy of answers over time.(Bal, 2023)

8. Advantages of Using AI in Libraries:

AI is used in various workplaces, and libraries are among the fields that have embraced this technology. The following is a summary of the advantages of AI in libraries:

8.1. Enhancing Scientific Research: AI analyzes big data and generates new insights, facilitating the scientific research process and helping to discover new relationships and trends in knowledge.(Awad, 2024)

8.2. Improved Operational Efficiency: Libraries can increase productivity and accelerate workflows by automating repetitive tasks such as information retrieval, classification, and cataloguing using AI technologies. Through the use of AI-powered algorithms, they can analyze large volumes of data more quickly and allocate resources more effectively.

8.3. Enhanced User Experiences: AI-enabled devices and software can improve user experiences by providing personalized recommendations, predictive search functions, and interactive virtual assistants. This customized approach to service delivery allows libraries to better meet the specific requirements and preferences of their users, increasing user satisfaction and engagement.

8.4. Expanded Access to Information: Advanced search engines and recommendations made possible by AI technology enhance access to information. By using machine learning and natural language processing techniques, libraries can improve the discoverability of their collections and provide users with relevant materials aligning with their interests and needs.

8.5. Data-Driven Decision Making: Libraries can leverage data analytics and predictive modeling using AI for service planning, collection development, and efficient resource allocation. By studying usage trends and user behavior patterns, libraries can streamline their operations and adapt their services to meet the changing needs of their patrons.

8.6. Innovative Service Offerings: AI opens up new opportunities for libraries to innovate and expand their range of services. From virtual reality experiences to AI-assisted research support, libraries can harness emerging technologies to deliver unique, immersive experiences for their clients that foster creativity and inquiry.

9. Difficulties in Implementing AI in Libraries:

9.1. Technological Difficulties: The main challenge libraries face when implementing AI is technological constraints. Integrating AI technologies requires a certain level of digital literacy, which poses a significant hurdle, as not all library staff possesses the necessary skills to use these technologies effectively. A report from the United Kingdom discussed how the digital divide is not just about access to technology but also the ability to use it. This applies particularly to libraries, where staff needs training to use AI technologies, which can represent a significant investment of time and resources.

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The rapid pace of technological change adds another layer of complexity, as libraries must continuously update their systems and train their staff to keep up with the latest developments.(Chris, 2023)

9.2. Availability of Vast Digital Content:The proliferation of digital content online has necessitated that libraries adapt by offering distinguished multimedia digital content and organizing digital events to attract audiences and maintain their relevance. It has also become imperative for libraries to transform from mere book repositories into centers for innovation and continuous learning through services such as 3D printing and creative spaces. This shift reflects libraries' commitment to meeting the evolving needs of society and supporting lifelong learning and innovation.

9.3. Financial Aspect:Amid the financial difficulties and challenges facing libraries and cultural institutions globally, it is crucial to understand the importance of these institutions adapting to various changes and leveraging modern technologies to enhance library performance and user experience. To achieve this, it is necessary to improve public funding allocated to libraries, or to benefit from partnerships with the private sector, relevant organizations, or grants.

9.4. Job Displacement:Many library specialists express concern about the potential for AI to dominate the work environment, which could lead to job losses due to AI's superiority in many tasks that were primarily human-dependent. Amid this transformation, libraries will need to redesign their services to meet the needs of workers who may lose their jobs. However, the challenge lies not only in the potential disappearance of certain roles but also in the transformation of the profession's nature.

9.5. The Human Touch in a World Full of Digitalization:Despite the ongoing global digital transformation, there is still no substitute for the human touch- something that libraries genuinely excel at. Libraries are not just about books; they are about connecting people, providing tailored assistance, and engaging everyone in the community. Librarians are crucial because they do more than just direct users to the right bookshelf; they help everyone discover information. This human connection, guidance, and empathetic behavior from librarians risk being diminished by AI's efficiency, potentially leading to a future where human connection in libraries and human qualities lose their perceived value.(Arab Union Catalog Blog, 2025)

10. Ethical Challenges Facing the Use of AI in Libraries:

10.1. Privacy, Data Security, and Confidentiality in AI-Powered Library Services:Data privacy and protection are critical ethical concerns in library systems that rely on AI. AI technologies often depend on vast amounts of user data to function effectively, raising questions about how this data is collected, stored, and used. Libraries must implement stringent data protection measures to ensure information is secure and used in compliance with privacy regulations. The General Data Protection Regulation (GDPR) in Europe and similar frameworks in other regions provide guidelines for managing user data.(Adams & Martin, 2023)

In the field of humanities research, it is essential to address the points of information reliability and privacy, as conventionally understood in this field. Participants are typically

required to provide their signature and consent, with the understanding that their information and various details will remain protected, and only the information agreed upon for publication will be shared. However, this can conflict with how AI tools operate, which often use all input information in machine learning algorithms. This raises many questions about the ability to protect user privacy.(Zaghar, 2024)

10.2. Transparency:Transparency in AI systems within libraries is a fundamental element for fostering trust and understanding among both users and staff. It is important that these systems are clear in how they make decisions, whether related to recommending resources, classifying them, or filtering search results. Users should be able to understand the reasons that led the system to suggest a particular book or article. This clarity reduces confusion and enhances trust in library services.

To achieve this, libraries should ensure that all stakeholders are informed about how AI tools work by providing explanatory interfaces or simplified documentation that helps users understand the logic behind these decisions and their implications. Accountability complements transparency by ensuring libraries take responsibility for the ethical use of these systems. This involves establishing clear monitoring mechanisms to track their performance, address errors, and respond to any potential harms that may result from AI outputs.(Raji, 2020)

10.3. Intellectual Property Concerns in AI-Powered Library Services:Intellectual property (IP) concerns arise when AI is used to create or manage content in library services. AI systems can generate, organize, or modify content, raising questions about ownership and rights associated with these creations. Libraries must navigate complex IP laws to ensure proper management of AI-generated content and respect copyright regulations. This includes clarifying ownership of works created by AI and ensuring appropriate attribution and licensing according to legal standards.(Yusuf, Ibrahim, & Sedick, 2024)

10.4. Social Effectiveness:AI should contribute to enhancing social well-being and community development, serving the public good, while avoiding deployment in ways contrary to that objective. The social aspects of libraries represent a fundamental basis for developing their services by providing data about their environment, its knowledge needs, and the trends that should be supported. The challenge lies in the ability of libraries to interact with their social environment and their effectiveness in meeting those needs. The question remains whether AI will support this social role of libraries or deepen the gap between them and their environment.(Bouldani, 2025)

10.5. Job Loss:Robots are one of the most prominent applications of AI technologies, reused in multiple fields and primarily employed to perform routine tasks in libraries. For example, "automated interaction" can be used to make certain decisions instead of humans. This interactive technology is also used to enhance social communication, particularly in healthcare, elderly care, and services related to special needs. However, this increasing reliance on AI raises a fundamental issue concerning the safety of replacing humans with machines and the potential resulting loss of many jobs, which in turn sparks real social and economic concerns.

11. Key Solutions to Address Ethical Problems Related to AI in Libraries:

The most important ethical frameworks for using AI in libraries are:

11.1. Involving Librarians and Users in Developing AI for Libraries: Developing AI systems in libraries requires the engagement of all stakeholders to ensure their effectiveness and ethicality. Librarians contribute their expertise to align systems with the library's mission. Users participate through surveys and advisory councils to guide decisions. Developers collaborate with libraries and ethics committees to ensure compliance with standards, while policymakers establish the necessary legal and legislative frameworks. This integrated approach helps foster trust, transparency, and a sense of collective ownership in the use of AI.

11.2. Establishing Core Ethical Principles and Frameworks: Developing AI in libraries requires establishing core ethical principles such as fairness, transparency, and accountability, alongside designing guidelines that consider the unique values and needs of the library environment. Clear policies should be adopted to regulate data processing, user interactions, and decision-making processes. It is advisable to leverage best practices and ethical standards applied in other sectors like healthcare, finance, and education, and to consult specialized experts to ensure the guidelines' appropriateness. Furthermore, these policies must be reviewed periodically to keep pace with technological advancements and global best practices. (Subhajit, 2024)

11.3. Ensuring the Protection of User Data Privacy: Maintaining user privacy while delivering personalized and effective services is one of the most prominent challenges in integrating AI into libraries. As these technologies evolve, new methods for data protection have emerged, such as differential privacy, which prevents the traceability of analysis outputs back to individuals' identities. Researchers are continuously working to make this technology more efficient and scalable, enabling libraries to benefit from AI without compromising user confidentiality. Federated learning is another promising solution, allowing models to be trained on data without the need for centralization. This approach helps reduce breach risks and enhances privacy protection by keeping data under user control.

11.4. Collaboration with AI Communities: Participation in AI-focused groups can enhance knowledge exchange and establish best practices in its applications. Libraries should collaborate with groups like AI for Libraries, Archives, and Museums to share information and solidify best practices. Collaboration with AI researchers and developers can also facilitate the development of applications that adhere to ethical and privacy standards, meeting library requirements. Libraries can leverage their expertise in data storage, licensing, and quality assessment to assist researchers in addressing ethical issues related to data use in AI applications. (Bradley, 2022)

11.5. Regular Algorithm Auditing and Testing: Continuous evaluation of AI systems is essential to maintain their integrity and reliability. Libraries must conduct regular audits and assessments of AI algorithms to ensure optimal performance and prevent any undesirable or unexpected outcomes. This requires evaluating AI systems for biases and

taking necessary corrective measures. Libraries must also ensure the accuracy and lack of bias in the data used within AI systems.(Mishra, 2023)

12. Study Findings:

Following its analysis of the topic of AI in libraries, the study reached a set of key findings, including:

- AI serves as an effective tool for developing library services by facilitating cataloguing and classification processes, providing advanced recommendation systems, and enhancing search and retrieval services.
- AI technologies have contributed to improving user experience by offering personalized, interactive, and responsive services.
- The intensive use of these technologies has led to the emergence of numerous ethical challenges, most notably: protecting user privacy, data security, and ensuring fairness in information access.
- Issues of algorithmic transparency and intellectual property pose real problems that may affect user trust in the services provided.
- The study concluded that the absence of clear and specific ethical frameworks for using AI in libraries may limit its effectiveness and amplify associated risks.
- The study affirmed that the rational and balanced use of AI allows libraries to benefit from its technical advantages while preserving professional and human values.

13.Study Recommendations:

Based on the previous findings, the study proposes the following:

- Establishing clear ethical frameworks and standards for employing AI in libraries to ensure the responsible use of these technologies.
- Strengthening awareness and training programmes for library staff regarding AI applications and their ethical implications.
- Developing stringent policies to protect data and ensure user privacy throughout all stages of information processing.
- Working towards transparency in the design and operation of AI algorithms to ensure fairness and prevent bias.
- Encouraging applied research and studies on AI in the library field, with a focus on ethical aspects.
- Enhancing cooperation between libraries, academic institutions, and technical entities to exchange expertise and build effective strategies for the optimal deployment of AI.
- Ensuring a balance between automation and the human element in library services, preserving the role of human staff in interacting with users.

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