Chatbots: A review of their potential applications in library services

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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 revels that chatbots are not a recent phenomenon. However, it has gained popularity due to 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.

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1. Introduction

A chatbot is a computer programme that mimics human communication by using Artificial Intelligence (AI) and Natural Language Processing (NLP) tools to interpret and answer clients' questions[1]. One can ask the chatbots questions in a conversational manner. They can put their queries and the chatbot can assist in search through responses and further follow-up inquiries. Chatbots can make it simple for consumers to access the information they need by answering queries

and requests from users via text, audio, or both without the need of further human assistance. Now-a-days, chatbot technology is practically ubiquitous, starting from home smart speakers to business messaging platforms. Modern AI chatbots are frequently referred to as "virtual assistants" or "virtual agents." They can communicate with the users via text messages or voice assistants. The famous examples of these applications are 'Apple Siri', 'Google Assistant', and 'Amazon Alexa' and so on.

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 algorithms[2]. 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 important to note that AI chatbots' deep learning capabilities allow conversations to get more precise over time. These AI technologies are creating network of suitable responses through their interactions with people. An AI chatbot's responses get more powerful the longer it has been in use. Therefore, compared to a chatbot that has just merged algorithm-based information, an AI chatbot utilizing deep learning may give a more thorough and correct response to a query, especially when it comes to the intentions behind the query.

In the past, chatbots were only text-based input output technology. It was trained to respond to a small number of straight forward questions with previously written answers. When faced with complex topics or the situation that the developers had not anticipated, the chatbots generally failed. They functioned like an interactive Frequently Asked Questions (FAQ). They performed admirably for the queries and answers on which they had been trained for. Over the years, more rules and natural language processing (NLP) have been incorporated into chatbots so that end users can interact with them in a conversational style. In fact, modern chatbots may learn as they encounter more and more human language since they are contextually aware. Natural language understanding (NLU) is a technique used by modern AI chatbots to ascertain the user's needs. Then cutting-edge AI algorithms are employed to ascertain what the user is attempting to do. These technologies rely on machine learning and deep learning techniques, which are among the aspects AI with subtle distinctions. These techniques are used to build an ever-more-detailed knowledge base of queries and responses based on user interactions. This enhances their capacity to correctly anticipate users' needs and respond over time. For example, if a user enquires about the weather for tomorrow, a classic chatbot can answer simply whether it will rain or not. To account for the longer morning drive (due to rain), an AI chatbot may also ask the user if they want to set an earlier alarm.

AI chatbots are used by consumers for a variety of functions, from interacting with mobile apps to using products that were specifically designed for the purpose, such as the smart thermostats and the smart kitchen appliances. Their use for business varies according to the need of the various user groups. For example, AI chatbots are used by marketers to

personalize consumer experiences, by IT teams to provide self-service, and by customer contact centers to expedite incoming communications and point clients in the right direction. Interfaces for conversation can also differ. AI chatbots are frequently utilized in internet applications, independent messaging platforms, and social media messaging apps. The most recent AI chatbots process data while speaking in human language to provide highly personalized experiences. This has obvious advantages for both customers and enterprise.

3. Literature Review

Chatbots are applications of computer communication that respond intelligently to the human requests[3]. These are the intelligent conversational agents that can interact with users through natural languages[4]. Chatbots have evolved rapidly in recent years with various form of motivations, usefulness, and impact on design and development.

Chatbots can also be classified based on various criteria such as area of knowledge, need, and architecture[2]. These are becoming increasingly popular in academia as well as business groups[5]. These tools can be tailor made to provide various services and facilities[6].

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 engagement[7]. Chatbots are virtual machine that can interact with humans using interactive textual skills. Cloud-based chatbots services are available for development and improvement[8]. 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 example, an experimental campaign was conducted to demonstrate its enforceability and efficiency [9].

Since the last decade, academic libraries in developing countries have been experimenting with chatbots. In 2010, the University of Nebraska-Lincoln created the chatbot "Pixel" for the use in its library. In 2013, the University of California-Irvine created the chatbot named "ANTswers". As more chatbot developers integrate AI and natural language processing (NLP), chatbots are better equipped to handle sophisticated information requests[10].

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. 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 programs that use natural language to interact with users, have existed for nearly fifty years. These technologies are playing a prominent role in the libraries since the mid-2000s[11].

The chatbot have enormous potential in various application areas of LIS field. Libraries, information, and knowledge resource centres 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 patrons[12]. 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 replaces complicated navigation systems and scrolling through search results with more targeted answers. These applications can even refer questions to librarians if needed[13].

The lately developed chatbots for example 'ChatGPT'-based chatbot systems are a viable alternative to traditional knowledge base-based chatbot systems in LIS field. For example, research shows that ChatGPT has the potential to provide more accurate and personalized responses to users' queries. ChatGPT's personalized answers can satisfy users' information needs and reduce the workload of library staff[14]. Moreover, OpenAI ChatGPT could be useful for LIS professionals to generate personalized contents in any academic as well as non-academic environment[15].

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:

4.1. 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.

4.2. 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.

4.3. 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.

4.4. 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.

4.5. 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.

4.6. 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.

5. 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.

5.1. 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.

6. 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	Commercial	Website address
1. 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/
1. 2.	Appy Pie Chatbot	Appy Pie LLC	2019	Contextual understanding chatbot powered by GPT-3.	Yes	https://www.appypie.com/chatbot/builder
1. 3.	Bard	Google	21 March 2023	Use it for tasks like ideation and brainstorming, creating original material, or obtaining clarification on issues.	No	https://bard.google.com/
1. 4.	Bing Chat	Microsoft	7 February 2023	Machine learning and NLP	No	
1. 5.	Bold360	Genesys	October 23, 2019	NLP technology provides natural answers, remembers context, and translates complex language.	No	https://dx.genesys.com/Web-Admin/Bold360Chat/
1. 6.	Botsify	Botsify	August 19, 2021	A self-learning chatbot use AI and ML.	Yes	https://botsify.com/
1. 7.	ChatGPT	OpenAI	30 November 2022	Natural language processing	No	https://chat.openai.com/
1. 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/home
1. 9.	Drift	Vista Equity Partners	Sep 1, 2021	AI chatbot with rule-based classifier that classifies conversations based on context for richer dialogues.	Yes	https://www.drift.com/platform/custom-chatbots/
1. 10.	Inbenta	Inbenta	April 5, 2018	To recognize conversation context, its chatbot uses machine learning and Inbenta's own NLP engine.	Yes	https://www.inbenta.com/en/
1. 11.	Infobip	Infobip	October 27, 2022	Omnichannel usability for Facebook Messenger, WhatsApp, and other services.	Yes	https://www.infobip.com/answers
1. 12.	Intercom	Intercom Inc.	2016	Offers a tailored experience using machine learning and behavioural data.	Yes	https://www.intercom.com/customizable-bots
1. 13.	Kommunicate	Applozic Inc.	2020	Conversational AI and NLP	Yes	https://www.kommunicate.io/
1. 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/
1. 15.	Salesforce Einstein	Salesforce	2016	Develops contextual comprehension and makes use of current Salesforce data to reveal the most effective solutions.	Yes	https://help.salesforce.com/s/articleView?id=sf.bots_service_intro.htm&type=5
1. 16.	Watson Assistant	IBM	7 October 2021	NLP and machine learning to gather context.	Yes	https://www.ibm.com/products/watson-assistant/artificial-intelligence
1. 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/#georedirect

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.

7. 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.

7.1 Limitation 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.

Acknowledgement

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