



# Opportunity or Challenge? — An Analysis of the Impact of ChatGPT on University Libraries Based on Artificial Intelligence Technology

Ling Zhu<sup>1, \*</sup>

<sup>1</sup> University of Shanghai for Science and Technology Library, University of Shanghai for Science and Technology, Shanghai 200093, China.

\*Email: [creationfudan@163.com](mailto:creationfudan@163.com)

Received on 04/24/2026; revised on 04/30/2026; published on 04/30/2026

## Abstract

At the end of November 2022, ChatGPT was launched and gained one million active users at the fastest rate in internet history (five days), surpassing 100 million users within two months and 1 billion users within half a year. Hundreds of millions of internet users have found through use that ChatGPT can not only engage in conversations but also search for information, write code, generate images, compose papers, and more, functioning almost as an all-round tool.

In libraries, ChatGPT can provide more personalized and intelligent information responses based on users' search histories. It can also analyze users' needs and feedback, helping libraries optimize services and resource allocation, thereby enhancing user satisfaction. Meanwhile, it has been noted that although ChatGPT can respond in a nearly human-like manner, its answers may contain flaws; it tends to produce seemingly reasonable yet absurd responses, whose errors are difficult to identify, leading to misinformation. This also poses challenges for its application in libraries. This paper analyzes the impact of ChatGPT on university libraries and proposes corresponding countermeasures.

*Keywords: ChatGPT, university libraries, artificial intelligence technology*

## 1 What is ChatGPT?

ChatGPT is an artificial intelligence dialogue system developed by OpenAI, an American company. Its full name is Chat Generative Pre-trained Transformer, a chat tool based on a generative pre-trained transformer model. It provides an intuitive and convenient human-computer interaction mode, enabling users to communicate more effectively with computers. It has the following characteristics:

### 1.1 Internally Based on a Generative Pre-trained Transformer Model

GPT stands for Generative Pre-trained Transformer, a generative pre-trained transformer model. Since its first introduction in 2018, it has been continuously iterated with an exponential increase in the number of training parameters (Table 1). Based on the Transformer architecture proposed by Google (a neural network architecture based on the attention mechanism, widely used in natural language processing and other sequence modeling tasks), this model uses unsupervised learning to pre-

train on large amounts of text, thereby generating high-quality natural language text. It can be seen that, as a multimodal large language model, GPT needs to learn implicit linguistic rules and patterns—such as word meaning, grammar, and context—from billions of parameters.

**Table 1. Development History and Parameter Comparison of GPT Models**

Time	Key Features
June 2018	GPT-1 released, with 110 million parameters
November 2018	GPT-2 released, with 1.5 billion parameters
June 2019	GPT-3 released, with 175 billion parameters
March 2022	InstructGPT released, with 175 billion parameters, generating outputs more aligned with human preferences
November 2022	GPT-3.5 released, with 175 billion parameters, adopting a novel conversational interface, namely ChatGPT

March 2023      GPT-4 released, with 1.5 trillion parameters, capable of text comprehension as well as image recognition and analysis

---

Trained on massive data, GPT performs excellently in various natural language processing tasks and can automatically generate coherent and fluent text sequences based on input prefixes and linguistic patterns learned by the model.

## 1.2 Externally Presented as a Chat Tool

The core framework of ChatGPT is InstructGPT, released in March 2022, which adopts Reinforcement Learning with Human Feedback (RLHF). This technology enables the model's outputs to imitate human common sense, cognition, and values, making users feel that the model increasingly resembles human thinking. ChatGPT rapidly gained popularity in November 2022 mainly due to its adoption of a brand-new chat mode. Users can send text messages and receive replies just like chatting with real people. Users can ask questions, seek advice, share feelings, and more with ChatGPT, which will generate natural and fluent responses based on the knowledge and dialogue experience acquired during training. This makes ChatGPT an easy-to-use intelligent chatbot that can answer various questions through conversational interaction, quickly becoming popular on the Internet.

## 1.3 Centered on Generative Artificial Intelligence Technology

Generative Artificial Intelligence (Artificial Intelligence Generated Content, AIGC) is an artificial intelligence application based on machine learning and natural language processing technologies. It can automatically generate natural language texts, including dialogues, articles, abstracts, and more. ChatGPT applies AIGC technology and, on the basis of learning human language and domain-specific knowledge, possesses intelligent creation capabilities and can automatically generate content in specific fields. Through training on massive dialogue data, it learns the rules and patterns of natural language and can generate natural and fluent text responses.

## 2 The Impact of ChatGPT on University Libraries

Libraries play a vital role in universities, providing various documents and services for students, teachers, and researchers, helping readers access required information and knowledge, and promoting academic research and cultural education. In addition to physical books and journals, university libraries offer various electronic resources such as e-books, e-journals, and online databases. Meanwhile, university libraries provide research support services for researchers, including research assistance, interlibrary loan, and information retrieval guidance. These resources are crucial to university research and constitute an important part of higher education institutions.

However, university libraries currently face numerous dilemmas: first, lagging digital services with insufficient digital resources and online services, failing to meet users' diverse needs; second, the limitations of traditional service models, which are still dominated by physical lending, requiring users to visit the library in person, which restricts service scope and efficiency; third, low management efficiency and high costs, requiring

substantial human and material resources for collection maintenance and management.

With the emergence of ChatGPT, ChatGPT is believed to bring opportunities to university libraries. Unlike traditional search engines, ChatGPT does not search the Internet but generates texts by predicting a series of sentences through artificial intelligence technology based on rich databases such as books, journals, websites, and news reports, ultimately forming complete information. Because ChatGPT has the ability to retrieve, integrate, and process information and generate content required by users, it can serve as a powerful information collection tool providing functions similar to libraries. Some even argue that ChatGPT could replace libraries in the near future.

### 2.1 Opportunities Brought by ChatGPT to University Libraries

#### 2.1.1 Enhancing Library Influence and Comprehensive Competitiveness

ChatGPT can integrate existing digital resources of university libraries, including e-books, journals, dissertations, and research achievements, providing users with more convenient and instant service channels and promoting interaction and communication between users and libraries. In addition, ChatGPT supports multiple languages, enabling users from different countries and regions to communicate with it easily, especially facilitating information access for non-native speakers. Compared with the complexity of library search pages, ChatGPT offers a simple and user-friendly interface. Users can easily understand and use various library services and resources through natural language interaction without complicated procedures, greatly reducing barriers to access.

ChatGPT can also integrate existing human service resources of university libraries, including librarians and subject experts, providing users with more comprehensive and in-depth service support and closer interaction. By conversing with ChatGPT, users can ask questions in real time and receive personalized recommendations, enhancing their experience of using library services and encouraging more frequent usage. With increasing interactions, ChatGPT can understand contextual conversations, delivering more natural and coherent responses, improving service efficiency and quality, and boosting user satisfaction and experience. Furthermore, ChatGPT can integrate social media resources and services of university libraries, including WeChat official accounts, WeChat groups, and Weibo, offering users more convenient and instant service channels. These integrated services provide users with high-quality information service experiences and enhance the influence and competitiveness of university libraries.

#### 2.1.2 Reducing Costs of Maintaining Physical Library and Improving Resource Utilization

ChatGPT can provide smarter and more convenient services for university libraries, reducing the workload of librarians and improving library efficiency and service quality. Through natural language interaction, ChatGPT delivers intelligent and convenient retrieval, recommendation, and Q&A services without dedicated librarian assistance, reducing librarians' workload and costs. It offers 24/7 uninterrupted services without extending library opening hours or increasing staffing costs.

ChatGPT can also accelerate the digital transformation of university libraries, lowering the costs of maintaining physical collections and improving resource utilization and sustainability. By analyzing user needs and behaviors, ChatGPT provides real-time data feedback and management

suggestions for university libraries, helping optimize services and management, reduce operation and maintenance costs, enhance resource utilization and sustainability, and ultimately improve the overall efficiency of university libraries.

### 2.1.3 Promoting Interdisciplinary Research and Academic Development

ChatGPT helps researchers quickly access literature, research findings, academic events and other field-related information, boosting the efficiency of researchers and students while fostering mutual understanding and communication across disciplines. Meanwhile, the reference to interdisciplinary information and knowledge is essential in research, as it helps solve problems in current research fields. Through natural language interaction, ChatGPT assists researchers in rapidly acquiring interdisciplinary information and knowledge, promoting cross-integration and cooperation among different disciplines, enhancing researchers' work efficiency and innovation capabilities, and driving the development of academic research.

## 2.2 Challenges Posed by ChatGPT to University Libraries

### 2.2.1 Challenges to Library Organizations and Librarians' Competencies

University libraries need certain technical capabilities and infrastructure to support the application of ChatGPT, including technical proficiency in understanding and applying artificial intelligence, processing and storing big data, server management, data backup, and troubleshooting. This poses a challenge for most university libraries. Meanwhile, librarians need the ability to use and maintain ChatGPT, including understanding and applying ChatGPT technology and mastering library resources and services.

Librarians also need to interact effectively with ChatGPT to deliver better services and handle issues that ChatGPT cannot resolve, presenting considerable challenges to librarians' traditional roles. Furthermore, the application of ChatGPT may challenge the organizational structure and service models of university libraries, which need to rethink adjusting service models to better adapt to ChatGPT. For instance, university libraries may need to reallocate job responsibilities, engage librarians more in ChatGPT operation and maintenance, and strengthen interaction with ChatGPT to improve service efficiency and user satisfaction.

### 2.2.2 Challenges to Library Digitalization Levels

ChatGPT requires massive data support, demanding corresponding digital capabilities from university libraries, including digital processing and storage of books, journals, papers, and other resources. University libraries need to establish a sound digital archive management system to uniformly manage and classify all digital resources for ChatGPT's data retrieval and analysis. This requires substantial human and material investment and consideration of ensuring the quality and accessibility of digital resources.

University libraries also need certain text processing techniques and artificial intelligence algorithm modification capabilities to perform word segmentation, word sense disambiguation, semantic analysis, and other operations, thereby improving the accuracy and efficiency of ChatGPT's search and answer recommendations. Meanwhile, the delivery of intelligent services relies on the acquisition of comprehensive user information. This applies both to building personalized profiles and recommendations from multi-dimensional user behavior data using mainstream big data and

data mining techniques, and to capturing user interests through conversational interactions powered by state-of-the-art AIGC technology. This requires university libraries to possess corresponding network technology and data security capabilities to safeguard data security and privacy. University libraries need to establish robust network and data security management mechanisms, including network firewalls, data backup and recovery, and data encryption, to protect user data security and privacy.

### 2.2.3 Challenges to the Authenticity and Authority of Information Provision

Libraries aim to provide various information resources such as books, journals, newspapers, databases, and other electronic resources. Libraries usually purchase and provide information resources from authoritative publishers and professional organizations to ensure content accuracy and reliability. They also offer professional reference services and training to help users better understand and utilize these resources. In contrast, ChatGPT is an artificial intelligence system trained on big data, highly dependent on the volume of its training data.

On the one hand, limited by the timeliness of its database, ChatGPT has limited knowledge of information after September 2021. With ongoing social development, this timeliness constraint may lead to outdated and inaccurate responses. For example, when the latest references are required, ChatGPT may fabricate seemingly reasonable citations that do not correspond to real-world sources. In addition, ChatGPT's training data mainly comes from public Internet data, and its breadth of knowledge is generally not comparable to the authoritative books and literature resources of libraries.

On the other hand, due to the evolution and diversity of real-world language, ChatGPT still struggles to understand complex linguistic contexts, resulting in relatively low information accuracy. Moreover, ChatGPT's information is constrained by the quality variations of its training databases, which may lack comprehensive and in-depth knowledge in certain fields, affecting information quality. Furthermore, differences in users' questioning styles and expressions may influence ChatGPT's comprehension accuracy. Ambiguous or unclear user statements may lead to model misunderstanding, undermining the academic authority of library services.

## 3 Conclusions and Countermeasures

University library services require self-innovation to embrace new technologies and opportunities. As an artificial intelligence-based tool, ChatGPT has knowledge and functions that are not yet comparable to those of existing university libraries, but it will enable libraries that make good use of this tool to play a more important role in universities. Overall, ChatGPT cannot replace the vital role of libraries in knowledge learning and research, but it can serve as a quick reference tool for users to conduct fast searches and answer queries. The two have respective advantages and applicable scenarios; they are not completely opposed but complementary.

University libraries can leverage ChatGPT's technological advantages to improve service quality and efficiency, such as enhancing document retrieval and lending efficiency, while expanding service scope and hours. Meanwhile, libraries should continue to leverage their strengths in knowledge learning and research to provide more in-depth and personalized services for students and researchers. University libraries and ChatGPT should collaborate to leverage their respective strengths and improve service levels and user satisfaction. While strengthening local resource curation, university libraries are also actively contributing to the development of artificial intelligence technology. To better apply

ChatGPT technology, university libraries need to make the following efforts:

### 3.1 Actively Embrace Artificial Intelligence Technology and Enhance Organizational and Individual Capabilities

Artificial intelligence technologies such as ChatGPT have great potential in information retrieval, knowledge management, intelligent recommendation, and other fields, bringing more opportunities to university libraries. University libraries need to actively introduce these technologies and integrate them into library services. To this end, university libraries need to enhance their organizational capabilities to better utilize AI technologies.

University libraries should improve organizational capabilities by introducing modern library management systems and building digital resource management platforms. Artificial intelligence technology can help libraries better manage collections, improve document retrieval and lending efficiency, and enhance service quality and user satisfaction. University libraries need a complete organizational structure and workflow to ensure the smooth operation of all tasks. Meanwhile, librarians need richer knowledge and skills to better adapt to changes brought by artificial intelligence technology, which is also an important guarantee for improving university libraries' organizational capabilities. Librarians need solid information literacy and computer knowledge to proficiently use various library management systems and artificial intelligence technologies. They also need strong service awareness and communication skills to provide more attentive and personalized services for users.

### 3.2 Accelerate Library Digital Transformation and Enhance Informatization Capabilities

With the continuous development of information technology, digital transformation has become an inevitable path for the development of university libraries. This includes converting physical books and journals into electronic versions, promoting the construction of electronic resources, and providing online search and lending services. Digital transformation enables university libraries to digitize their collections, thereby managing and utilizing collection resources more efficiently while offering more convenient and personalized services. Furthermore, it improves the service quality and user satisfaction of university libraries by enhancing the efficiency of document retrieval and lending. In addition, digital transformation allows university libraries to better adapt to changing user needs and the adoption of new technologies, thus further increasing user satisfaction and service quality.

### 3.3 Strengthen Localized Library Resource Construction and Improve Information Quality

ChatGPT's information originates from its training corpus. For user questions, ChatGPT provides accurate answers based on the corpus if relevant information is available; if not, it may infer and generate responses according to patterns and rules in the corpus, which may lead to errors and "plausible nonsense". This phenomenon makes it difficult for researchers to judge the accuracy and quality of information sources, raising widespread doubts about the authority and academic rigor of its responses and resulting in resistance from many universities worldwide.

As a service institution supporting university scientific research and innovation, university libraries possess large-scale high-quality professional literature resources that are professionally reviewed and certified as authoritative information. However, these resources may suffer from issues

such as incomplete local information in university libraries. To address this, university libraries can strengthen the collection, localized storage, digital processing and extraction, and annotation of training data for full-text literature, fully leverage their advantage of having massive high-quality and reliable professional literature corpora, independently conduct large model training, provide users with authoritative and accurate information, and improve information quality.

## References

- Li, Y.T. (2023) Opportunities, Challenges, and Strategies for Libraries in the Era of Artificial Intelligence Generated Content. *Library and Information*, 2, 42–48.
- Liu, Q.F. (2021) Digital transformation relying on artificial intelligence: the finishing touch. *Enterprise Management*, 473(01), 15.
- Zhang, H., Tong, T. and Ye, Y. (2023) GPT-Driven Technical Innovation of Smart Libraries in the AI 2.0 Era. *Library Journal*, 42(05), 4–8.