

ISSN - 0971-4286

Vol. 36, No 1-2, Jan-June, 2023

INDIAN JOURNAL OF INFORMATION LIBRARY AND SOCIETY
A Peer Reviewed Journal



Surabhi Publications

FLAT NO. B-202, B.T. RESIDENCY, GGPCOLONY, RASULGARH, BHUBANESWAR-751025
ODISHA, (M) 7008403718, Email - ijils2017@gmail.com, Website : www.ijils.com

Chatbots: A Review of their Potential Applications in Library Services

Sankhayan Mukherjee¹
Swapan Kumar Patra²

Abstract

Chatbots are increasingly getting popularity in recent years. It is being predicted that this new technology is going to affect all aspect of human being. Along with its applications in other areas it can also be widely used in the field of Library and Information Science (LIS). In this context this study is an attempt to survey a few available Chatbots globally. The literature review reveals that chatbots are not a new phenomenon. However, it has gained popularity due to the latest development of “pattern-matching algorithm” and the intelligence based on the “Artificial Intelligence Markup Language.” These sophisticated chatbots can be widely used in library services not only as a handy reference tool but also in other areas of LIS domain. The study further finds the open source and commercial Chatbots and discusses their potential application in the LIS field. With their huge potential these bots may not replace the librarians and their jobs but can supplements their functions.

Key words: Chatbot, Chatbot Application, Library services, Library Science, Library and Information Science, LIS, Information Science.

1. Introduction

A chatbot is a computer programme that simulates human communication by interpreting and responding to client inquiries using Artificial Intelligence (AI) and Natural Language Processing (NLP) techniques¹. The chatbots can be questioned in a conversational way. The chatbot can help them look through the answers and make additional follow-up enquiries once they submit their questions. Consumers can easily access the information they require by using chatbots to respond to their questions and requests via text, audio, or both without further human intervention. Now-a-days, chatbot technology is nearly everywhere, from personal smart speakers to professional messaging systems. Modern AI chatbots are often referred to as “virtual assistants” or “virtual agents.” Users can communicate with them via voice assistants or text messages. The most well-known examples of these programmes include “Apple Siri”, “Google Assistant”, “Amazon Alexa”, and others.

2. Evolution of the Chatbots

Chatbot is not a recent phenomenon. The idea of chatbot came from ‘Turing Test’ proposed by Alan Turing in 1950. The first chatbot was Eliza, developed in 1966 which uses pattern matching algorithms². With the span of time and with the latest development of AI technology, Chatbots are gaining popularity. The phrases ‘chatbot,’ ‘AI chatbot,’ and ‘virtual agent’ are sometimes used interchangeably. It is also true that some chatbots are now using sophisticated algorithms to give answers with greater specifics. It is significant to highlight that discussions can become more exact over time because to the deep learning capabilities of AI chatbots. These AI systems interact with individuals to build a network of appropriate replies. The more time an AI chatbot is used, the more intelligent its responses become. As a result, an AI chatbot using deep learning may provide a more detailed and accurate response

^{1&2}Department of Library and Information Science, Sidho-Kanho-Birsha University, Purulia, West Bengal, India, Corresponding author: Swapan Kumar Patra, Email: skpatra@gmail.com

to a query than a chatbot that has just combined algorithm-based knowledge, especially when it comes to the objectives behind the query.

In the past, chatbots were only text-based input output technology. It was trained to provide prewritten answers to a limited number of simple questions. The chatbots typically failed when presented with challenging subjects or circumstances that the developers had not foreseen. They served as an interactive version of a frequently asked questions (FAQ) page. They excelled at the questions and responses for which they had received training. More rules and natural language processing (NLP) have been integrated into chatbots over time to enable conversational interaction between users and them. In fact, given their contextual awareness, modern chatbots might pick up new language as they come across more and more human speech. Modern AI chatbots use natural language understanding (NLU) as a method to determine the users' demands. Then cutting-edge AI algorithms are employed to ascertain what the user is attempting to do. These tools are based on machine learning and deep learning methods, which are among the subtle differences in AI. These methods are employed to create an ever-more-detailed knowledge base of user interactions for queries and responses. Their ability to accurately predict consumers' demands and adapt over time is improved by this. A traditional chatbot, for instance, can simply state whether it will rain or not in response to a user's question regarding the weather for tomorrow. An AI chatbot might additionally ask the user if they want to set an earlier alarm to account for the lengthier morning journey (due to the rain).

Consumers utilize AI chatbots for a range of tasks, including engaging with mobile apps and using goods created especially for the purpose, including smart thermostats and smart kitchen appliances. The needs of the various user groups determine how they are used for business. For instance, customer contact centers employ AI chatbots to expedite incoming communications and send customers in the correct path, while IT teams utilize them to offer self-service. Marketers also use AI chatbots to personalize consumer experiences. Conversational interfaces can also vary. Internet applications, independent messaging platforms, and social network messaging apps regularly use AI chatbots. In order to deliver highly customized experiences, the latest AI chatbots process data while speaking in human language. This has clear benefits for both customers and businesses.

3. Literature Review

Chatbots are applications of computer communication that respond intelligently to the human requests³. These are conversational intelligent agents that can communicate with users in natural languages⁴. Chatbots have evolved rapidly in recent years with various form of motivations, usefulness, and impact on development and design.

Another way to categories chatbots is according to their architecture, needs, and knowledge bases². These are becoming increasingly popular in academia as well as business groups⁵. These tools can be tailor made to provide various services and facilities⁶.

Social Chatbot Relationships (HCRs) are now becoming more common. HCRs typically have a superficial character motivated by curiosity, but evolve to a stable state with substantial affective exploration and engagement⁷. Chatbots are virtual machine that can interact with

humans using interactive textual skills. Cloud-based chatbots services are available for development and improvement⁸. Chatbot can provide support to university students in educational domain with the help of some prototype. It uses natural language processing tools and ontologies to detect questions and provide answers. There are many studies that explore its usefulness. For instance, a test campaign was run to show how effective and enforceable it was⁹. Since the last decade, academic libraries in developing countries have been experimenting with chatbots. The University of Nebraska-Lincoln created the chatbot “Pixel” in 2010 for the use in its library. The University of California-Irvine created the chatbot named “ANTswers” in 2013. As more chatbot developers integrate AI and natural language processing (NLP), chatbots are better equipped to handle sophisticated information requests¹⁰.

Chatbots have come to light as a useful tool for academic libraries to give ready referred services. These services can improve customer satisfaction without adding much human resources. Although there are many possible applications of chatbots in various fields, it can be widely used in LIS field also. In this review, the popular chatbots are surveyed and their potential application in LIS fields is explained. The following section will give a brief overview of chatbots potential in library services.

4. Scope of the Study

Although there are many chatbots available, in this study, just 17 chatbots are surveyed. In the year 2023, there many chatbots available in the public domain. Some of them are commercial and many are available for free. Is not possible to cover all available chatbots, this study is based on the limited numbers of chatbots. Further, this is a review of the chatbots and their potential application in the LIS field. Further in-depth study is required to do an analysis of their features and the relevance to the LIS professionals.

5. Chatbot’s Potential Application in the Library Services

The recent evolution of chatbots and their application in various field have been quite explored. However, there are very few literatures that have been explored the Chatbot’s potential for application in LIS field. Perhaps the area is quite new and still an unexplored territory for the LIS professional particularly in the developing countries. Although the natural language chat by using computer program was not a new thing, its development in recent years have drawn attention to many. The computer programmes that communicate with people using natural language have been around for almost 50 years. These technologies are playing a prominent role in the libraries since the mid-2000s¹¹.

The chatbot has enormous potential in various application areas of LIS field. Libraries, information, and knowledge resource centers in the developed part of the globe have already adopted chatbots within their technological fold. This has been done to provide improved services to the patrons¹². These latest AI tools can answer questions from a variety of users. Moreover, these chatbot provides tireless services round the year anytime in a day. In addition, their services are continuous, consistent, and have highly interactive interface that engages users. It substitutes very wide solutions for convoluted navigation techniques and scrolling through search results. These applications can even refer questions to librarians if needed¹³.

The recently created chatbots, such as 'ChatGPT'-based chatbot systems, offer a competitive alternative to conventional knowledge base-based chatbot systems in the LIS industry. For instance, research indicates that ChatGPT has the potential to give users' inquiries more precise and customized answers. ChatGPT's personalized answers can satisfy users' information needs and reduce the pressure of library staff¹⁴. Moreover, OpenAI ChatGPT could be useful for LIS professionals to generate personalized contents in any academic as well as non-academic environment¹⁵. The core LIS activities include information acquisition, collection development, information processing, organization, storage, and dissemination through means. In the overall functioning of the library activities, these chatbots can enhance user relations and information retrieval within the library system. The chatbots can provide helps in the following aspects of library services:

5.1. Information retrieval: Chatbots can be created to help library users find information or use its resources. Chatbots allow users to engage in natural language discussions and ask questions about a variety of topics, including books, articles, databases, library services, and hours of operation. Real-time responses from chatbots are possible, directing users to pertinent resources or, if necessary, human librarians.

5.2. Reference Services: In libraries, reference services involve assisting users in finding information and answering their questions. Chatbots can be embedded into the library websites or online public access catalogs (OPAC) system to provide instant reference assistance. With this integration, these bots can give recommendations, help with basic research queries, and provide information about library services, policies, or other issues.

5.3. Virtual Assistants: Chatbots can be used by libraries as virtual assistance tools to improve user experiences. Chatbots can be created to offer pre-programmed services like book renewals, study room reservations, book recommendations, and information about library activities. Libraries may provide 24/7 assistance and automate basic operations with the help of chatbots. These can free librarians to concentrate on more sophisticated user needs.

5.4. User Engagement: Chatbots can be used to interact with library visitors. Based on user preferences, reading history, or internet surfing habits, they can be programmed to provide tailored book recommendations. In addition to facilitating interactive activities like games, quizzes, and virtual book clubs, chatbots can also build community involvement and boost user engagement.

5.5. Data analytics in Libraries: By analyzing chatbot interactions, libraries can gather valuable insights into user behavior, preferences, and common information needs. This data can inform collection development, improve services, and help librarians understand user trends. It can also be used to identify frequently asked questions or areas where additional resources or assistance may be needed.

5.6. Training and Educating Library Staff and Patrons: Chatbots can help with training and educating library patrons or employees. They can provide instruction on how to use databases, navigate the library catalogue, conduct efficient research, or use other library resources. Chatbots can help library users develop their information literacy and digital literacy abilities.

6. Objectives

In the light of the literature review above, the objective of this study is to survey the various chatbots available in the public domain. This section is a pointer for the LIS profession to give a brief overview of the available chatbots, their year of establishment, owner of the chatbot, their prominent features and the respective websites. This will act as a ready reference tool for the LIS professionals in their activities.

7. Methodology

This is a brief survey of available chatbots from their respective websites. The websites of the corresponding Chatbots are accessed between April 2023 and May 2023. In total, 17 different Chatbots were examined for this study. Table 1 displays specific details about those Chatbots. The results of a thorough literature search and a visit to the websites of the relevant Chatbots are presented in the following sections.

8. Findings

This is a survey of 17 Chatbots available in public domain. These Chatbots are analyses based on their owner, their start year, prominent features, their nature (free or commercial) and their website address. The findings are presented in Table 1.

Table 1: A Review of Selected Chatbots

Sl. No.	Name of the Chatbot	Company that owned it	Year started	Major features	Commer cial	Website address
1.	Ada	Ada Support Inc	2016	Employs machine learning models that have already been trained that you may modify to suit your business needs.	Yes	https://www.ada.cx/
2.	Appy Pie Chatbot	Appy Pie LLC	2019	Contextual understanding chatbot powered by GPT-3.	Yes	https://www.appypie.com/chatbot/builder
3.	Bard	Google	21 March	Use it for task likes ideation and brainstorming, creating original material, or obtaining clarification on issues.	No	https://bard.google.co
4.	Bing Chat	Microsoft	7 February 2023	Machine learning and NLP	No	https://dx.genesys.com/Web-Admin/Bold360Chat/
5.	Bold360	Genesys	October 23, 2019	NLP technology provides natural answers, remembers context, and translates complex language.	No	

Sl. No.	Name of the Chatbot	Company that owned it	Year started	Major features	Commercial	Website address
6.	Botsify	Botsify	August 19, 2021	A self-learning chatbot use AI and ML.	Yes	https://botsify.com/
7.	ChatGPT	OpenAI	30 November 2022	Natural language processing	No	https://chat.openai.com
8.	ChatSpot	HubSpot	6th March 2023	Chat-based commands aid service, create analytics reports, write follow-up emails, or even solicit	No	http://chatspot.in/
9.	Drift	Vista Equity Partners	Sep 1, 2021	AI chatbot with rule based classifier that classified conversations based on context for richer dialogues.	Yes	http://chatspot.in/platform/custom-chatbots/
10.	Inbenta	Inbenta	April 5, 2018	To recognize conversation context, its chatbot uses machine learning and Inbenta's own NLP engine	Yes	https://www.ingenta.com/en/
11.	Infobip	Infobip	October 27, 2022	Omnichannel usability for Facebook Messenger, WhatsApp, and other services.	Yes	https://www.infobip.com/answers
12.	Intercom	Intercom Inc.	2016	Offers a tailored experience using machine learning and behavioural data.	Yes	https://www.intercom.com/customizable-bots
13.	Kommunicate	Applozic Inc.	2020	Conversational AI and NLP	Yes	https://www.kommunicate.io/
14.	LivePerson	LivePerson	2018	Develop automated conversational flows for use with various messaging platforms (such as a website, a mobile app, Apple Business Chat, etc.)	Yes	https://www.liveperson.com/

Sl. No.	Name of the Chatbot	Company that owned it	Year started	Major features	Commercial	Website address
15.	Salesforce Einstein	Salesforce	2016	Develops contextual comprehension and makes use of current reveal the most effective solutions.	Yes	https://help.salesforce.com/s/article View?id=sf.bots_service_intro.htm & type=5
16.	Watson Assistant	IBM	7 October 2021	NLP and machine learning to gather context.	Yes	https://www.ibm.com/products/watson-assistant/artificial-intelligence
17.	Zendesk Answer Bot	Zendesk	2017	The ability to contextualise interactions and comprehend intent using deep learning.	Yes	https://www.zendesk.com/in/service/ai/#geor edirect

The literature review shows that Chatbots are not a recent phenomenon. However, there is boom in the development of Chatbots in the recent years. Continuously new chatbots are being introduced to the market. Perhaps this technology will eventually be adopted by the general public replacing the search engines. It may be claimed that people favor chatbots over traditional search engines. Therefore, it is possible that the term “search engine” will eventually disappear. Anyone looking for something online will only be familiar with the term “Chatbots.” There is a tremendous potential for the LIS professionals to adopt this technology in their field.

9. Conclusion

The use of Chatbots may usher a new paradigm in LIS systems and services. There are currently very limited studies on the utilization of Chatbots in LIS field. This study is a brief survey of major Chatbots and offers a preliminary but much-needed understanding of the driving forces behind the use of conversational interfaces. Although Chatbots could be very valuable tools for LIS profession but they could not replace librarians. In future, these tools have enormous potential to supplement librarians. Hence, librarians should ready to adopt these tools in their normal activities to serve patrons with their personalized information needs. To evaluate the effectiveness of chatbots in the LIS area, further study is required to input phrase connected to LIS area in certain conversation sections of chatbots and evaluate their content to judge their relevance in the field.

Acknowledgement

The earlier version of the paper has been uploaded in the Qeios open access archive (available at: <https://www.qeios.com/read/R3USN5>). Authors are thankful to the reviewers for their constructive comments on the preprint version of the article.

Reference

1. What is a Chatbot? Available at: <https://www.ibm.com/topics/chatbots> (Accessed on 20.05.2023)

2. Adamopoulou, E., & Moussiades, L. (2020). An overview of chatbot technology. In *Artificial Intelligence Applications and Innovations: 16th IFIP WG 12.5 International Conference, AIAI 2020, Neos Marmaras, Greece, June 5–7, 2020, Proceedings, Part II 16* (pp. 373-383). Springer International Publishing.
3. Dahiya, M. (2017). A tool of conversation: Chatbot. *International Journal of Computer Sciences and Engineering*, 5(5), 158-161.
4. Luo, B., Lau, R. Y., Li, C., & Si, Y. W. (2022). A critical review of state of the art chatbot designs and applications. *Wiley Interdisciplinary Reviews: Data Mining and Knowledge Discovery*, 12(1), e1434.
5. Ranoliya, B. R., Raghuwanshi, N., & Singh, S. (2017, September). Chatbot for university related FAQs. In 2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI) (pp. 1525-1530). IEEE.
6. Shawar, B. A., & Atwell, E. (2007, April). Different measurement metrics to evaluate a chatbot system. In Proceedings of the workshop on bridging the gap: Academic and industrial research in dialog technologies (pp. 89-96).
7. Skjuve, M., Følstad, A., Fostervold, K. I., & Brandtzaeg, P. B. (2021). My chatbot companion-a study of human-chatbot relationships. *International Journal of Human-Computer Studies*, 149, 102601.
8. Rahman, A. M., Al Mamun, A., & Islam, A. (2017, December). Programming challenges of chatbot: Current and future prospective. In 2017 IEEE region 10 humanitarian technology conference (R10-HTC) (pp. 75-78). IEEE.
9. Colace, F., De Santo, M., Lombardi, M., Pascale, F., Pietrosanto, A., & Lemma, S. (2018). Chatbot for e-learning: A case of study. *International Journal of Mechanical Engineering and Robotics Research*, 7(5), 528-533.
10. Rodriguez, S., & Mune, C. (2021). Library chatbots: Easier than you think. *Computers in Libraries*, 41(8), 29-32.
11. McNeal, M. L., & Newyear, D. (2013). Introducing chatbots in libraries. *Library technology reports*, 49(8), 5-10.
12. Bagchi, M. (2020). Conceptualising a Library Chatbot using Open Source Conversational Artificial Intelligence. *DESIDOC Journal of Library & Information Technology*, 40(6). Pp.329-333
13. Allison, D. (2012), "Chatbots in the library: is it time?", *Library Hi Tech*, Vol. 30 No. 1, pp. 95-107. <https://doi.org/10.1108/07378831211213238>
14. Panda, S. and Kaur, N. (2023), "Exploring the viability of ChatGPT as an alternative to traditional chatbot systems in library and information centers", *Library Hi Tech News*, Vol. 40 No. 3, pp. 22-25. <https://doi.org/10.1108/LHTN-02-2023-0032>
15. Kirtania, D. K., & Patra, S. K. (2023). OpenAI ChatGPT Generated Content and Similarity Index: A study of selected terms from the Library & Information Science (LIS). *Qeios*.