

Global to Local: Diversity and Inclusiveness in Resource Sharing



Artificial Intelligence (AI) enables resource sharing and promotes open innovation collaboration within libraries.

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Abstract

At present, a new round of scientific and technological revolution and industrial transformation is accelerating. The emergence of AI technology has greatly enhanced the mobility and accessibility of resource information. In recent years, the National Library has always adhered to the development concepts of coordination, openness and sharing, and has established inter-library loan relations with more than 600 libraries in 34 provinces, municipalities and autonomous regions across the country, and inter-library loan relations with more than 500 libraries in 63 countries around the world. To improve the dissemination of resource information, Chinese artificial intelligence technology companies are relying on their technological advantages to expand application areas and enable resource sharing. For example, China's Huawei, Baidu and the National Library have signed cooperation agreements to further promote the application of relevant technologies in library-related fields. Similarly, Ali, Tencent Research Institute, iFlytek, and other companies are actively exploring strategies to use AI to enable resource sharing and promote open innovation collaboration within libraries.

Keywords: Artificial intelligence; The library; Resource sharing; Service innovation; Intelligent library

Introduction

As a treasure trove of knowledge, libraries bear the important mission of transmitting culture and information. With the rapid development of information technology, especially the increasing maturity of artificial intelligence technology, the service model of libraries is undergoing profound changes. This article aims to explore how artificial intelligence technology can promote the sharing of library resources, as well as the main challenges and countermeasures faced in this process.

In recent years, scholars at home and abroad have conducted extensive research on the application of artificial intelligence in libraries. On the one hand, research has shown that AI technology can significantly improve the efficiency and service quality of libraries. On the other hand, there are also concerns about data security, privacy and other issues. This article will further explore the specific application and impact of AI technology in library resource sharing, based on previous research and case studies such as the National Library.

Application of Artificial Intelligence in Library Resource Sharing

Artificial Intelligence (AI) is a technology that enables computers and machines to exhibit human-like intelligence. It involves several disciplines such as computer science, mathematics, psychology and neuroscience, and aims to develop theories, methods, technologies and application systems to simulate, augment and extend human intelligence. Its main characteristics are autonomy, adaptability, intelligent interaction, ability to process large amounts of data, and learning ability. Its main application areas include robotics, speech recognition, image recognition, natural language processing (NLP), expert systems, machine learning, computer vision, etc. At present, the application of artificial intelligence (AI) has penetrated widely into various industries, including intelligent manufacturing, smart homes, financial services, healthcare, educational technology, smart cities, entertainment media, scientific research, and many others, greatly promoting social progress and economic development.

In recent years, Artificial Intelligence has been continuously applied and has played an important role in the sharing of library resources. The automation of intelligent classification, cataloguing and indexing has improved the efficiency of document processing; the use of reader data such as borrowing history and reading preferences has provided personalized recommendation services; and the digital reference system provides automated question and answer services to enhance users' information retrieval experience. In addition, AI also supports the integration and sharing of resources between libraries, making cross-library searching and literature transfer more convenient and efficient, and promoting the widespread sharing and use of academic resources. Overall, the application of AI is mainly reflected in three aspects.

2.1 Intelligent Analysis and Recommendation System

The Intelligent Analysis and Recommendation System can provide personalized resource recommendations for each user by analyzing their borrowing history and preferences. The system uses data analytics and machine learning algorithms to gain a deep understanding of users' reading habits and interests, and to accurately deliver content that meets their needs. Such personalized services also help libraries to better

manage their resources, ensuring that highly relevant resources are discovered and borrowed by more readers who need them.

2.2 Automated Management System

The Automated Management System uses AI technology to achieve full process automation from book classification to shelving to searching in the daily operation of the library. Using robotics, image recognition, and natural language processing, libraries can automatically classify and list books, and respond quickly and accurately to readers' requests. Automated management also helps to optimize inventory management, ensuring effective allocation and utilization of book resources.

2.3 Convenient support for literature transmission

By analyzing user demand data, libraries can predict trends in literature requests, prepare and allocate resources in advance, and ensure the timeliness and effectiveness of literature delivery. In addition, data analysis can be used to optimize literature retrieval algorithms, improve retrieval accuracy, and enable users to find the required information they need more quickly. By establishing an efficient mechanism for requesting and delivering literature, and continuously improving services based on user feedback, libraries can significantly enhance their ability to share and exploit information resources¹.

3. Case study on the development of library resource sharing empowered by artificial intelligence

3.1 National Library Resource Situation

The National Library of China is China's National General Library, National Bibliographic Centre, National Centre for the Protection of Ancient Books and National Museum of Ancient Books². With the development and changes of information carriers, the collection size of the National Library is constantly increasing and the types are becoming more and more diversified. Among them, the collection of literature exceeds 44.23 million volumes, and the total storage capacity of digital resources exceeds 2756TB, with an annual growth rate of 100TB. The total collection of national libraries ranks seventh in the world, the collection of Chinese literature ranks first in the world, and the collection of foreign literature ranks first in the country³.

In recent years, the National Library of China has always adhered to the concept of coordinated, open and shared development. It started inter-library loan services in 1927 and has established inter-library loan relations with more than 600 libraries in 34 provinces, municipalities and autonomous regions across the country. The annual number of borrowing requests has reached more than 30,000, and it has established business relations with more than 500 libraries in 63 countries around the world. For many years, we have cooperated with foreign libraries such as the British Library, the National Library of Russia and the National Diet Library of Japan. In 1997, the National Library of China established the Literature Supply Centre to better promote the co-development and sharing of literature resources, and to carry out functions such as

¹ Quan Rao .National Smart Library System _ Embarking on a New Chapter of Library Smart Transformation. Journal of library science in china, 2021,4-14.

² The national library of China. Available at: https://www.nlc.cn/web/dsb_footer/gygt/lsyg/index.shtml

³ The national library of China. Available at: https://www.nlc.cn/web/dsb_footer/gygt/lsyg/index_2.shtml

literature search, information consultation, and knowledge and information dissemination. The Centre's service network covers all regions of the country. As the world's largest Chinese literature guarantee base and the largest foreign language literature query centre in China, it provides multi-level and comprehensive services to national key educational, scientific research and production units, the vast library community and individual users.

3.2 National Library Cooperation Case Sharing

To better promote the role of technology in cultural enterprises, the National Library of China has signed cooperation agreements with technology companies such as Huawei and Baidu, using advanced technologies such as 5G and AI to improve the library's information technology level and service quality. These collaborations not only promote resource sharing, but also bring new service models to libraries.

3.2.1 Case Study of Cooperation between the National Library of China and Huawei Technologies Co., Ltd

The National Library of China has established a close cooperation with Huawei Technologies Co., Ltd. to promote the information construction and service innovation of the library industry. The two sides have promoted the digitization and intelligent sharing of cultural resources through a series of specific project cooperation, including the establishment of a new 5G reading experience center to provide an immersive reading experience⁴, the high-precision digital processing of precious ancient books and documents to protect and widely disseminate cultural heritage, and the combination of ancient books and technology. For example, Huawei's new-generation foldable flagship Mate X2 has cooperated with the National Library to bring precious ancient books into daily life and achieve resource sharing. At the same time, both parties have established the "National Library Huawei Joint Innovation Laboratory" to jointly incubate industry solutions and cultivate innovative talents in cultural and technological integration, and jointly promote the intelligent and efficient development of the library industry⁵. These measures have jointly improved the convenience and service quality of the public's access to knowledge, and promoted the inheritance and development of culture.

3.2.2 Cooperation case between the National Library and Baidu Netcom Technology Co., Ltd

Based on its rich collection resources, digital content, distinctive cultural heritage and strong service capabilities, Guotu combines Baidu's technological advantages in the Wenxin big model and cloud computing power to achieve the sharing of high-quality resources, promote the wider service of library resources to society and provide convenient ways to obtain information. According to the strategic cooperation agreement signed by the two parties, they will promote the intelligent application of libraries through resource sharing and technological complementarity, improve the quality of public cultural services, jointly promote the intelligent popularization of

⁴ National Library creates 5G new reading experience.[2020-08-07]Available at:https://www.mct.gov.cn/whzx/zsdw/zggjtsq/202008/t20200807_873971.htm

⁵ The National Library of China and Huawei cooperate comprehensively to open a new era of reading with 5G+libraries .[2019-10-18] Available at :<https://baijiahao.baidu.com/s?id=1647740772449437956&wfr=spider&for=pc>

⁶ National Library of China and Baidu Launch Strategic Cooperation .[2023-09-04] Available at:http://www.ncha.gov.cn/art/2023/9/4/art_723_183839.html

national cultural resources, and contribute to the building of a cultural power. Through this cooperation, the National Library, together with Baidu ERNIE Bot, has realized the extensive sharing of cultural resources through digital ancient books and intelligent search technology, helping Chinese people around the world to conveniently find their roots and veins, and promoting cultural inheritance and popularization⁶.

3.2.3 Cases of cooperation between the National Library of China and ByteDance

Through technology-enabled protection and relying on the Internet to promote digital dissemination, the National Library (National Center for the Protection of Ancient Books) and the China Heritage Protection Foundation have established a long-term strategic cooperation with ByteDance. This cooperation aims to harness social and technical forces to promote the digital protection and dissemination of ancient books. The National Library has cooperated with the Digital Humanities Research Center of Peking University, ByteDance Public Welfare, Lijiang Dongba Culture Research Institute and other institutions to develop the "Yongle Grand Ceremony high-definition image database" and the "Dongba Chinese language combination of Genesis knowledge database", which have facilitated the opening and sharing of a number of high-quality digital resources of ancient books with the public. In addition, the National Library, together with PICO, Tiktok and other platforms, has launched the ancient book activation project "Ancient Books and Travels". These measures not only promote the digital preservation of ancient books, but also realize the extensive resource sharing of precious cultural heritage through the Internet. Through technological empowerment, traditional classics have been able to live on and shine in new forms, further promoting China's excellent traditional culture⁷.

3.3 Sharing of resource sharing and cooperation cases with other institutions

3.3.1 On 8 December 2022, under the guidance of the National Cultural Heritage Administration's "Internet plus Chinese Civilization" action plan, the Dunhuang Research Institute and Tencent jointly launched the "Digital Dunhuang · Open Material Library" based on blockchain technology. This platform collects over 6500 high-resolution digital resources from grotto sites such as Mogao Caves and Dunhuang Scripture Cave Documents, and is open for global sharing, The aim is to create a "one-stop" Dunhuang cultural sharing platform that uses blockchain technology to protect digital resources and achieve safe and efficient circulation of cultural resources. In 2016, Dunhuang Academy launched the "Digital Dunhuang" resource library to serve academic research, which has received more than 730000 visitors by 2021. With the continuous improvement of the charm of Dunhuang culture, public interest is also increasing. Since its launch in 2020, the "Cloud Tour Dunhuang" mini-programme has accumulated more than 60 million visits and attracted more than 200 million people to participate in online interactions. By combining the achievements of Dunhuang Studies with Tencent's technology, the digital upgrading of cultural resource sharing has been achieved⁸.

⁷ The National Library of China collaborates to preserve and revitalize ancient books, continuing the Chinese cultural heritage. [2024-08-09] Available at:

<https://baijiahao.baidu.com/s?id=1806892212398139570&wfr=spider&for=pc>

⁸ Dunhuang Academy collaborates with Tencent to create the world's first cultural heritage "on chain", with the first batch of 6500 materials available for download.[2022-12-09] Available at:

<https://baijiahao.baidu.com/s?id=1751702542215191228&wfr=spider&for=p>

3.3.2 Alibaba's construction and sharing cooperation with the library industry includes many concrete projects, such as the "Reading Light Plan" jointly initiated with China Braille Library and Zhejiang University, which improves the quality of life of visually impaired people through the joint construction of a "Smart Home Library" and the donation of Tmall Genie smart speakers; Collaborating with the Capital Library to provide high-quality digital resources and reading environments, and helping rural primary schools create a bookish campus; using intelligent voice technology and personalised recommendation systems to improve the level of intelligent services in libraries; and supporting cultural exhibitions with AR and VR technology to attract more people to participate. These collaborations will not only improve the quality and efficiency of library services, but also promote the modernization of public cultural services⁹.

3.3.3 IFlytek collaborates with various libraries and educational institutions to apply its advanced intelligent speech, big data, and cloud computing technologies to jointly promote the construction of intelligent libraries. For example, IFlytek is working with the Foreign Language Teaching and Research Press to build an audio library, with the Suzhou Library to enhance intelligent search and personalized recommendation services, with the China Geological Library to develop research assistant services, and with the Xi'an Jiaotong University Affiliated Middle School and Shenzhen Gezhi Middle School to build digital reading rooms and smart reading rooms to improve user experience, promote efficient management and sharing of digital resources, provide accessible services for special groups, and promote the modernization of public cultural services¹⁰.

4. Challenges Faced

4.1 Economic cost

The introduction of artificial intelligence technology in libraries poses significant economic challenges. Firstly, the initial investment is relatively high, including not only the cost of purchasing high performance computing equipment, servers and other hardware facilities, but also the cost of developing custom software, databases and data processing software. In addition, the operation of AI systems is not a one-off solution. It also requires regular technical updates and daily maintenance to ensure the efficient and stable operation of the system. This ongoing investment is a significant expense for many small and medium-sized libraries. How to plan and allocate resources wisely within a limited budget has become a major concern for library managers.

4.2 Security and Privacy

With the widespread application of AI technology in library services, data security and privacy have become important issues that need to be addressed urgently. On the one hand, libraries are providing more accurate services by collecting users' borrowing records, search behaviour and other information. However, this also means an

⁹ China Braille Library, Zhejiang University, Alibaba join hands to launch the "Light Reading Plan", using technology to serve 17.32 million visually impaired people. [2020-12-03] Available at: <https://cn.chinadaily.com.cn/a/202012/03/WS5fc8845ba3101e7ce97331a0.html>

¹⁰ Add "Buff" to Chinese scientific research: iFlytek Spark Research Assistant lands in nearly 100 research institutes of the Chinese Academy of Sciences, empowering teachers and students from over 1000 universities. [2024-08-09] Available at: http://ah.anhuinews.com/kjyww/202408/t20240809_7755596.html

increased risk of exposure of users' personal information. Ensuring that user data is not misused or leaked is a major challenge for libraries. On the other hand, libraries often store a large amount of valuable literature and materials. Once data leakage or loss occurs, it will not only cause incalculable cultural loss, but will also seriously damage the social image and public trust of the library.

4.3 Regulations and Talent

At the legal level, while using AI technology to promote resource sharing, libraries must strictly comply with relevant laws and regulations, such as copyright laws, to ensure the legitimate use of resources. For example, in the process of copying and distributing digital resources, special attention should be paid to copyright protection to avoid infringing on the legitimate rights and interests of the original author. At the same time, the application of AI technology can also raise a number of ethical and moral issues, such as the fairness and transparency of recommendation algorithms and potential biases in automated decision-making processes. In addition, the library industry is undergoing a process of transition from traditional models to digitalization, and there is a shortage of composite talent that understands both library science and AI technology, which poses a significant challenge to the recruitment and training of talents in libraries¹¹.

5. Conclusion and Prospect

Artificial intelligence technology has brought unprecedented opportunities for sharing library resources, but it also brings a number of challenges. Libraries should take full advantage of AI, continuously innovate service models, and also attach importance to data security and privacy protection, ensuring that technological progress and humanistic care are equally emphasised. In the future, with the continuous development and improvement of technology, artificial intelligence will play a greater role in the field of libraries. Libraries should actively explore the application of new technologies, strengthen interdisciplinary cooperation and cultivate composite talents, promote resource sharing and service innovation, and provide users with more convenient and efficient services.

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