

# Research on the Use of Artificial Intelligence in Subject Services of University Libraries

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**Abstract:** Artificial intelligence (AI) technology is leading the transformation of subject services in university libraries, shifting from traditional manual services to an efficient model centered on data intelligence, and promoting a deep improvement in the quality of subject services. Based on the analysis of the importance and challenges of using AI in subject services of university libraries, this paper examines the current status of applying AI technology to the content, space construction, equipment, and platforms of subject services in university libraries. It also proposes strategies to enhance the quality of subject services by improving the quality of subject librarians, deeply exploring user needs, and establishing intelligent academic resource repositories, in order to meet users' high-standard requirements. Ultimately, it emphasizes that library subject services need continuous innovation to adapt to the changes brought by AI, and better serve the construction of education and intelligent education systems.

**Keywords:** Artificial Intelligence; Subject Services; University Library.

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## 1. Introduction

With the rapid development of artificial intelligence technology, innovative techniques such as facial recognition, large language models, and automatic video generation have been deeply integrated into all aspects of social life and have brought about profound and revolutionary changes to the field of education. As an important support for the education system, university libraries bear an irreplaceable key mission in promoting the construction of a high-quality education system and urgently need to achieve intelligent upgrading and transformation based on traditional document resource management and service models. However, there are still many limitations in the understanding and application of AI in university libraries. Although some progress has been made in basic areas such as book circulation and cataloging, the exploration and application of AI technology in subject services are still in their infancy. To better meet the needs of the high-quality education system construction, university libraries must deepen their understanding of AI technology and expand its application in the content, space, equipment, and platforms of subject services. In addition, libraries should strengthen in-depth cooperation with the information technology field and actively explore how to deeply integrate AI with library subject services to achieve a more precise and efficient service model. In summary, university libraries face unprecedented challenges in the application of AI technology, but also rare opportunities. Through continuous exploration and practice, libraries can better serve the education cause and contribute to the construction of an intelligent education system.

## 2. The Importance and Challenges of Utilizing AI in University Library Subject Service

From the perspective of the university, the application of AI is an important way to lead the high-quality development of higher education institutions. As an

important research entity of the university, the library is a vital place for teachers and students to conduct research work, and it is responsible for providing sufficient document resources, high-quality information literacy education, and a variety of research tools for teachers and students. It should naturally become the forefront of applying AI technology to comprehensively improve the quality of library services in teaching and research. Over the years, the scope of subject services has significantly expanded, covering multiple aspects of library services. At this point, it is particularly important to use AI technology to innovate traditional services to better meet the personalized needs of teachers and students.

However, university libraries also face many challenges in applying AI. First, AI technology is rapidly evolving, and once new technologies are released, a large number of related tools emerge. Subject librarians need to continuously update their knowledge systems and learn how to use these new tools. Even with high-frequency learning and tracking, it is difficult to fully master them, which is undoubtedly a huge challenge for subject librarians. Second, the application of AI requires a large amount of funding for space transformation, equipment upgrading, and personnel training, and its effect evaluation often takes a long time to show. For university libraries with limited funds, this constitutes a realistic pressure. Finally, data security issues urgently need to be resolved. AI algorithms need a large amount of data for debugging to achieve localization adaptation. How to collect, store, and use these data while ensuring their security and user privacy is a key issue that needs to be discussed and resolved urgently.

## 3. Current Status of Using AI in Subject Services of University Libraries

In the era of AI development, university libraries have achieved initial success in applying AI technology to subject services. Many university libraries have

restructured their service models centered on user needs, through data-driven, virtual and real coexistence, and human-computer collaboration, deeply integrating into teaching and research scenarios.

### **3.1. Personalized Subject Service Content**

The content of subject services in university libraries mainly involves document resource construction, subject data analysis, and information literacy education. Firstly, in terms of document resource construction, subject librarians use the Electronic Resource Utilization Performance Analysis System (ERS), an advanced deep data mining platform, to understand the teaching and research situation of faculties and the development dynamics of disciplines, and to become familiar with the distribution of document resources in the discipline. The working mode of ERS is to collect various types of standardized quantitative data such as resource lists, Counter reports, and citation statistics to scour the situation of electronic resources and deeply mine and analyze the performance of resource utilization. The use of this system makes the recommendation of college resources by subject librarians more in line with the characteristics of the discipline [1]. Secondly, in terms of subject data analysis, database platforms such as Scopus and CNKI have launched AI services and opened up trial use for university libraries. Subject librarians use the data and AI tools of these platforms to analyze the development trends of disciplines, and with the help of big data analysis and visualization tools such as CiteSpace, Tableau, and VOSviewer, deeply mine the frontier dynamics of disciplines and provide customized and personalized analysis results for faculties. In addition, the text writing function of generative AI also provides convenience for subject librarians, enabling them to efficiently complete basic data cleaning and text editing work, thus saving time and energy, and allowing them to focus more on humanistic care, such as increasing face-to-face communication opportunities with teachers and students. Thirdly, in terms of information literacy education, university libraries provide AI resource navigation on their official websites, including guiding students to understand the basics of AI, providing download links and usage guidelines for AI tools, and offering a series of AI-related courses and information on AI seminars. Targeting different educational groups, the library carefully designs AI training content to meet diverse learning needs.

### **3.2. Intelligent Subject Service Space Construction**

The intelligent subject service space aims to build an open, dynamic, and intelligent academic environment, providing precise services for the learning, teaching, and research activities of university teachers and students[2]. To achieve this goal, university libraries actively promote the online and offline construction of subject service spaces. The offline space is further divided into teaching space, research space, and practice space. Firstly, in terms of online space construction, some MOOCs and micro-courses have introduced intelligent back-end management systems that can monitor students' progress in completing courses and the results of online exams in real-time, and promptly remind students. This intelligent management method ensures that students can complete their studies with high quality even without face-to-face teaching.

Secondly, in terms of offline space construction, university libraries vigorously develop new types of spaces such as future learning centers and makerspaces. By transforming traditional classrooms and introducing intelligent equipment, support is provided for teaching, research, and practice. For example, using facial recognition and voice devices to capture the movements and voice information of teachers and students, analyzing students' understanding of knowledge, and helping teachers optimize course design. In addition, university libraries also provide virtual teaching and research places, using VR technology to simulate teaching scenarios and help teachers adjust their teaching strategies. For disciplines with strong practicality, the library also has VR laboratories, allowing students to strengthen their knowledge through virtual operations and improve their practical abilities. By breaking the limitations of physical space and closely integrating virtual and physical spaces, the subject service space can precisely meet user needs and achieve the goal of intelligent construction.

### **3.3. Intelligent Subject Service Equipment and Platforms**

With the popularization of AI technology, library equipment is becoming increasingly intelligent. At the same time, in order to better utilize these technologies, the basic equipment of libraries has also been updated in a timely manner. Many university libraries actively carry out equipment upgrading work, such as upgrading high-speed networks. On this basis, many libraries are also equipped with advanced facilities and tools, such as GPU servers, 3D printers, open-source software, and IT tools. Some libraries have even introduced cutting-edge technologies such as human-computer interaction, algorithms, Docker, AR, and intelligent reading and development[3]. In the process of conducting subject services, subject librarians can use these equipment and tools for practical teaching, helping students better understand and master relevant knowledge and technologies. At the same time, many university libraries have also upgraded their resource management platforms, such as institutional repositories. By integrating resources in a unified manner, they have enabled one-click access to personal search reports, thereby saving a significant amount of human effort and time. In addition, many universities have established independent or affiliated AI LibGuide sections that cover all academic disciplines. These sections introduce the use of AI tools, citation standards, and ethical issues, providing comprehensive guidance and support for faculty and students[4].

## **4. Strategies for Enhancing Subject Services in University Libraries Using AI Technology**

Currently, universities are still in the early stages of applying AI technology. With the continuous progress of technology and the constant upgrading of equipment, the subject services of university libraries urgently need to keep pace with the times and further improve service quality. In this process, we can draw on advanced domestic and international experiences and start from the following aspects:

## 4.1. Improving the AI Literacy of Librarians

In recent years, the academic structure of university library staff has been significantly optimized, with a steady increase in the proportion of master's and doctoral degree holders. This has laid a solid foundation for libraries to adapt more quickly to technological changes. Surveys have found that many university libraries now prefer to recruit subject librarians with backgrounds in cutting-edge disciplines such as mathematics, statistics, computer science, and data science. These librarians are required to master key technologies such as machine learning and deep learning and be proficient in using generative AI tools like ChatGPT.

The improvement of subject librarians' capabilities depends on the joint efforts of their own initiative and support from the library. On the one hand, subject librarians should take the initiative to conduct self-training while providing AI training for users. They can enhance their theoretical knowledge by attending AI-related seminars, engaging in in-depth discussions with college experts, and participating in various online training programs. At the same time, librarians should actively practice AI tools in their daily work and teaching to accumulate personalized experience for different disciplines, thereby comprehensively improving their hard and soft skills. For subject librarians, it is their responsibility to strive to improve their professional literacy. However, in the rapidly evolving technological landscape, relying solely on their own initiative may leave them struggling to keep up with the pace of technological updates.

Therefore, libraries should establish and improve mechanisms and systems to enhance the professional literacy of librarians and provide comprehensive support for them. Specifically, it is necessary to deepen the reform of the librarian training system and accelerate the development of a management system that follows the laws of librarian capability improvement. At the same time, the mechanisms and systems for the integrated development of librarians and users should be improved to create a favorable environment for librarians' smooth growth, helping them to steadily move forward in the new era and better serve the development needs of university libraries.

## 4.2. Deeply Exploring User Needs

In traditional library work, user needs for subject services are mainly collected through questionnaires, with subject librarians connecting with faculties to gather long-term subject service requirements and updating them regularly. However, the current challenge lies in breaking through the traditional model to obtain diversified and in-depth user needs—needs that may not even be perceived by users themselves. To address this issue, libraries need to establish unified and standardized data transmission and storage technologies and build cloud computing and AI processing platforms. At the same time, a user-centered data perspective should be established, using AI technology to deeply mine user behavior data such as browsing, searching, and borrowing records. Content should be filtered and pushed based on user needs, and user profiles should be precisely created. In this process, subject librarians can use data mining and visualization tools to comprehensively analyze user needs and establish dynamic user demand models. Therefore, university libraries should actively learn and develop data processing technologies to deeply perceive users' learning contexts and build user data visualization views based on

users' interests, preferences, and personalized characteristics. By cleaning and filtering data that does not meet user needs, libraries can achieve precise service data.

## 4.3. Building Intelligent Academic Resource Repositories

University libraries have a vast number of printed books and digital resources, characterized by high repetition and rapid updates. This not only requires data cleaning to remove unnecessary repetitive information but also necessitates the real-time integration of new hot academic resources based on algorithms. In this context, it is particularly important to use AI technology to intelligently filter the vast amount of information in libraries. By screening, organizing, and refining professional information resources scattered across various disciplines and combining them with in-depth information development and services, libraries can provide users with comprehensive, integrated, and efficient knowledge and value-added information. AI technology can realize the intelligent and automated services of library information. By leveraging its key common technologies to deeply mine resources from multiple sources, disciplines, and data types, and constructing cross-media knowledge graphs, AI can provide deeper resource support for subject services. At the same time, AI technology can widely collect and refine knowledge sources, merge, deduplicate, and sort data meticulously, and update the resource repository in real-time to ensure that subject services always have access to cutting-edge resources. By building intelligent subject resource repositories, libraries can not only significantly improve the efficiency of resource acquisition but also ensure the accuracy, depth, and cutting-edge nature of resources. This not only provides efficient information services for discipline construction but also helps to enhance the overall level of library information resource construction.

## 5. Conclusion

The diverse and ever-changing subject information needs of users present both challenges and opportunities for university libraries. Big data and artificial intelligence (AI) technologies offer powerful tools to enhance the quality of subject services in higher education institutions. The users of subject services in universities can generally be categorized into three groups: students, teachers, and researchers. Students are typically at the early stages of understanding the information resources and services offered by libraries. While their knowledge is not yet comprehensive, they can make rapid progress with proper guidance. Therefore, libraries need to proactively offer services to increase the accessibility of assistance for these users and enhance their ability to search for and utilize academic resources. Teachers, on the other hand, require a large volume of subject-related materials, including textual information, illustrations, and video materials, to develop lesson plans, enrich classroom designs, stimulate student interest, and improve teaching effectiveness. Researchers generally possess strong information retrieval skills and need subject services to provide extensive literature resources, current developments and cutting-edge analyses in their fields, as well as recommendations for publication venues. Most importantly, users' identities and needs evolve over time, with changes in their learning

stages and work content. Therefore, subject services must be seamless and adaptable to meet these dynamic needs. By leveraging big data and AI technologies, libraries can collect and analyze user search behaviors and reading patterns to more accurately and objectively understand user needs. This enables libraries to proactively offer efficient, convenient, and labor-saving subject services, thereby improving the utilization efficiency of academic resources and meeting users' personalized subject information needs. However, while applying AI technologies, libraries must pay special attention to data security and academic ethics. Currently, there are no comprehensive policies regulating these areas, so libraries should proceed with caution to ensure the security of user data and the compliance of academic activities.

## References

- [1] Y. Zhang, H. Qin and L. Du. Performance Evaluation of Foreign E-books based on Electronical Resource System -- the Case of UESTC Library Collections[J]. *Library and Information Service*, 2020, 64:50-57.
- [2] Dong, X. Ma. Construction of Intelligent Subject Service Space from the Perspective of "Artificial Intelligence + Library"[J]. *Research on Library Science*, 2019, 83-88+46.
- [3] Su, L. Ji. Research and Insights on Artificial Intelligence Services in Foreign Universities Libraries[J]. *Library and Information Service*, 2023, 67:28-36.
- [4] Zai, L. Ye, Y. Hu. Investigation on the AI Literacy Education in Foreign Universities Libraries--Based on the Analysis of AI LibGuide[J]. *Journal of Academic Libraries*, 2024, 42:58-68.
- [5] X. Yu, J. Gao. Research on the Strategy of Embedded Subject Service in University Library Based on User Demand[J]. *Information Studies: Theory & Application*, 2014, 37:73-76+82.