

AN EVALUATION OF LIBRARY CHATBOT USING OPEN-SOURCE CONVERSATIONAL ARTIFICIAL INTELLIGENCE

Mamta Vaish

Reference Assistant in Tagore Library, Lucknow University, Lucknow

Abstract

This study highlights the way Open-Source conversational artificial intelligence (AI) evaluates library chatbot services. This study gathered data through a survey from 51 sample participants using a Google form; they were selected through a simple random sampling technique. This highlighted that chatbots effectively use natural language processing (NLP) methods that promote easy use of libraries for any individual from any lingual background. Its conversational intelligence is another effective service to detect users' language and serve them accordingly to have an easy searching ability. Natural Language Understanding (NLU) libraries and language independence improve the chatbot system to automatise services to readers. This study also highlights that the execution of this system is expensive, and financial aid from the government can manage this issue.

Introduction

Open-source artificial intelligence is beneficial for designing library chatbots for simulating discussions with the end users. Most chatbots are equipped with artificial intelligence, and the concept of natural language processing is used to understand the questions of users and automate the response. The conversation of the users with the chatbot is easy as the chatbot gives instantaneous answers to the queries of the user without any human intervention (Josephine, 2021). Chatbot technology is commonly used in all social media platforms, such as WhatsApp, Facebook Messenger and many other digital platforms. The chatbots are programmed to answer a set of standard questions frequently asked by the users. The developers design the chatbots based on the predicted questions that the users can ask. It is not possible for the chatbots to give the answer to the questions which has not been predicted by the developer. The algorithms of chatbots have been becoming complex every day, which has resulted in the rise of new chatbots equipped with machine learning (Suhel *et al.*, 2020). Modern AI chatbots use natural language processing to recognize the meaning of the input given by open-ended users. Furthermore, most organizations use the chatbot tool to provide better support to their customers.

Aims and objectives

The main goal of the is to evaluate the chatbot library using conversational Artificial Intelligence technology. The main objectives of the research are:

- To Discover the importance of artificial intelligence in examining the chatbot.
- To Evaluate the effect of chatbots in improving customer support in companies.

Literature review

Using open-source conversational AI in conceptualizing library chatbots

The usage of chatbots is significantly increasing in popularity with the advancement of technology and developments in the domains of marketing. Studies point out that conversational software is emerging as a groundbreaking technology in connecting individuals across people-centric organizations. In this regard, Bagchi (2020) argues that incorporating conversational AI in libraries can be highly beneficial in “recognizing, absorbing and effectuating technology” and attracting a wider audience and suggests the utilization of the “Rasa Stack”. Rasa is a widely accepted “conversational AI” platform that uses “machine learning” (ML), “Natural Language Processing” (NLP) and “Natural Language Understanding” (NLU) to develop chatbots and virtual AI assistants (Bagchi, 2020). In the field of library science, chatbots can heavily contribute to interpreting data and answering the queries of clients to mimic human communication on a 24/7 basis. Considering the bulk amount of information stored in libraries, incorporating conversational AI can make it relatively easier for clients to inquire about specific materials and request information in a short span. Contrary to human interaction that involves spending hours going through datasets, library chatbots can substantially improve the speed of communication, where clients’ inquiries can be addressed in a matter of seconds. In this regard, Kuhail *et al.* (2023) point out that chatbots can significantly help library activities by interacting with visitors based on user behavior, reading history, and website activities. This can additionally help in curating personalized book recommendations for students and facilitating user engagement through interactive games and virtual book clubs.

The effectiveness of open-source conversational chatbots in improving customer support

Human customer support is increasingly being replaced with conversational technology and AI chatbots as time-saving alternatives that save costs in the long run. In recent times, conversational chatbots have been fueled by artificial intelligence (AI), machine learning (ML) and deep learning (DL). Eventually, “human chat service agents” are rapidly replaced by the CAs (“conversational software agents”). To analyze the effectiveness of chatbots in facilitating customer engagement, Adam *et al.* (2021) conducted a randomized experiment examining the extent to which automated chatbots are effective in meeting customers’ expectations. The findings reveal that customers prefer getting human-like attributes to non-human agents, which necessitates the need for developing humanized interaction frameworks to meet customers’ expectations. Based on the results, it was gathered that conversational agents (CAs) can significantly help in mitigating the drawbacks that are likely to occur in AI-based customer interaction by reproducing human-like communication traits. The findings also reveal that user experience in chatbots can be improved and the willingness of customers to engage with open-source conversational agents if more human-like qualities are incorporated in chatbots. In this regard, Kretzschmar *et al.* (2019) argued that despite being efficient conversational agents, AI chatbots can pose certain ethical challenges in terms of data privacy and user consent. As a result, it is crucial to make sure that the AI and ML initiatives comply with relevant legal standards and regulations to avoid potential lawsuits.

Methodology

The use of Open-Source Artificial Intelligence (AI) is the independent variable of this study; the evaluation of the Library Chatbot system is the dependent variable. These variables are connected through a reason-and-result relationship, as this will analyse the effect of using Open-Source AI in developing and evaluating the Library Chatbot system.

This research process used primary sources of data to gather the most current and authentic information for this study. Primary sources of information involve human participation in a research process to promote the authenticity of collected data (Sileyew, 2019). Hence, this research process used a Google Form as a tool to

conduct a survey to collect information. In this concern, this study used a questionnaire of 10 questions, containing 3 demographic and 7 objective-oriented questions.

In order to collect information, this research process targeted 101 readers and selected 51 readers in total based on their responses. This study used a simple random sampling technique as this sampling strategy provides an equal chance to participate in a research process (Rahman *et al.* 2022). The sample was selected based on their responses, that is, gathered answer sheets with answers to all questions.

This research process used a quantitative analysis process to assess collected numeric data through the conducted survey. According to Mellinger and Hanson (2020), the quantitative research process gathers the opinions of participants and allows a research process to conduct an overall study based on those responses. Hence, there was no chance for researchers' personal views that made this research process bias-free.

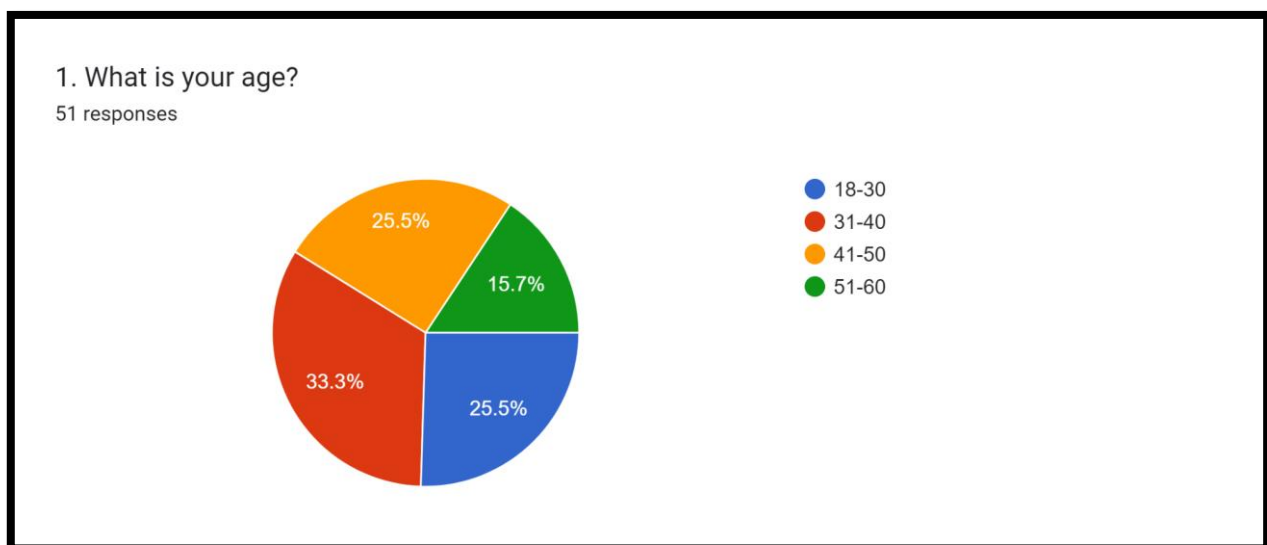
The ethical considerations that this study maintained were the volunteer and willing participation of sample participants. Participants were well-known at every step of this research process, and their information was kept confidential.

Findings and Discussion

Findings

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
18-30	13	25.5	51
31-40	17	33.3	51
41-50	13	25.5	51
51-60	8	15.7	51

Table 1: Age of participants



Graph 1: Age of participants

Table 1 and Graph 1 show that the highest number of participants are in the 31-40 age group.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Male</i>	16	31.4	51
<i>Female</i>	27	52.9	51
<i>Prefer not to say</i>	8	15.7	51

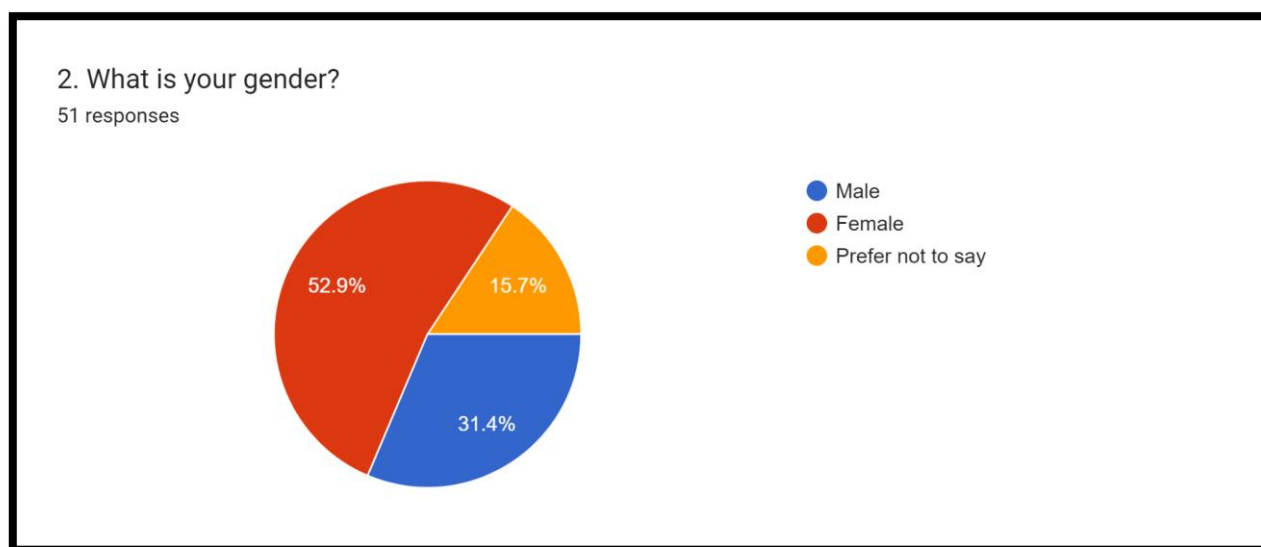
Table 2: Gender of participants**Graph 2: Gender of participants**

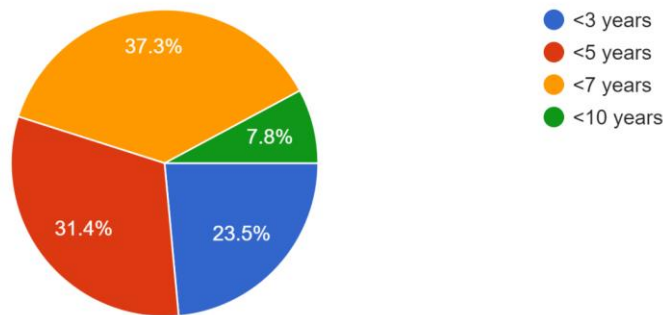
Table 2 and Graph 2 highlighted that above 52% of women were participants.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i><3 Years</i>	12	23.5	51
<i><5 Years</i>	16	31.4	51
<i><7 Years</i>	19	37.3	51
<i><10 Years</i>	4	7.8	51

Table 3: User experience of participants

3. What is your work experience?

51 responses

**Graph 3: User experience of participants**

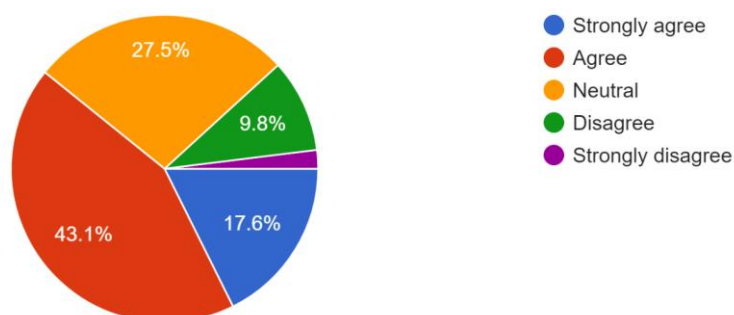
The highest number of participants are under the group of “<7 years” in this study.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Strongly agree</i>	9	17.6	51
<i>Agree</i>	22	43.1	51
<i>Neutral</i>	14	27.5	51
<i>Disagree</i>	5	9.8	51
<i>Strongly disagree</i>	1	2	51

Table 4: Chatbots promote “natural language processing” (NLP) techniques based on chats

4. Chatbots promote natural language processing (NLP) techniques based on chats

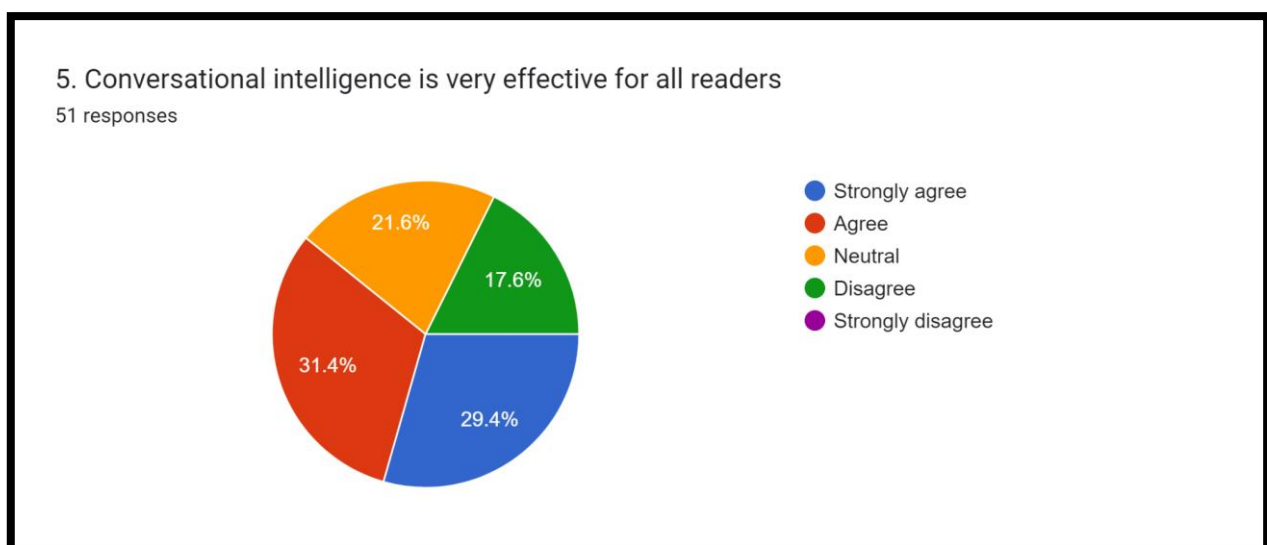
51 responses

**Graph 4: Chatbots promote “natural language processing” (NLP) techniques based on chats**

The above graph and table combined present almost 61% agreement regarding chatbot’s promotion of NLP based on chat; hence, this agreement is taken to be true.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Strongly agree</i>	15	29.4	51
<i>Agree</i>	16	31.4	51
<i>Neutral</i>	11	21.6	51
<i>Disagree</i>	9	17.6	51
<i>Strongly disagree</i>	0	0	51

Table 5: Conversational intelligence is very effective for all readers



Graph 5: Conversational intelligence is very effective for all readers

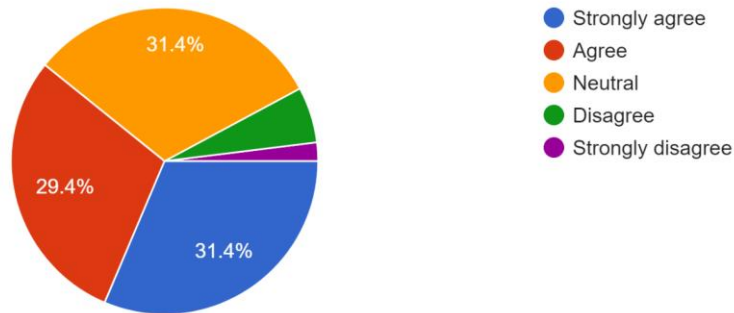
The fifth statement focuses on the effectiveness of conversational intelligence for library readers, which fetched agreement from almost 61% of participants and indicates its truthfulness.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Strongly agree</i>	16	31.4	51
<i>Agree</i>	15	29.4	51
<i>Neutral</i>	16	31.4	51
<i>Disagree</i>	3	5.9	51
<i>Strongly disagree</i>	1	2	51

Table 6: Language independence promotes the experience of any reader in online libraries

6. Language independence promotes the experience of any reader in online libraries

51 responses



Graph 6: Language independence promotes the experience of any reader in online libraries

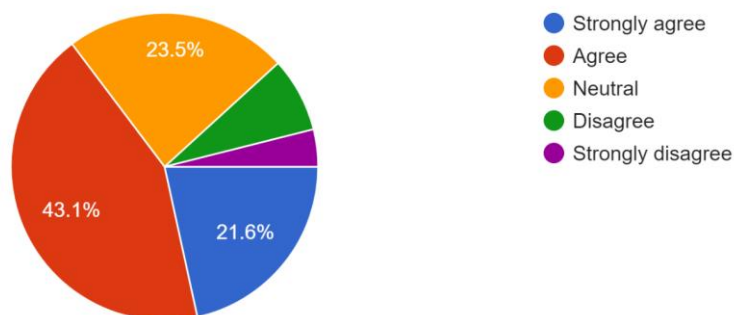
Despite 8% disagreement, the language independence service of open-source AI fetched almost 61% agreement, leading to high acceptance of this statement.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Strongly agree</i>	11	21.6	51
<i>Agree</i>	22	43.1	51
<i>Neutral</i>	12	23.5	51
<i>Disagree</i>	4	7.8	51
<i>Strongly disagree</i>	2	3.9	51

Table 7: Chatbots automatise customer interactions

7. Chatbots automatise customer interactions

51 responses

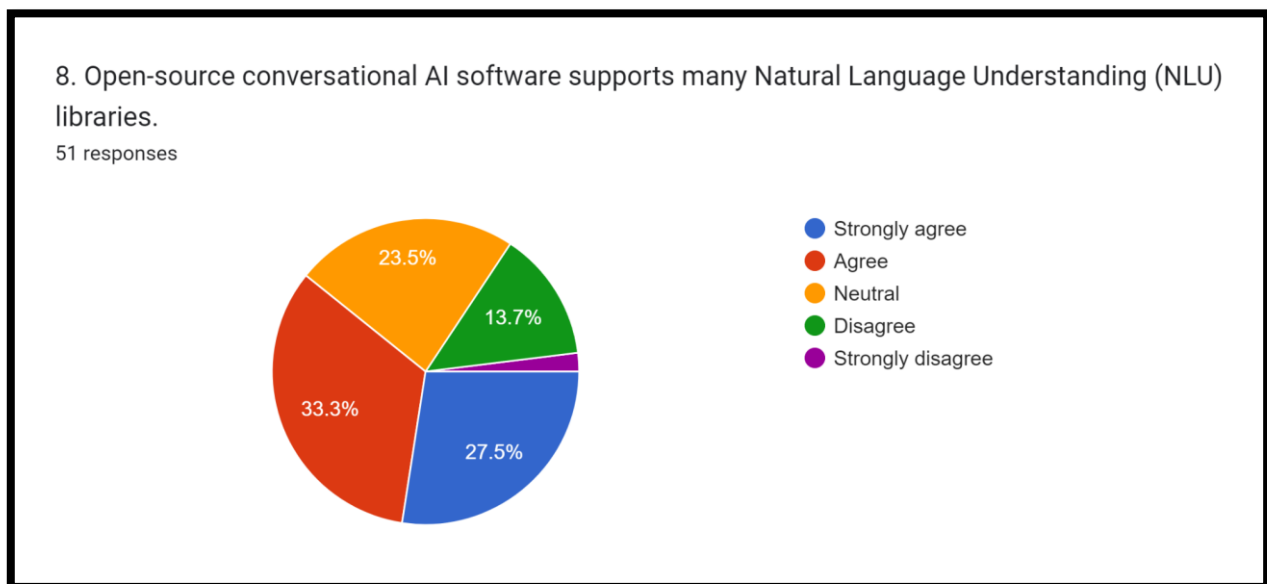


Graph 7: Chatbots automatise customer interactions

The seventh statement also fetched above 64% acceptance of the matter that chatbot services develop automatic customer services to enhance reader experiences.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Strongly agree</i>	14	27.5	51
<i>Agree</i>	17	33.3	51
<i>Neutral</i>	12	23.5	51
<i>Disagree</i>	7	13.7	51
<i>Strongly disagree</i>	1	2	51

Table 8: “Open-source conversational AI” software supports many “Natural Language Understanding” (NLU) libraries

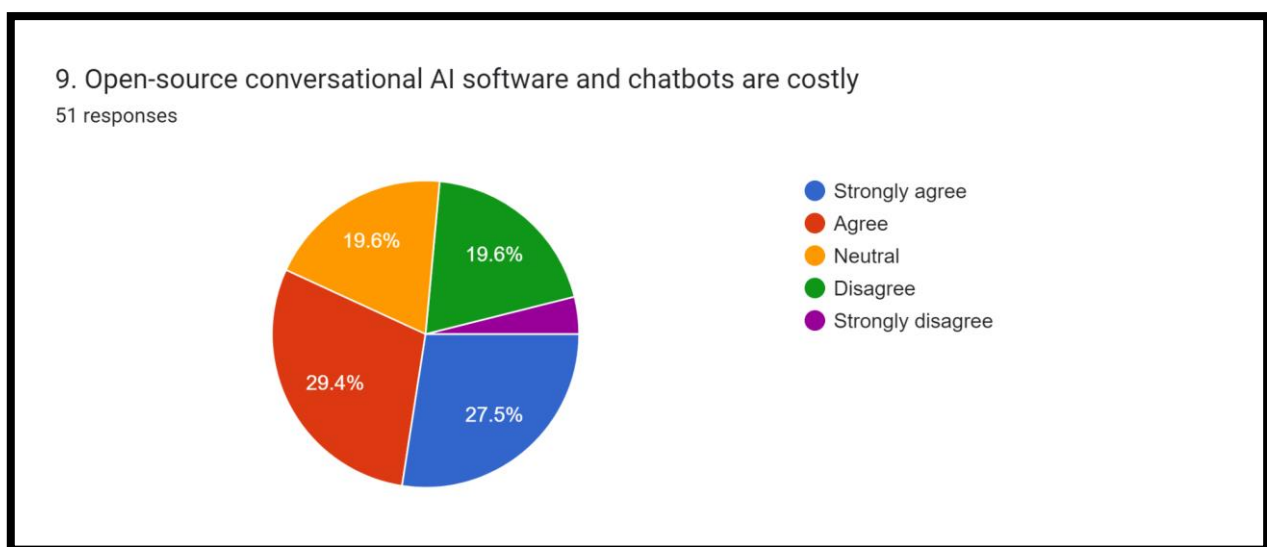


Graph 8: “Open-source conversational AI” software supports many “Natural Language Understanding” (NLU) libraries

The above graph and table together fetched high acceptance from 60% of participants; this highlights that NLU libraries are enriched with open-source conversational AI services.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Strongly agree</i>	14	27.5	51
<i>Agree</i>	15	29.4	51
<i>Neutral</i>	10	19.6	51
<i>Disagree</i>	10	19.6	51
<i>Strongly disagree</i>	2	3.9	51

Table 9: Open-source conversational AI software and chatbots are costly



Graph 9: Open-source conversational AI software and chatbots are costly

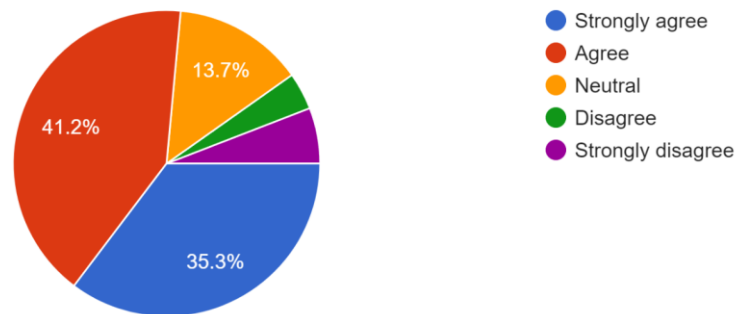
The above statement also fetched almost 57% of agreement that these softwares are expensive.

<i>Responses</i>	<i>Respondents</i>	<i>Percentage</i>	<i>Total</i>
<i>Strongly agree</i>	18	35.3	51
<i>Agree</i>	21	41.2	51
<i>Neutral</i>	7	13.7	51
<i>Disagree</i>	2	3.9	51
<i>Strongly disagree</i>	3	5.9	51

Table 10: Increasing governmental support can promote better educational services by providing financial help in executing Open-source conversational AI software to develop chatbots

10. An increasing governmental support can promote better educational services by providing financial help in executing Open-source conversational AI software to develop chatbots

51 responses



Graph 10: Increasing governmental support can promote better educational services by providing financial help in executing Open-source conversational AI software to develop chatbots

Above 75% of participants supported the need for financial assistance from the government to execute expensive open-source conversational AI to improve chatbot services.

Discussion

Natural language processing (NLP) methods highlights the importance of the developing the conversational management process for readers. This promotes human-like comprehension through the use of artificial intelligence (AI). Furthermore, this also assesses the changes in abbreviation and unused words, which eases dataset creation processes (Rath *et al.* 2023). Furthermore, this also detects the languages of every individual and provides them supports based on their demands. As a result, online libraries can provide efficient services with conversational analysis of users' language. In addition, these services allow chatbots in automatization of customer services; automatic reply to readers enhance their user experience. Thereafter, rule-based chatbots assess users' particular behaviours and provide them with required suggestion and make decisions for their readers. It can be concluded that natural language processing helps in understanding the function of chatbots has been examined. Natural language processing makes the usage of chatbots easy for individuals who know any language. Conversational intelligence is one of the services that is used for detecting the language of the users and serving the users based on the search pattern in the online platform. Moreover, natural language processing brings improvisation in the chat processing so that the end users can get the automated services. The implementation of the chatbot system has been found to be quite expensive, and this problem can be mitigated by getting adequate funds from the government.

Conclusion

An inter-relationship has been developed between the open-source AI and library chatbot systems. Primary data analysis has been used in the research, which involved human participation. Moreover, primary data analysis has been used as it promotes the genuineness of the data. A Google form has been used as a tool in this survey for collecting the information. The number of respondents who have participated in the research is 101, and a total of 51 respondents have been selected. A random sampling technique has been used to determine the readers from the entire population. A quantitative analysis has been used to assess the numeric data, and the opinions of the participants have been gathered. Moreover, a literature review has been

conducted where the concept of chatbot library and conversational AI has been elaborated. It can be further concluded that the Chatbots have been used effectively in solving the problems of the customers.

References

1. Adam, M., Wessel, M. & Benlian, A., 2021. AI-based chatbots in customer service and their effects on user compliance. *Electron Markets*, 31, 427–445.
2. Bagchi, M., 2020. Conceptualising a Library Chatbot using Open Source Conversational Artificial Intelligence. *DESIDOC Journal of Library & Information Technology*, 40(6).
3. Josephine, D. D. (2021). Amazon Lex based personalized chatbot for IoT LAB@ CIT. *International Journal of Advance Scientific Research and Engineering Trends*, 6(5).
4. Kretzschmar, K., Tyroll, H., Pavarini, G., Manzini, A., Singh, I. and NeurOx Young People's Advisory Group, 2019. Can your phone be your therapist? Young people's ethical perspectives on the use of fully automated conversational agents (chatbots) in mental health support. *Biomedical informatics insights*, 11, p.1178222619829083.
5. Kuhail, M.A., Alturki, N., Alramlawi, S. et al., 2023. Interacting with educational chatbots: A systematic review. *Educ Inf Technol* 28, 973–1018.
6. Mellinger, C.D. and Hanson, T.A., 2020. Methodological considerations for survey research: Validity, reliability, and quantitative analysis. *Linguistica Antverpiensia, New Series–Themes in Translation Studies*, 19.
7. Rahman, M.M., Tabash, M.I., Salamzadeh, A., Abduli, S. and Rahaman, M.S., 2022. Sampling techniques (probability) for quantitative social science researchers: a conceptual guidelines with examples. *Seeu Review*, 17(1), pp.42-51.
8. Rath, S., Pattanayak, A., Tripathy, S., Priyadarshini, S.B.B., Tripathy, A. and Tanvi, S., 2023. Prediction of a Novel Rule-Based Chatbot Approach (RCA) using Natural Language Processing Techniques. *International Journal of Intelligent Systems and Applications in Engineering*, 11(3), pp.318-325.
9. Sileyew, K.J., 2019. Research design and methodology. *Cyberspace*, pp.1-12.
10. Suhel, S. F., Shukla, V. K., Vyas, S., & Mishra, V. P. (2020, June). Conversation to automation in banking through chatbot using artificial machine intelligence language. In *2020 8th international conference on reliability, infocom technologies and optimization (trends and future directions)(ICRITO)* (pp. 611-618). IEEE.