Exploration of the Feasibility of Applying ChatGPT in the Field of Smart Libraries

Xiaochen Xu*

National Library of China, Zhongguancun Nandajie, Haidian District, Beijing, China
*Corresponding author

Abstract: ChatGPT, as one of the most popular artificial intelligence models, has demonstrated remarkable learning capabilities and strong generalization abilities in various fields. The library domain is also an area of exploration for this model. This article provides an overview of the concepts, advantages, and research significance of ChatGPT, and explores the feasibility and recommendations for its application in the domain of smart libraries. It aims to provide insights for practical implementation of ChatGPT in libraries and accelerate the development of smart library systems.

1. Introduction

In recent years, with the rapid development of artificial intelligence technology, ChatGPT has gradually become a focal point of attention. ChatGPT is an AI-based language model that utilizes vast amounts of textual data to simulate human-like conversational language generation. ChatGPT technology has garnered widespread attention from businesses, academia, and even at the national level, both domestically and internationally. Its application in the library domain holds significant potential, as it can help address the challenges and issues faced by libraries. The research primarily focuses on exploring the potential application scenarios of ChatGPT technology in libraries and envisioning future development trends, thereby providing new service models and ideas for libraries.

2. An Overview of ChatGPT

2.1. The Concept of ChatGPT

The full name of ChatGPT is Chat Generative Pre-trained Transformer. It is a chat-bot developed by OpenAI and was released on November 30, 2022. It is currently one of the most advanced artificial intelligence-powered natural language processing tools in the world. ChatGPT has the ability to engage in conversations by learning and understanding human language. It can even perform tasks such as code generation, copy-writing, and translation.

2.2. International and Domestic Attention

Following the release of ChatGPT by OpenAI, both domestic and international companies and

academia have shown great interest and made strategic deployments. Microsoft launched New Bing, a search engine powered by ChatGPT technology, and plans to integrate ChatGPT into its Office software suite. Google developed Bard, an AI chat-bot. Companies such as Apple, Amazon, Meta, as well as Baidu, Alibaba, Tencent, and Huawei, have expressed their intention to explore related applications. Ne-tease has implemented ChatGPT technology in the education sector. JD.com will introduce an industrial version of ChatGPT in the finance and retail domains. On May 6th, products like iFLYTEK AI Learning Machine were launched. Fudan University released MOSS, the first ChatGPT-like model in China.

Moreover, ChatGPT has garnered attention at the national level. During a series of press conferences held by the State Council Information Office on February 24th, 2023, Wang Zhigang, the Minister of Science and Technology, stated that "ChatGPT has made progress in natural language understanding and processing and has effectively combined algorithms, data, and computing power." Chen Jiachang, the Director-General of the Department of High and New Technology at the Ministry of Science and Technology, mentioned that "ChatGPT has recently achieved a phenomenon-level application, demonstrating a high level of human-machine interaction and natural language modeling. It possesses some characteristics of general artificial intelligence and has extensive potential applications across various industries [1]."

3. Advantages and Disadvantages of ChatGPT

3.1. Advantages

ChatGPT is a language generation model that excels in producing coherent and contextually relevant text, enabling natural and engaging conversations. It demonstrates versatility by performing a wide range of tasks, such as answering questions, providing explanations, generating creative content, and assisting with various language-related activities. With its learning capability, ChatGPT can adapt to different domains and topics, continuously improving its knowledge and understanding through vast amounts of data. The model's scalability allows for efficient handling of larger datasets and complex language patterns. ChatGPT's accessibility through APIs makes it easily integratable for developers into applications and services.

Compared to regular chat-bots, ChatGPT stands out with its ability to provide more accurate and fluent responses, enabling intricate reasoning and a broader range of tasks. It benefits from fine-tuning using multi-turn dialogue data, allowing it to model conversation history and engage in continuous interactions with users. Furthermore, ChatGPT incorporates reinforcement learning through human feedback to adjust its output preferences, resulting in model-generated responses that better align with human expectations.

3.2. Disadvantages

ChatGPT, despite its impressive real-world performance as a large-scale language model, has certain limitations. It lacks real-time context and persistent memory of previous interactions, leading to inconsistent and forgetful responses. The model heavily relies on training data, making it prone to reproducing biases and inaccuracies present in the data. ChatGPT may struggle with handling ambiguity in queries, resulting in responses that may not fully address the user's intended meaning. While it can generate contextually relevant text, it may not fully comprehend the deeper nuances of a conversation. Ethical concerns arise from the potential misuse of ChatGPT, including the generation of deceptive or harmful content, highlighting the need for addressing and mitigating these issues. Additionally, ChatGPT's credibility is not guaranteed, as its responses can appear reasonable but be factually incorrect. It has limited knowledge currency and may face challenges in

answering newer questions. The high training and deployment costs of ChatGPT, along with potential latency issues, should also be considered. Furthermore, the pretrained language model underlying ChatGPT is based on real-world language data, which introduces biases and the risk of generating harmful content. Bias-related issues can also be influenced by labeling strategies.

4. Potential Applications of ChatGPT

In recent years, ChatGPT has gained widespread application and research as a chat-bot program with natural language processing capabilities, benefiting various fields and scenarios.

Chat-bot: ChatGPT can develop chat-bots that understand user input and respond in a conversational and natural manner. Chat-bots provide an efficient and cost-effective method for answering common reference questions and guiding users to appropriate services. However, they may not match the complexity of human interaction, both intellectually and emotionally. Chat-bots can establish closer connections with the younger generation and consistently address multiple user queries in real-time [2].

Language Translation: ChatGPT can be fine-tuned for language translation, serving as an effective tool for multilingual communication. This is particularly important for libraries, where translation services contribute to improving document utilization. Library users often request translations of articles written in languages they do not understand, and ChatGPT can assist in translating them into their preferred language.

Library Services: Some libraries utilize ChatGPT for generating reports, automating user services, and creating content. Natural language processing applications such as chat-bots, virtual assistants, and question-answering systems are developed using ChatGPT.

Finance: ChatGPT can be employed in finance for tasks such as risk control, intelligent customer service, investment advice, and news dissemination, enhancing the intelligence level of financial services.

Production and Manufacturing: ChatGPT can contribute to quality control, equipment maintenance, optimizing production plans, and process improvement, thus enhancing the management efficiency of enterprise production lines and supply chains for better business outcomes.

Healthcare: ChatGPT can assist in medical consultations and diagnoses, medical image recognition, and health data management, helping doctors improve efficiency and refine treatment plans.

Education: ChatGPT can serve as a teaching assistant, aiding teachers in tasks like grading assignments and providing clarification. It can also recommend learning resources, assist in learning assessments, and support paper writing, offering personalized and intelligent services to students and teachers [3].

Customer Support: ChatGPT can function as a customer support robot, providing 24/7 online customer service to enhance customer satisfaction.

Search Engines: Microsoft has incorporated ChatGPT functionality into the Bing search engine, and Baidu has introduced "Wenxin Yiyan" in its search engine, combining search and question-answering to deliver a superior search experience to users.

Social Media: ChatGPT's content creation and editing capabilities can help bloggers in fields like travel, food, and fashion produce content more efficiently, facilitating content creation and creative thinking.

Entertainment: ChatGPT enables the creation of more intelligent virtual personas for interactive live streaming, enhancing interaction and engagement with players.

The aforementioned application examples highlight the extensive potential of ChatGPT in

improving the intelligence and efficiency across various industries, providing people with convenient and efficient service experiences.

5. How can ChatGPT Empower Smart Libraries?

Scholars have shown interest in applying ChatGPT to innovative scenarios in intelligent libraries, such as intelligent recommendations, smart searching, automatic summarization and classification, intelligent translation, and writing and editing assistance [4]. Furthermore, the impact on academic libraries primarily manifests in research, reference consulting, teaching, information literacy, writing and creation, copyright, and other areas [5]. In the context of intelligent library applications, ChatGPT can empower resource development, enhance specialized research services, enable intelligent consulting services, and promote equal access to social education [6]. Scholars have also recognized the influence of ChatGPT on literature and information work. Firstly, it can transform the organization of literature and information data from surface-level information organization to semantic content organization. Secondly, it can shift the knowledge service model in literature and information work from information retrieval to knowledge-based question-answering. Thirdly, it can revolutionize the analysis methods of literature and information work from manual workshops to large-scale intelligent analysis. Fourthly, it brings forth concerns about the security of literature and information services, necessitating the establishment of risk management mechanisms. Fifthly, it impacts user reading habits, guiding the development of new modes of human-computer collaborative reading. Lastly, it poses challenges to traditional library information work processes, requiring comprehensive planning of library team capabilities and job systems [7].

ChatGPT holds vast potential for future applications in intelligent libraries. By leveraging ChatGPT technology to automate routine library tasks, libraries can enhance their efficiency and the quality of user services. Moreover, ChatGPT technology can provide users with more accurate and personalized service experiences, ensuring a superior reading experience for individuals.

5.1. Intelligent Retrieval Services

By leveraging ChatGPT technology to automate routine library tasks such as book retrieval and reservation management, libraries can significantly improve their efficiency and the quality of user services. Establishing a retrieval strategy model using ChatGPT technology can enhance retrieval efficiency and achieve fast and accurate searches. Through automated processing mechanisms, book retrieval tasks can be completed more swiftly, enabling users to access the desired resources more promptly.

In terms of literature retrieval, readers can utilize ChatGPT to search for books, articles, and other materials in the library catalog through natural language queries. ChatGPT utilizes its natural language processing capabilities to understand user queries and provide relevant search results. Through ChatGPT, readers can pose queries in a natural and fluent manner, without the need for specific search syntax or keywords. ChatGPT can comprehend the intent behind the queries and offer intelligent library catalog search services, helping users quickly find information such as library resource classifications and providing relevant search results based on reader needs. This provides readers with a more convenient and intuitive search experience, reducing the learning curve for users and enabling more individuals to efficiently utilize the library's catalog resources. It helps users swiftly locate the desired books.

Regarding reader reservations, ChatGPT technology can support multiple reservation methods and scenarios to meet different user needs. It can automatically allocate reservation resources based on user requirements and send reminders to users before the reservation time arrives.

5.2. Intelligent Question-Answering Services

ChatGPT can be utilized to provide intelligent question-answering services in libraries. Readers can interact with the chat-bot, ask questions at any time, and receive instant responses without having to wait for the availability of library staff. ChatGPT can be trained to handle various types of questions, including providing basic information about library services, collections, and policies. This includes details such as opening hours, available books, borrowing policies, and the location within the library. Moreover, it can assist readers in addressing more complex research questions by guiding them to relevant resources or providing research strategy suggestions.

In terms of intelligent consulting and answers, ChatGPT can offer users intelligent reference consulting services. Users can pose questions to ChatGPT through the chat-bot, which will analyze the queries and provide the best answers. ChatGPT's natural language processing capabilities enable it to understand and respond to user queries in a conversational manner, enhancing the user experience through more interactive and intuitive interactions with virtual consulting services. Additionally, based on user interests and learning trends, ChatGPT can recommend relevant resources such as books, journals, and academic papers, assisting the library in better meeting user needs.

5.3. Intelligent Recommendation Services

ChatGPT has extensive applications in book recommendations. It can provide personalized recommendations based on a reader's reading history and preferences. By analyzing the books borrowed in the past and the responses regarding reading habits, ChatGPT can offer book suggestions that readers may find interesting. Leveraging natural language processing and machine learning techniques, ChatGPT can understand and interpret a reader's reading history, preferences, and responses to questions. It analyzes and filters user data to identify their preferences and areas of interest, utilizing this information to generate personalized recommendations aligned with the reader's interests.

The personalized reading recommendations provided by ChatGPT help readers discover new books and authors that match their personal tastes and preferences, enhancing their overall reading experience and increasing their engagement with library resources. Furthermore, through continuous learning from user interactions and feedback, ChatGPT can gradually improve the accuracy of its recommendations, predict users' reading needs, and provide increasingly relevant and personalized suggestions.

Overall, applying ChatGPT to book recommendations enhances the reading experience for readers, encourages their active involvement in reading, and encourages exploration of new books and authors based on their individual preferences and interests. The personalized recommendation feature of ChatGPT helps readers better utilize library resources and meet their reading needs.

5.4. Collection Planning

By analyzing reader queries, ChatGPT can identify their interests and needs in specific subjects and disciplines. This data can help librarians understand readers' reading preferences and make informed decisions on purchasing new books or expanding collections in related areas. Additionally, ChatGPT can utilize circulation data and popular trends analysis to identify the book types and topics that readers are most interested in and borrow. This information helps librarians understand current popular reading trends and demands, facilitating better collection planning and updates [8].

Utilizing ChatGPT for collection planning provides valuable data and insights to librarians, enabling them to accurately understand reader needs and interests and better meet their reading

requirements. The analytical capabilities of ChatGPT assist librarians in making more targeted collection decisions, ensuring that library collections align with reader demands and stay up to date.

5.5. Personalized Services

The application of ChatGPT in the field of personalized services in smart libraries is a highly research-worthy topic. Establishing user profiles: Smart libraries can establish user profiles by utilizing personal information, reading history, borrowing records, and other user data. By analyzing these profiles, libraries can understand users' interests and needs, enabling them to provide more personalized recommendations and services. Achieving intelligent recommendations: By analyzing users' borrowing history and interests, libraries can recommend resources that are relevant to their needs and interests, thereby increasing user satisfaction and borrowing rates. Providing personalized consultations: Through natural language processing techniques, libraries can analyze user inquiries to understand their true needs and provide more accurate and personalized responses.

5.6. Assisting Librarians in Better Serving Readers

ChatGPT can assist librarians in building a knowledge base, documenting library collections, borrowing records, consultation responses, and more. By analyzing borrowing data, user behavior, and participation in library activities, ChatGPT can generate user profiles and analysis reports, helping librarians understand user needs, borrowing habits, and preferences for engaging in activities. This information can serve as a decision-making basis for future library resource procurement, reader services, activity planning, and other aspects of library work.

5.7. Achieving Equal Service

As a socially-oriented public cultural service institution, the principle of equal service has always been a core tenet of library services. However, due to uneven regional development and inequitable resource allocation, significant disparities exist in the development of libraries in different areas. Furthermore, within the service process, libraries face instances of inequality towards certain groups, such as neglecting the information resource development needs of vulnerable communities or recommending books based on stereotypes. These issues require urgent attention. ChatGPT, as an artificial intelligence product, provides users with unbiased service, free from biases related to gender, race, identity, or geographic location. Any individual can enjoy equal service. ChatGPT, through remote services, can enable marginalized groups to access library services. In order to achieve the goal of equalizing library services, libraries should proactively collaborate with multiple stakeholders to develop artificial intelligence products represented by ChatGPT or acquire their usage rights, allowing readers to enjoy more equal and high-quality library resource services without leaving their homes[9].

6. Conclusions

This article provides an analysis of the concept of ChatGPT, its global and domestic attention, and its application scenarios across various industries. It also presents the potential feasibility of ChatGPT in the context of smart libraries. The future development of ChatGPT technology requires addressing issues related to improving accuracy and reliability, integrating diverse technological domains to offer more diversified services, meeting the diverse needs of users, and addressing data security and privacy concerns. Libraries need to actively adapt to and respond to the challenges

brought by artificial intelligence, while continuously exploring and implementing innovative approaches. ChatGPT technology holds significant application prospects and potential in the field of smart libraries, and libraries should actively embrace ChatGPT technology to enhance service quality and efficiency, providing users with intelligent and personalized reading experiences.

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