❒ 307

NOVA-a virtual nursing assistant

Vijaykumar Bidve, Amit Virkar, Prajakta Raut, Samruddhi Velapurkar
Department of Information Technology, Marathwada Mitra Mandal's College of Engineering, Pune, India

Article Info	ABSTRACT
	The majority of people are medically unqualified to research or comprehend the severity of their ailments or symptoms. Natural language processing plays a critical role in healthcare in this area. These chatbots collect patient health data and, based on that data, provide more relevant information to patients about their physical ailments, as well as advise next steps. Artificial intelligence (AI)-powered healthcare chatbots are useful in the medical industry for supporting patients and directing them to the most appropriate resources. Chatbots are more useful for online searches that users or patients conduct when they are searching for answers to their health-related questions. With this application, a user can make health requests via text message and might also get relevant health suggestions/recommendations through it. This Chatbot is developed to be both educational and conversational. Chatbot delivers medical information, such as symptoms and remedies for diseases. Patients' personal and medical information is stored in a database for further study, and patients receive real-time advice from experts. AI-powered apps in healthcare have experienced a significant increase in recent days. As a result, office wait times are reduced, saving money and energy. Patients may be learning medical information and assisting at their own pace and location.
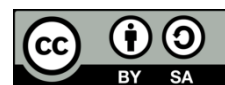
Corresponding Author:

Vijaykumar Bidve
Department of Information Technology, Marathwada Mitra Mandal's College of Engineering
Savitribai Phule Pune University, Pune-411052, Maharashtra, India
Email: vijay.bidve@gmail.com

1. INTRODUCTION

Chatbot system is automating loads of client care services and additionally company, establishments, organization's websites. Users get a fast response to the queries that square measure a lot of common square measures that square measure commonly asked. Here we've projected a chatbot system for patients [1]–[3]. Patients positively might have ample queries associated with diseases, medicines, and different facilities. rather than asking any random person, they will get a fast answer via this chatbot system. A chatbot is an associate AI agent who will participate in a very speech with a user. Most measures are equipped with a messenger-type interface with input from a user-associated output from the chatbot [4]–[7]. The chatbot processes the user's input and outputs a reply supported by what the user has simply sent. It might be an acknowledgment, a speech topic, or perhaps a picture. most elementary chatbots work by matching a user's input with a predefined set of dialog. for instance, the user language "Thank you" can end in the chatbot language "you're welcome" [8]–[10].

The predefined set of dialog is often established to imitate a standard speech between two individuals. Issues will arise once a user says one thing the chatbot doesn't acknowledge, associate example might be the user aspiring to say "Thank you". This results in loads of manual work by making an attempt to outline each combination of a user language "Thanks". Advances in modern technologies have caused a shift towards digital health intending, wherever clinical and body activities are often motor-assisted by computer-generated

analytics, and Marathwada Mitra Mandal's College of Engineering (MMCOE), Department of Knowledge Technology 2022 three with the utilization of electronic medical records [11]–[14]. The objectives are:

a. Solving the tending issue of the localized users by providing an easy interface.
b. Providing tending recommendations and predictions so as to form the practice cheap and economical.
c. To avail practice for minor health problems right away.

However, though health professionals have trained for years to follow, retrieving data from large-scale information typically needs specialist IT skills and specialized infrastructure. As a result, health professionals are typically restricted by their own personal expertise or that of peers during a joint follow. Therefore, associate data retrieval systems within the kind of a matter respondent (QA) model are often of nice price for health professionals, in serving to realize similar patients, patterns of sickness, or triple-crown treatments.

Chatbots probably represent a brand new paradigm in how folks can move with information and services within the future. Currently, there's an absence of empirical investigations into why folks use chatbots. This study provides required insight into the psychological feature factors associated with the utilization of colloquial interfaces. Its results will guide future analysis on this subject, which can give new insights and guide the future style and development of chatbots. It's hard to have personal access to the hospital and doctors on a commonplace. Approaching hospitals for routine consultation and medical aid is long and costly. Localized us ought to be able to connect with medical practitioners with ease, which can be accomplished by utilizing a machine learning approach. it has been hard for traditional of us to urge timely and affordable medical recommendations from professionals on several occasions. this might be shrunken by utilizing existing technologies. Localized us ought to be able to connect with medical practitioners with ease, which can be accomplished by utilizing a machine learning approach.

Akhtar *et al.* [5] described the idea of utilizing computers for question answering tasks has been around from the start of these systems. First algorithms with the objective to accomplish this were already implemented in the early 1960s. In recent years, chatbots have been gaining huge popularity in various fields. In the environment of business applications, they are considered as useful tools for improving customer relationships. The chat conversations between customers and the chatbot of a telecommunication company are analyzed to find out if these interactions can be used to determine a) users' topics of interests and b) user satisfaction. To reach this goal, chat conversations are interpreted as sequences of events and user inputs are analyzed with the help of text mining techniques. The study shows that based on users' written conversational contributions, valuable insights on users' interests and satisfaction can be gained. The most of users leave the chat conversation after a short period of time if the chatbot was not able to give the desired answer right away. Moreover, a huge number of conversations deal with similar topics. Our results imply that companies offering chatbots must thoroughly analyse the collected data to gain more insights into their customers' needs.

Arsenijevic *et al.* [6] described that, the chatbot is analyzed as an artificial intelligence tool in marketing, its today's application. A survey of respondents' behaviors, habits, and expectations when using various communication channels was conducted, with particular emphasis on chatbots, their advantages and disadvantages in relation to other communication channels, in total sum of 60 survey respondents. The results showed that the major advantage of using chatbots in the marketing service was when providing simple, fast obtained information, but also showed respondents' fear of chatbots giving them the wrong information. Organizations should consider using chatbots, especially if challenges in communication with customers are reality, but also if they intend to keep up with the growing number of consumers' lifestyle.

Patel *et al.* [7] described that, Chatbots are special agents that respond with the user in natural language just as a human would reply. Specifically, social chatbots are the ones which establish a strong emotional relationship with the user. The main concept behind this chatbot was to provide mental relief to students who undergo various levels of stress and which can be the onset of an inimical depression. It is proposed an intelligent social therapeutic chatbot which distributes the text into emotion labels namely, happy, joy, shame, anger, disgust, sadness, guilt, and fear. Further, based on the emotion label, it identify the users' mental state such as stressed or depressed using users' chat data. For emotion detection, they deployed three popular deep learning classifiers namely, convolutional neural network (CNN), recurrent neural network (RNN), and hierarchical attention network (HAN). In particular, the proposed methodology of the chatbot is domain specific where through the users' interaction, the chatbot will try to prevent the pessimistic actions and rebuild more constructive thoughts. This paper highlighted the importance of a social therapeutic chatbot especially for the students. In this work, they proposed an intelligent chatbot for mental state identification and their remedy. In order to identify emotion of user chat text, three deep learning algorithms namely, CNN, RNN, and HAN were deployed. With the help of label of emotion, it also identify the mental state of the user such as stressed or depressed. In the future, they will try to increase accuracy for text classification methods. Currently, we have focused on minor details of the user as we believe that

attending to their queries and alleviating them from the stress would be the need more information about the user would lead to an efficient and desired output.

Telang *et al.* [8] described the development method that was shortened and extra functionalities like calculable time additional importantly, this home automation system are long and climbable while not having a subject field design associate degreed alternative complications. Telang *et al.* [8] described the potential applications and popularity of chatbot technology has resulted in leading technology vendors such as IBM, Facebook, Microsoft, and Google to releasing frameworks to build such chatbots. Most such commercially available frameworks reduce the task of engineering chatbots to a variant of the if-this-then that (IFTTT) style of programming that was at the core of expert systems proposed in the 1980s. However, the IFTTT approach is inadequate in terms of the flexibility and maintainability of the chatbots produced. The resulting chatbots all too often are monolithic and they mix rules for managing dialog with rules for executing business logic and generating responses. Additionally, when a chatbot must interact with third-party services to orchestrate a workflow, the resulting orchestration logic is interleaved into the IFTTT rules. Furthermore, IFTTT rules are often order sensitive. As the capability required of a chatbot evolves over time, the complexity of the rules implementing the chatbot increases.

Thus, even a simple upgradation to a chatbot may require substantial effort to 1) determine where in the sequence a new rule should be added; and 2) ensure that the new rule does not cause existing functionality to break due to interactions among the rules. We posit that leveraging well-studied abstractions of goals and commitments from the area of artificial intelligence (AI) and multi agent systems allows for a flexible realization of chatbots. Goals capture an agent's intentions, and commitments capture meaningful business relationships between agents. It is described how employing goals and commitments enables us to model a chatbot that:

a. can be verified at design time or runtime;
b. offers flexible enactments; and
c. provides a basis for judging correctness.

Quan *et al.* [9] described, automated chatbot has been witnessed recently as an emerging trend for customer cares in various domains. Many virtual assistants have been introduced by major technology corporations such as Apple's Siri, Microsoft's Cortana or Amazon's Echo. Such developments are resulted from the recent achievement in research in artificial intelligence, especially machine learning. In literature research, an intelligent chatbot is considered as a system consisting of various components including natural language understanding (NLU), dialog manager (DM), and natural language generation (NLG). In a complete chatbot system is introduced using an encoder decoder neural network system for training data from past conversation. In a system where NLU and DM are concurrently trained in a bidirectional long short term memory (BiLSTM) system. Individual components of a chatbot system are also addressed in various works. In hidden markov models (HMM) and conditional random field (CRF) is used to handle the slot tagging problem, a sub-problem of NLU. In convolutional neural network (CNN) is used to classify intent and domain of the conversed texts, which are also sub-problems of NLU. The accuracy of NLU is also increased by using RNN. In machine learning techniques are used to manage states of DM.

Ranoliya *et al.* [10] described that, Chat bots are programs that mimic human conversation using artificial intelligence (AI). It is designed to be the ultimate virtual assistant, entertainment purpose, helping one to complete tasks ranging from answering questions, getting driving directions, turning up the thermostat in smart home, and to playing one's favorite tunes. Chat bot has become more popular in business groups right now as they can reduce customer service cost and handles multiple users at a time. But yet to accomplish many tasks there is need to make chat bots as efficient as possible. To address this problem, in this paper we provide the design of a chat bot, which provides an efficient and accurate answer for any query based on the data set of frequently asked questions (FAQs) using artificial intelligence markup language (AIML) and latent semantic analysis (LSA). Template based and general questions like welcome/greetings and general questions will be responded using AIML and other service based questions uses LSA to provide responses at any time that will serve user satisfaction. This chat bot can be used by any university to answer FAQs to curious students in an interactive fashion.

Kao *et al.* [15] described that, The intent recognition and natural language understanding of multi-turn dialogue is key for the commercialization of chatbots. Text sentiment recognition enables a chatbot to know the user's emotional state and select the best response, which is important in medical care. Authors combined the multi-turn dialogue model and sentiment recognition model to develop a chatbot, that is designed for used in daily conversations rather than for specific tasks. Thus, the chatbot has the ability to provide the robot's emotions as feedback while talking with a user. Moreover, it can express different emotional reactions based on the content of the user's conversation. data is imbalance, and the dataset is generated by the TV series in which the actors may express strong emotional ups and downs to express the tension of the story. It improves this issue by adding tags to quantify the emotion. For continuous positive or negative emotions, give a higher value than usual, which can make the emotional transition appear smoother, rather than a sudden change. Most

of the training datasets of the generative model for current chatbots are question-answer chats, although the generative model differ from those for specific task, the answers are dull and vague in daily conversation. There are still many factors that affect the content of a conversation. It is assumed that there is no standard answer in a chat, but the generative model chatbot uses Seq2Seq from the translation model as a generator. Therefore, in this study, changes have been made to generate multiple types of responses in the presence of many different factors. The emotion feedback by a chatbot is not specified by a human or rule-base but is automatically changed by learning, thus making the response more natural.

Albayrak *et al.* [16] described that, ChatBot as a software that can chat with people using artificial intelligence. These software are used to execute tasks such as rapidly responding to users, informing them, helping to purchase products and providing better service to customers. This paper presents the general working principle and the basic concepts of artificial intelligence based chatbots and related concepts as well as their applications in various sectors such as telecommunication, banking, health, customer call centers and e-commerce. Additionally, the results of an example chabbot for donation service developed for telecommunication service provider are presented using the proposed architecture.

Ravi *et al.* [17] described that, in this fast-moving data-driven world, it is vital that we draw the accurate insights to make the right decisions at the right time. In terms of online websites, there are many web analytic tools that will give us performance reports. However, it is tedious and time consuming to master the tools leave alone to derive insights to understand the business impacts. In this paper, there is a comparison of 2 widely used analytic tools based on their ease of use. In the light of the same, it is proposed that an artificial intelligence machine learning (AIML) driven chatbot, that is fueled with analytic raw data, that will enable bot-users to get business insights by just typing in the query. This paper proposed a chatbot that would enable bot-users to just type in the query related to web analytics and will get response immediately. This is to avoid the time consuming task of mastering a web analytics tool. The proposed chatbot is developed using AIML and the data set is the raw analytic data. Experiments were conducted to understand the performance of the tool. The tool was evaluated based on the quality of response and it performed well. Since the chatbot is developed using AIML, the bot-user has to follow a pattern by which he can type in the query. He extended his work by further refining the chatbot and making it more intelligent so that the bot-user need not follow a predefined pattern while entering the query.

2. METHOD

It's hard to have personal access to the hospital and doctors on a commonplace. Approaching hospitals for routine consultation and medical aid is long and costly [18]–[21]. Localized us ought to be able to connect with medical practitioners with ease, which can be accomplished by utilizing a machine learning approach. it has been hard for traditional of us to urge timely and affordable medical recommendations from professionals on several occasions. this might be shrunken by utilizing existing technologies [22]–[32]. Localized us ought to be able to connect with medical practitioners with ease, which can be accomplished by utilizing a machine learning approach.

2.1. Implementation

Natural language method (NLP) linguistic communication process-linguistic communication process is of specific importance for chatbots as a result of this technique determines whether the bot will understand and interpret the text input. Due to the character of linguistic communication process techniques to undertake and mimic human spoken communication, testing this algorithmic program is really testing the communication skills of the chatbot.

Some of the foremost normal and applicable ways in which to visualize linguistic communication process algorithms unit of measuring user satisfaction and feedback analysis.
a. Give the input (or speech)
b. Segmentation of text into elements (segmentation and tokenization).
c. Text cleanup (filtering from "garbage") - removal of inessential elements.
d. Text vectorization and have engineering.
e. Lemmatization technique

Term frequency-inverse document frequency (TF-IDF) represents term recurrence and converse archive recurrence and is one of the most famous and powerful natural language processing methods. This procedure permits you to appraise the significance of the term for the term (words) compared to any remaining terms in a text. Figure 1 gives the architecture diagram of proposed system.
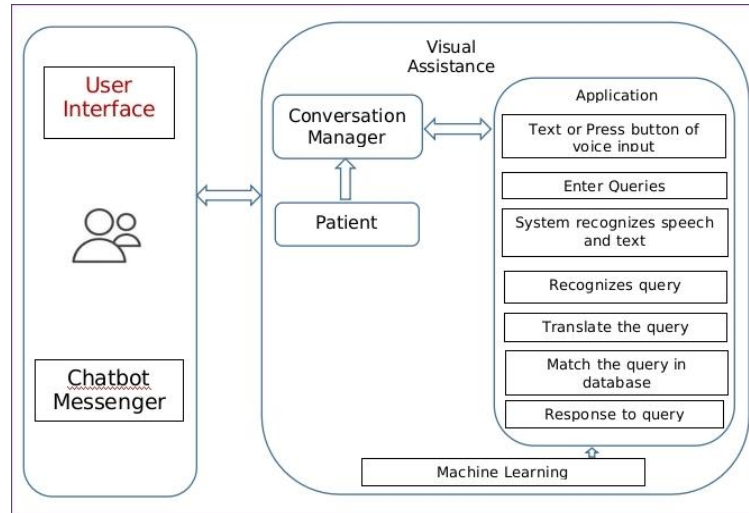
Figure 1. System architecture

2.2. CSV algorithm

The steps and working of CSV algorithm are explained in the following paragraph. CSV designs are best used to address groupings of standards in which each record has an indistinguishable rundown of fields. This compares to a solitary connection in a social data set. CSV is a delimited information design that has fields/sections isolated by the comma, character and records/lines ended by newlines. A CSV document doesn't need a particular person encoding, byte request, or line eliminator design (some product doesn't uphold all line-end varieties). A record closes at a line eliminator. Nonetheless, line eliminators can be inserted as information inside fields, so programming should perceive cited line-separators to gather a whole record from maybe numerous lines accurately. All records ought to have a similar number of fields, in a similar request. The CSV algorithm is used in matching the query form database.

3. RESULTS AND DISCUSSION

The input to the system is submitted in the form of text and voice queries. The system recognizes the speech and text input and translate the query in the format stored in the database. The query is matched with the queries stored in the database. The response to the query is generated in the form of nursing assistance. The graph given in Figure 2 represents the accuracy of the system for different inputs provided by the user. The accuracy range shown is between 85% to 95%.
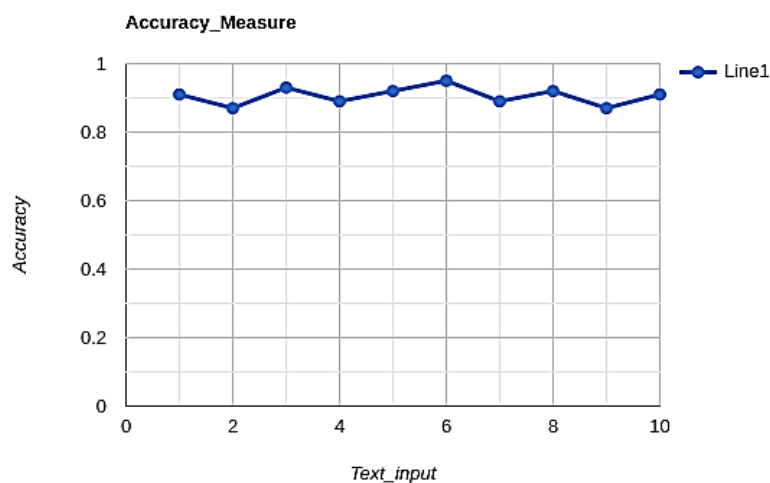
Figure 2. System accuracy

The Table 1 gives different system parameters and descriptions. There are four parameters used by the system viz. Input, Interface, mode of usage, functionality. Input is text and voice, user friendly interface is designed to access all the functionalities of the system, the user can access the system in online/virtual mode, the functionality includes support to the gathered data. The system interprets user queries and recommends diagnosis to the users.

Table 1. System parameters

Parameters	Description
Input (voice/text)	Provides text equally as speech recognition.
Interface	Straight forward and user friendly interface.
Mode of usage	Applicable Virtual facilitation.
Functionality	Supports gathered data equality.
	As a result, the information is fed to its algorithmic program.
	Sense interpreters the user's symptoms and recommends diagnosis.

Figures 3 and 4 give the user interface details of the system. Figure 3(a) shows the first page of the system which provides a basic overview of the system. Users can register themselves for the first time and fill his/her personal information. The user have to register to the system. After registration, the user has to log in using his/her credentials to access the system. The Figure 3(b) shows sign up form. After login user will be navigated to the dashboard where he/she can choose the functionalities he/she wants to access. Figure 4(a) shows system dashboard. Users can chat with the system with text/voice input and receive appropriate output. The interface of chatbot is shown in the Figure 4(b). The symptoms of illness are submitted to chatbot as an input to the system. The system suggests necessary medicines as an output. Users can chat with the system with voice input and receive appropriate output in text format. The interface for voice input is shown in the Figure 4(a).
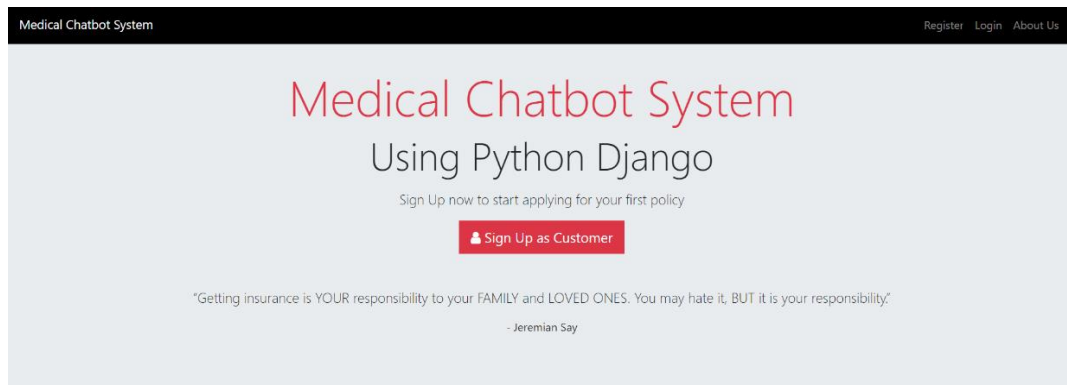
(a)

(b)

Figure 3. System user interface of (a) first page of the system and (b) sign up form
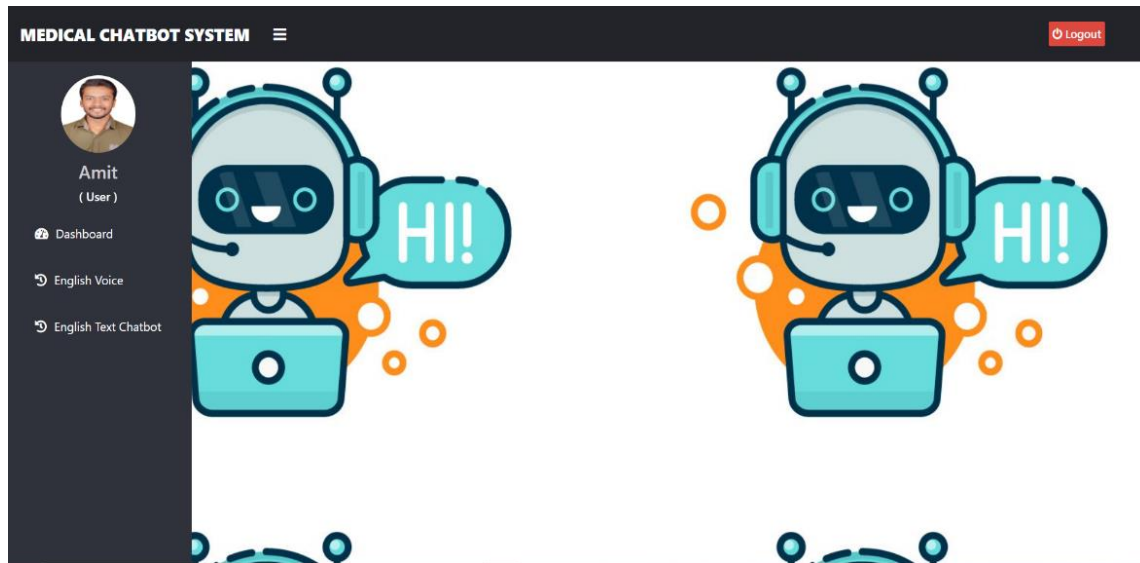
(a)

(b)

Figure 4. System user interface of (a) chatbot interface-voice input and (b) chatbot interface-text input

4. CONCLUSION

The proposed system takes the input from user in the form of text/voice data. The input data is interpreted by the system. The user can access the system in the virtual mode and submit the query to the virtual nursing assistance system. The system generates the output in the form of user symptoms and diagnosis commendations. This proposed system acts a private assistant to the user of the system in the domain of virtual nursing assistance. The bots developed are helpful to maintain patient history. Also, the system can assist multiple users at a time.

REFERENCES

[1]   A. Augello, G. Saccone, S. Gaglio, and G. Pilato, "Humorist bot: bringing computational humour in a chat-bot system," in *2008 International Conference on Complex, Intelligent and Software Intensive Systems*, 2008, pp. 703–708. doi: 10.1109/CISIS.2008.117.

[2]   O. Gambino, A. Augello, A. Caronia, G. Pilato, R. Pirrone, and S. Gaglio, "Virtual conversation with a real talking head," in *2008 Conference on Human System Interactions*, May 2008, pp. 263–268. doi: 10.1109/HSI.2008.4581446.

[3]   H. S. Masovic, H. M. Saračević, H. Kamberović, and M. Kudumovic, "Java technology in the design and implementation of web applications," Technics Technologies Education Management, 7(2), June 2012, pp. 504-512.

[4]   D. Dohan and D. Schrag, "Using navigators to improve care of underserved patients," *Cancer*, vol. 104, no. 4, pp. 848–855, Aug. 2005, doi: 10.1002/cncr.21214.

[5]   M. Akhtar, J. Neidhardt, and H. Werthner, "The potential of chatbots: analysis of chatbot conversations," in *2019 IEEE 21st Conference on Business Informatics (CBI)*, Jul. 2019, pp. 397–404. doi: 10.1109/CBI.2019.00052.

[6]   U. Arsenijevic and M. Jovic, "Artificial intelligence marketing: chatbots," in *2019 International Conference on Artificial Intelligence: Applications and Innovations (IC-AIAI)*, Sep. 2019, pp. 19–193. doi: 10.1109/IC-AIAI48757.2019.00010.

[7]   F. Patel, R. Thakore, I. Nandwani, and S. K. Bharti, "Combating depression in students using an intelligent chatbot: a cognitive behavioral therapy," in *2019 IEEE 16th India Council International Conference (INDICON)*, Dec. 2019, pp. 1–4. doi: 10.1109/INDICON47234.2019.9030346.

[8]   P. R. Telang, A. K. Kalia, M. Vukovic, R. Pandita, and M. P. Singh, "A conceptual framework for engineering chatbots," *IEEE Internet Computing*, vol. 22, no. 6, pp. 54–59, Nov. 2018, doi: 10.1109/MIC.2018.2877827.

[9]   T. Quan *et al.*, "Lead engagement by automated real estate chatbot," in *2018 5th NAFOSTED Conference on Information and Computer Science (NICS)*, Nov. 2018, pp. 357–359. doi: 10.1109/NICS.2018.8606862.

[10] B. R. Ranoliya, N. Raghuwanshi, and S. Singh, "Chatbot for university related FAQs," in *2017 International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, Sep. 2017, pp. 1525–1530. doi: 10.1109/ICACCI.2017.8126057.

[11] M. W. Munir, S. M. Omair, and M. Z. Ul Haque, "An android-based application for determine a specialized hospital nearest to patient's location," *International Journal of Computer Applications*, vol. 118, no. 9, pp. 43–46, May 2015, doi: 10.5120/20776-3316.

[12] R. P. Schumaker, M. Ginsburg, H. Chen, and Y. Liu, "An evaluation of the chat and knowledge delivery components of a low-level dialog system:The AZ-ALICE experiment," *Decision Support Systems*, vol. 42, no. 4, pp. 2236–2246, Jan. 2007, doi: 10.1016/j.dss.2006.07.001.

[13] A. D. Angeli, G. I. Johnson, and L. Coventry, "The unfriendly user: exploring social reactions to chatterbots," in *Proceedings of The International Conference on Affective Human Factors Design*, 2001.

[14] H. Candello, C. Pinhanez, and F. Figueiredo, "Typefaces and the perception of humanness in natural language chatbots," in *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, May 2017, pp. 3476–3487. doi: 10.1145/3025453.3025919.

[15] C.-H. Kao, C.-C. Chen, and Y.-T. Tsai. "Model of Multi-turn Dialogue in Emotional Chatbot," International Conference on Technologies and Applications of Artificial Intelligence, Kaohsiung, Taiwan, November 2019. doi: 10.1109/TAAI48200.2019.8959855.

[16] N. Albayrak, A. Ozdemir, and E. Zeydan, "An Overview of artificial intelligence based chatbots and an example chatbot application," 26th Signal Processing and Communications Applications Conference, Izmir, Turkey, May 2018. IEEE, 2018, pp. 1–4. doi:10.1109/SIU.2018.8404430.

[17] R. Ravi, "Intelligent Chatbot for Easy Web-Analytics Insights," *International Conference on Advances in Computing, Communications and Informatics (ICACCI)*, Bangalore, India, 2018, pp. 2193-2195. doi: 10.1109/ICACCI.2018.8554577.

[18] J. Hill, W. R. Ford, and I. G. Farreras, "Real conversations with artificial intelligence: A comparison between human–human online conversations and human–chatbot conversations," *Computers in Human Behavior*, vol. 49, pp. 245–250, Aug. 2015, doi: 10.1016/j.chb.2015.02.026.

[19] A. Kerly, P. Hall, and S. Bull, "Bringing chatbots into education: Towards natural language negotiation of open learner models," *Knowledge-Based Systems*, vol. 20, no. 2, pp. 177–185, Mar. 2007, doi: 10.1016/j.knosys.2006.11.014.

[20] S. Lee and J. Choi, "Enhancing user experience with conversational agent for movie recommendation: Effects of self-disclosure and reciprocity," *International Journal of Human-Computer Studies*, vol. 103, pp. 95–105, Jul. 2017, doi: 10.1016/j.ijhcs.2017.02.005.

[21] G. Neff and P. Nagy, "Automation, algorithms, and politics | talking to bots: symbiotic agency and the case of Tay," *International Journal of Communication*, vol. 10, pp. 4915–4931, 2016.

[22] A. Xu, Z. Liu, Y. Guo, V. Sinha, and R. Akkiraju, "A new chatbot for customer service on social media," in *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, May 2017, pp. 3506–3510. doi: 10.1145/3025453.3025496.

[23] J. Li, M. X. Zhou, H. Yang, and G. Mark, "Confiding in and listening to virtual agents," in *Proceedings of the 22nd International Conference on Intelligent User Interfaces*, Mar. 2017, pp. 275–286. doi: 10.1145/3025171.3025206.

[24] T. W. Bickmore, L. Caruso, and K. Clough-Gorr, "Acceptance and usability of a relational agent interface by urban older adults," in *CHI '05 Extended Abstracts on Human Factors in Computing Systems*, Apr. 2005, pp. 1212–1215. doi: 10.1145/1056808.1056879.

[25] K. Long *et al.*, "'Could you define that in bot terms'?," in *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems*, May 2017, pp. 3488–3500. doi: 10.1145/3025453.3025830.

[26] S. Savage, A. Monroy-Hernandez, and T. Höllerer, "Botivist," in *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing*, Feb. 2016, pp. 813–822. doi: 10.1145/2818048.2819985.

[27] P. M. Krafft, M. Macy, and A. "Sandy" Pentland, "Bots as virtual confederates," in *Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing*, Feb. 2017, pp. 183–190. doi: 10.1145/2998181.2998354.

[28] K. Kuligowska, "Commercial chatbot: performance evaluation, usability metrics and quality standards of embodied conversational agents," *Professionals Center for Business Research*, vol. 2, no. 02, pp. 1–16, 2015, doi: 10.18483/PCBR.22.

[29] I. Ahmed and S. Singh, "AIML based voice enabled artificial intelligent chatterbot," *International Journal of u- and e-Service, Science and Technology*, vol. 8, no. 2, pp. 375–384, Feb. 2015, doi: 10.14257/ijunesst.2015.8.2.36.

[30] P. Langley, C. Thompson, R. Elio, and A. Haddadi, "An adaptive conversational interface for destination advice," in *Lecture Notes in Computer Science*, Springer Berlin Heidelberg, 1999, pp. 347–364. doi: 10.1007/3-540-48414-0_24.

[31] F. Berthelon and P. Sander, "Emotion ontology for context awareness," in *2013 IEEE 4th International Conference on Cognitive Infocommunications (CogInfoCom)*, Dec. 2013, pp. 59–64. doi: 10.1109/CogInfoCom.2013.6719313.

[32] T. Bickmore and T. Giorgino, "Health dialog systems for patients and consumers," *Journal of Biomedical Informatics*, vol. 39, no. 5, pp. 556–571, Oct. 2006, doi: 10.1016/j.jbi.2005.12.004.

BIOGRAPHIES OF AUTHORS

Dr. Vijaykumar Bidve is Associate Professor and Dean Academics at Marathwada Mitra Mandal's College of Engineering, Pune, Maharashtra, India. He Holds a PhD degree in Computer Science & Engineering with specialization in Software Engineering. His research areas are Software Engineering, Machine Learning. Dr Vijaykumar has published number of patents. He is working as an expert for various subjects. Also he has worked as a reviewer for various conferences and journals. He can be contacted at email: vijay.bidve@gmail.com.

Amit Virkar received the B.E. degree in Information Technology from the Savitribai Phule Pune University, Pune, Maharashtra, India. He was student at Marathwada Mitra Mandal's College of Engineering, Pune between 2018 to 2022. She is working as System Engineer at Tata Consultancy Services (A software company). His research interests include machine learning, and intelligent systems. He can be contacted at email: amitvirkar2018.it@mmcoe.edu.in.

Prajakta Raut received the B.E. degree in Information Technology from the Savitribai Phule Pune University, Pune, Maharashtra, India. She was student at Marathwada Mitra Mandal's College of Engineering, Pune between 2018 to 2022. She is working as Software Engineer at TietoEvry (a software company). Her research interests include soft computing, machine learning, and intelligent systems. She can be contacted at email: prajaktaraut2018.it@mmcoe.edu.in.

Samruddhi Velapurkar received the B.E. degree in Information Technology from the Savitribai Phule Pune University, Pune, Maharashtra, India. She was student at Marathwada Mitra Mandal's College of Engineering, Pune between 2018 to 2022. She is working as Associate Software Developer at Schlumberger (A software company). Her research interests include machine learning, and intelligent systems. She can be contacted at email: prajaktaraut2018.it@mmcoe.edu.in.