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ENHANCING USER EXPERIENCE AND INFORMATION RETRIEVAL IN LIBRARIES THROUGH CHATBOT INTEGRATION: A STUDY ON UTILIZING CHATGPT

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Abstract *This research investigates the integration of ChatGPT, a generative pre-trained transformer model, within library systems to augment user experience and information retrieval efficacy. The study explores user interactions with ChatGPT, analyzes data security anxieties, assesses technical feasibility, and evaluates the influence of integration on users' ability to find relevant resources. Findings reveal a significant portion of library patrons utilize chatbots for information retrieval, perceive ChatGPT as helpful for queries, and value personalized recommendations. Nevertheless, concerns regarding data privacy and the potential for diminished human interaction necessitate mitigation strategies. The study advocates for a measured approach to Generative Pre-trained Transformer (GPT) integration, emphasizing user training and transparent communication regarding data privacy practices. Furthermore, librarians should retain an active role to address complex inquiries demanding human expertise and attenuate potential biases within GPT responses.*

Keywords: *Generative Pre-Trained Transformers, Artificial Intelligence, ChatGPT, Information Retrieval, User Experience, Chatbots, Data Privacy*

INTRODUCTION

Artificial intelligence and machine learning are now trending subjects. With the introduction of numerous Chatbots, more libraries are using machine learning technologies to optimize, automate, and simplify their operations as workplace requirements, products, and services change as a result of the digital transformation. One of the most popular AI technologies right now is NLP (Natural language processing). Technology decreases the necessity for typing or screen interaction as machines started comprehending human languages and we can now readily speak with them. Additionally, AI-powered devices can already translate spoken languages into computer codes that can execute programs and applications (Patel & Kansara, 2022). Ministry of Electronics and IT also working on developed Indian languages real time translation tool to enable exchange of communications between two persons not speaking the same language PTI (2021, June 19). It is thus clear that AI-based tools of voice recognition and language translation technologies, summarizing tools, chatbots ect. will empower digital inclusion in India as more and more people get online (Srinivasan, n.d.).

Remarkable advancements in Artificial Intelligence have propelled AI generative models such as ChatGPT and DALL-E. Based on the GPT language model technology, ChatGPT is a free tool created by OpenAI. It is a highly developed chatbot that is able to carry out a wide range of text-based requests (Lund & Wang, 2023). One key problem stem from the necessity for more accurate citations within the created material because for academic/scholarly writing it's vital to maintain integrity and build credibility, by giving references to specific sources. Additionally, these models can produce false information known as "hallucinations," which compromise the validity and dependability of the content they generate. In some cases, the generated answers might not be comprehensive enough, which could result in omissions and insufficient results (Hamed et al., 2023).

APPLICATION OF CHATGPT IN LIBRARIES

The fundamental LIS activities include information collecting, collection development, information processing, organization, storage, and distribution via methods. These chatbots can improve user interactions and information retrieval within the library system and the general operation of the library's activities. According to Mukherjee and Patra (2023), while librarians are urged to understand its implications and adjust practices accordingly (Frederick, 2023). ChatGPT's use in research and scholarly writing is recognized, despite concerns about information verification

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(Houston & Corrado, 2023). Further, Integrating GPT technology like SheetGPT in library systems has shown effectiveness in language processing, enhancing efficiency for library professionals (Panda & Kaur, 2023). As libraries navigate the evolving landscape of AI tools, understanding the uses, limitations, and educational implications of ChatGPT is crucial for adapting reference services, collection development, and teaching practices to meet the changing needs of users in the digital age. Library services can be assisted by chatbots in the following aspects:

Reference Services

Reference services at libraries involve helping patrons find information and responding to their inquiries. To offer immediate reference assistance, chatbots can be integrated into the library's websites or online public access catalogs (OPAC) system. These bots can provide suggestions, assist with simple research questions, and provide details about various library services, rules, and other topics because of this integration.

Information Retrieval

Chatbots can be designed to assist library patrons in finding information or using the library's resources. Users can have natural language conversations with chatbots and ask queries on a range of subjects, such as books, papers, databases, library services, and hours of operation. It is conceivable for chatbots to respond in real-time and point consumers toward useful resources or, if required, actual librarians.

User Engagement

Chatbots can be used to interact with library visitors. They can be configured to offer specialized book recommendations based on user preferences, reading history, or internet browsing patterns.

Data Analytics in Libraries

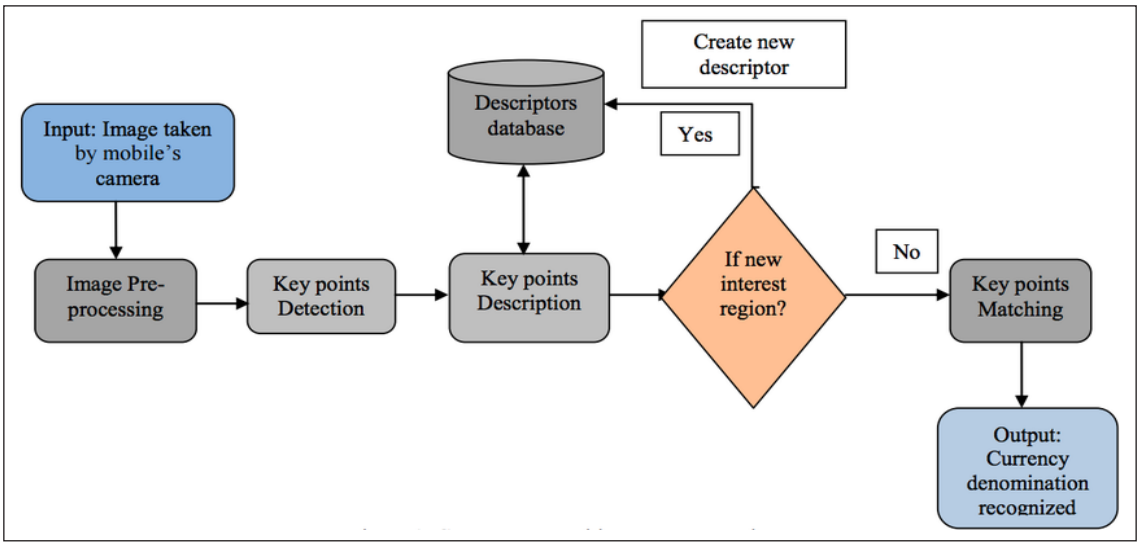
Libraries can gain useful insights into user behavior, preferences, and common information demands by examining chatbot interactions. This information can assist librarians better analyze user trends, enhance services, and expand collections. It can also be utilized to find out what issues are frequently questioned or where more resources or help might be required.

AI Assistive Technology for Visually Impaired Users

Visually impaired users benefit greatly from advancements in AI-powered assistive technology. Here are some prominent examples:

Object and Scene Recognition

Image recognition tools like Google Lookout or Seeing AI (by Microsoft) leverage smartphone cameras and AI to identify objects, text, and even currency in real-time. These tools narrate the surroundings, providing valuable information for navigation and daily tasks (See an example).



Source: Fernandes, Sousa, Paredes, & Vitor Filipe, 2015.

Fig. 1: Flowchart for Object Recognition AI

Optical Character Recognition (OCR)

Text-to-speech conversion tools like KNFB Reader or Prizmo Go use OCR technology to convert printed text into audible speech. This allows users to access documents, signs, and other text-based information independently [4, 5].

These AI tools empower visually impaired users with greater independence and access to information (2021 AI Principles Progress Update).

LITERATURE REVIEW

The literature review was carried out in line with the research objectives of the study. The integration of Artificial Intelligence (AI) in libraries presents exciting possibilities for enhancing user experience and streamlining operations. However, careful consideration must be given to factors like algorithm accuracy, potential bias, and the impact on library personnel. Nawaz et al. (2020) highlight the potential of AI to address challenges faced during the COVID-19 pandemic. Their study proposes using AI-powered chatbots and other tools to improve service delivery. They emphasize the need for infrastructure upgrades to ensure efficient service provision (Nawaz et al., 2020). While their suggestion of drone delivery is interesting, it might not be universally applicable. Wheatley and Hervieux (2019) conducted an environmental scan to assess academic libraries' engagement with AI. Their findings revealed a lack of awareness or responsiveness to the current AI trend among many institutions. This highlights the need for proactive library leadership to adapt and embrace AI technologies (Wheatley & Hervieux, 2019). Adetayo (2023) investigated the potential of AI chatbots, specifically ChatGPT, in academic libraries. The study suggests that chatbots can provide valuable assistance with tasks like answering basic reference questions and navigating library resources. However, limitations like potential inaccuracies and limited comprehension necessitate viewing chatbots as complementary tools alongside human librarians (Adetayo, 2023). Another study by Adetayo (2023) explored the integration of Bing Chat, a conversational AI assistant, in university libraries. The research suggests that Bing Chat's conversational interface can enhance user experience and empower users through tailored learning pathways. Additionally, integration with existing library resources can improve resource discovery and navigation (Adetayo, 2023). However, concerns regarding data privacy and algorithmic bias remain paramount.

Looking beyond libraries in developed nations, Mannuru et al. (2023) examined the potential impact of Generative AI on developing countries. Their research highlights the importance of ensuring inclusive growth and mitigating potential biases inherent in AI algorithms. They emphasize the need for adequate infrastructure and support to harness the positive potential of AI for development across various sectors (Mannuru et al., 2023). The literature suggests that AI offers significant opportunities for libraries. However, responsible implementation requires careful consideration of accuracy, bias, and the impact on librarians. Libraries must adopt a measured approach, leveraging AI's strengths while mitigating its limitations to create a future-proof information landscape for their users.

OBJECTIVES OF THE STUDY

- To study user interactions with the ChatGPT-based chatbot to identify common usage patterns, user preferences, and areas for improvement in the chatbot's design and functionality.
- To investigate and address privacy and data security concerns associated with integrating ChatGPT into library systems, ensuring compliance with privacy regulations and protecting user data.
- To explore the technical feasibility and potential challenges associated with integrating ChatGPT into existing library systems.
- To examine how ChatGPT integration affects the efficiency and effectiveness of information retrieval for library users, including speed and accuracy in finding relevant resources.

RESEARCH METHODOLOGY

A survey research design was utilized in the study in which data has been collected with the help of simple random sampling through questionnaire. The researcher distributed 240 questionnaires among the library users of different libraries and was able to obtain 196 response which are eligible to investigate.

FINDINGS

The results of the study and their interpretation are discussed below with the help of charts and graphs.

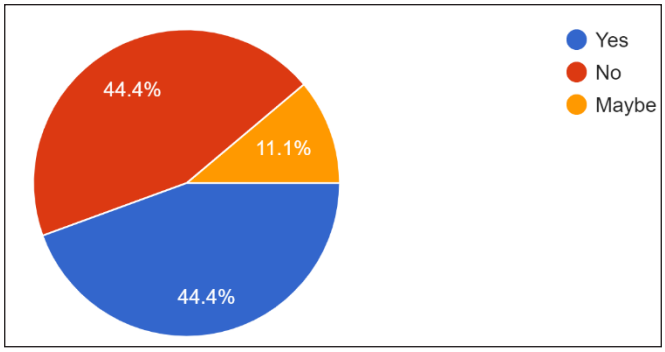


Fig. 2: Use of Chatbot for Information Retrieval and Assistance

Fig. 2 shows that 44.4% library patrons used chatbot for information retrieval, 11.1% might be using chatbot but simultaneously 44.4.% didn't use chatbot ever.

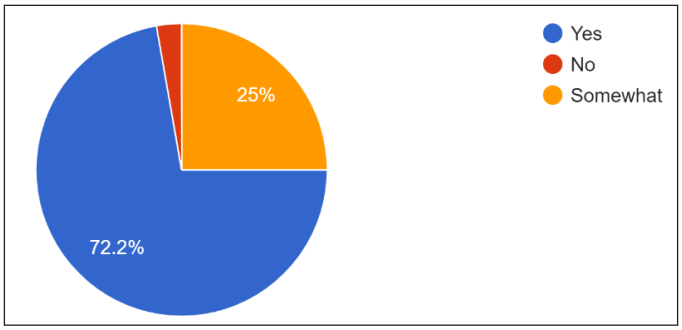


Fig. 3: ChatGPT Relevant Response towards Queries

Fig. 3 shows that 72.2% respondents agreed that ChatGPT was helpful and give relevant response to their queries, 25% responded somewhat relevant information were retrieved with the help of ChatGPT but 2.8% completely disagreed.

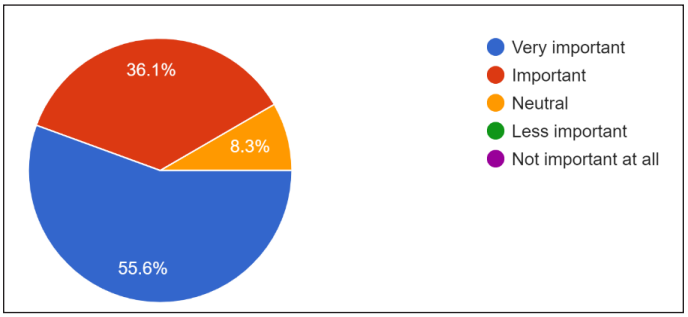


Fig. 4: Importance of Personal Assistance While Seeking Information in a Library Setting

Fig. 4 shows that 55.6% patrons seek personalized assistance and recommendations very important and helpful while looking information, 36.1 % considered it as less important and 8.3% responded neutral.

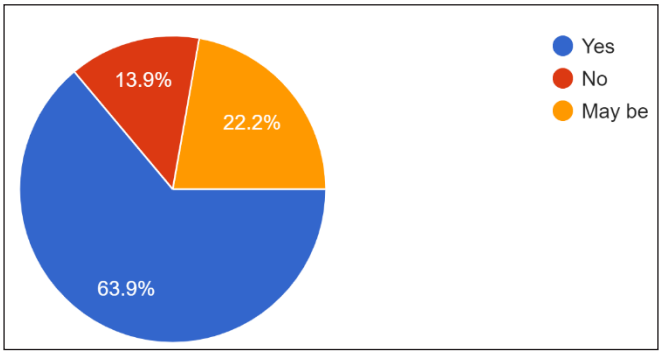


Fig. 5: User Comfort Level with Personalized Library Resources Recommendations from ChatGPT

Fig. 5 reflects that 63.9% were comfortable with ChatGPT using their previous interactions to provide personalized recommendations for library resources, 22.2% responded maybe and 13.9% was disagreed for the same.

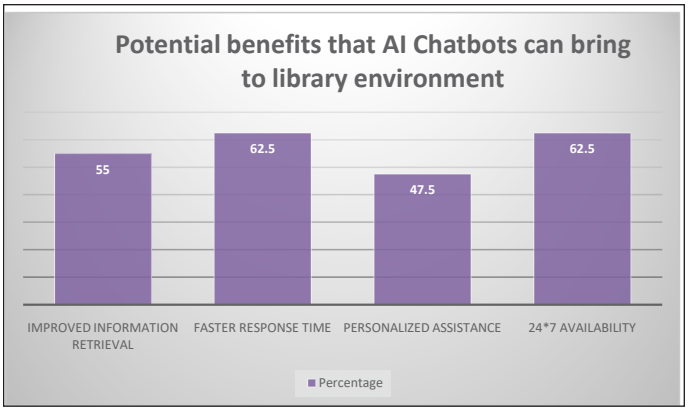


Fig. 6

Fig. 6 shows that application of AI Chatbots can bring efficient changes in the library environment. 62.5% responded that it provides 24/7 availability and faster response time, 55% acknowledged that it provides improved information retrieval and 47.5% considered it as personalized assistance.

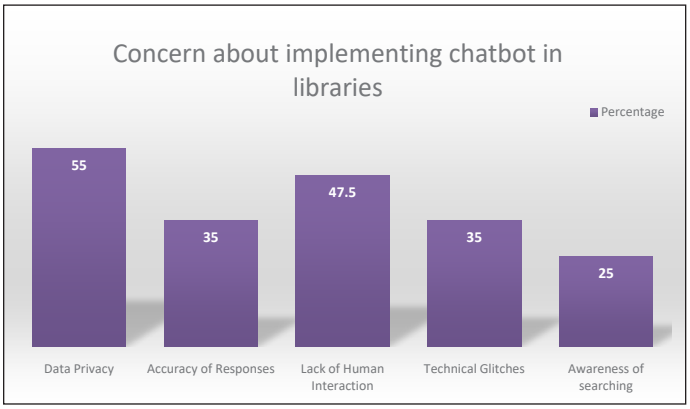


Fig. 7

Fig. 7 represents concern related to the implementation of chatbot in libraries. Here, 55% opined for data privacy, 47.5% for lack of human interaction, 35% agreed for technical glitches and accuracy of responses and 25% finds awareness of searching was also responsible factor.

FINDING STATEMENTS AND RECOMMENDATIONS

While advancements in Generative Pre-trained Transformer (GPT) models offer exciting possibilities for libraries, a

measured approach is crucial (Adetayo, 2023). This study investigated user interactions with GPT models, data security concerns, technical feasibility, and the impact on information retrieval. Findings demonstrated that a significant portion of library patrons utilize chatbots for information retrieval and value personalized recommendations (refer to Fig. 1 and Fig. 4 in the original manuscript). However, concerns regarding data privacy and the potential for diminished human interaction necessitate the development of mitigation strategies. Given the potential benefits of ChatGPT for user experience and information retrieval, alongside the identified limitations, libraries should consider a measured approach to integration. Training and clear communication regarding data privacy practices are essential. Additionally, librarians should remain actively involved to address user queries requiring human expertise and to mitigate potential bias in ChatGPT responses.

CONCLUSIONS

Artificial intelligence and machine learning technologies, such as ChatGPT, are being utilized in libraries to enhance user experience and information retrieval. Chatbots integrated into library systems can assist with reference services, information retrieval, user engagement, and data analytics. However, there are challenges related to accuracy, privacy, and algorithmic bias that need to be addressed. The study aims to explore user interactions with ChatGPT, privacy concerns, technical feasibility, and the impact of integration on information retrieval. The findings indicate that a significant percentage of library patrons use chatbots for information retrieval, find ChatGPT helpful for queries, and value personalized assistance. The integration of AI chatbots can bring efficient changes to the library environment, but concerns regarding data privacy and lack of human interaction need to be addressed.

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