

## ISSUES AND CHALLENGES OF CHATBOT DEVELOPMENT FOR AN EDUCATIONAL INSTITUTION

**A. Sudha Ramkumar**

Associate Professor & Head, Department of Computer Science, Sri Kanyaka Parameswari  
Arts and Science College for Women, email:sudharam99@gmail.com

**Abstract:** Chatbot is artificial intelligence software that can simulate the conversation between the human and the system. The chatbot is widely used in areas such as customer support, banking, health care, and educational institutions to simplify the interaction between humans and systems. It not only saves money and time for the users but also brings new opportunities to improve their business. Hence, this paper discussed two approaches such as the pattern matching approach and the machine learning approach to develop a chatbot. The pattern matching approach represents a question answering system which formulates responses to questions in human language. The machine learning approach uses training data and natural language processing to train systems to answer the user's query. The machine learning approach is more efficient than pattern matching. This paper demonstrated the development of a chatbot for college website is essential for the providing the round the clock information to the students or the visitors of college website.

### 1 INTRODUCTION

Artificial intelligence is the simulation of human intelligence by computer systems and nowadays it has influenced our daily activities in the form of intelligent agents as it can do a lot of functions. A chatbot is artificial intelligence software that can simulate the chat between humans and computer systems. Chatbots were developed initially with the purpose of enhancing the communication between humans and computer systems. As technology evolves very fast, Machine learning, Natural language processing, and deep learning technologies paved a very good path for Artificial intelligence to develop chatbots. These technologies help chatbots by providing an intelligent interface between humans and computer systems. Chatbot can be implemented for textual conversations, voice-based conversations, and for image-based conversations also. Chatbots were used in almost all fields like Health Care, Banking, Insurance, Media, Sales, Marketing, e-commerce, and educational institutions. The rest of the paper is organized as follows. Section 2 provides the literature survey and Section 3 provides the list of approaches used for the development of a Chatbot. Section 4 provides the methodology for the development of Chatbot and Section 5 discusses about the results and Section 6 provides the conclusion.

### 2 LITERATURE SURVEY

Babu, Emil, and Geethu Wilson [1]and Lalwani, Tarun, et al.[5]developed a chatbot using artificial intelligence and Natural language processing algorithm. This chatbot response to user's queries related to examination cell, admission, academics, user's attendance, grade

point average, placement cell and other activities related to college. Feine, Jasper, Stefan Moranaand Alexander Maedche [2] proposed and evaluated design principles that guide the design of interactive chatbot development systems to increase the engagement of domain expert. This study contributed the prescriptive knowledge for designing interactive system. Hiremath, Guruswami, et al. [3] proposed a Chatbot for education system which will reply to the student's queries. This system used artificial intelligence and machine learning for the implementation of this chatbot. It was implemented using pattern matching approach. Khan,

Mohammad Monirujjaman[4] developed an e-commerce sales Chatbot to provide customer support and to increase sales. This e-commerce chatbot uses machine learning for natural language understanding. Punith, S., et al. [6] developed a Chatbot for Student Admission Enquiry which used machine learning algorithm. This Chatbot acts as a person at College enquiry office and it will respond to users' questions regarding admission and college environment. This system also provided a feedback mechanism through which a user can rate chatbot's responses and based upon, the chatbot can respond more accurately next time. Shingte, Kshitija, et al. [7] developed Chatbot for Educational Institute which helps the student to know about the admission process of the college. This chatbot system reduces the work of admission process department by providing the required information to the students or parents and also reduces the workload of the department to keep on answering all the queries of the students.

Shivam, Kumar, et al. [8] and Susanna, Ms Ch Lavanya, et al.[9] developed Chatbot for college website. This Chatbot used an algorithm to identify responses related to user queries. Database was used to store the user questions and its related responses. This system was developed and deployed to the web server as web application. Tamrakar, Rohit, and Niraj Wani[10] reviewed the techniques, terminology and different platforms used to design and development of the Chatbot. This paper reviewed the development history, architecture and approaches used for the development of Chatbot. Venusamy, Kanagaraj, Navaneetha Krishnan Rajagopal, and Muhammed Yousoof [11] proposed a human resource development Chatbot using artificial intelligence. This HR Chatbots assists the manager and HR executives with comprehension and examines the conduct of their representatives. This article analysed the use of Chatbot in human resource development field and listed the benefits of using this Chatbot.

### 3 APPROACHES

Chatbots are becoming more important, more conversational and it acts like a human in almost all the fields. Hence, development of Chatbot is very much essential and the development of Chatbot is depending upon the types of chatbot and what approach we need to use. Chatbots are broadly classified into 3 types. They are, Text based Chatbot, Voice based Chatbot and Image based Chatbot

Text based Chatbot is a type of Chatbot provides textual interface. It allows the user to make conversation with the Chatbot through a text or message. Text based Chatbot is useful for messaging applications, social media and SMS. Voice based Chatbot is a type of Chatbot provides voice-based interface. It allows the user to talk and the Chatbot will respond to the users' voice. Voice based Chatbot uses pre-recorded responses and text to speech capabilities to answer user questions. There are 2 approaches exist to develop Chatbot,

1. Pattern Matching Approach
2. Machine Learning Algorithm Approach.

Pattern matching approach represents the basic question answering system. It consists of two steps. In a first step, questions need to be collected for the domain of interest with the help of domain experts. In a second step, answers to the questions collected in the first step was prepared. These question and answers were stored in Chatbot. Whenever, user queries any information, it will look for the related pattern in the question and answers list. If it finds the associated pattern, it will return that corresponding answer to the user. If it does not find the associated pattern, then it will suggest user to ask question clearly. Pattern matching approach is otherwise called as rule based approach.

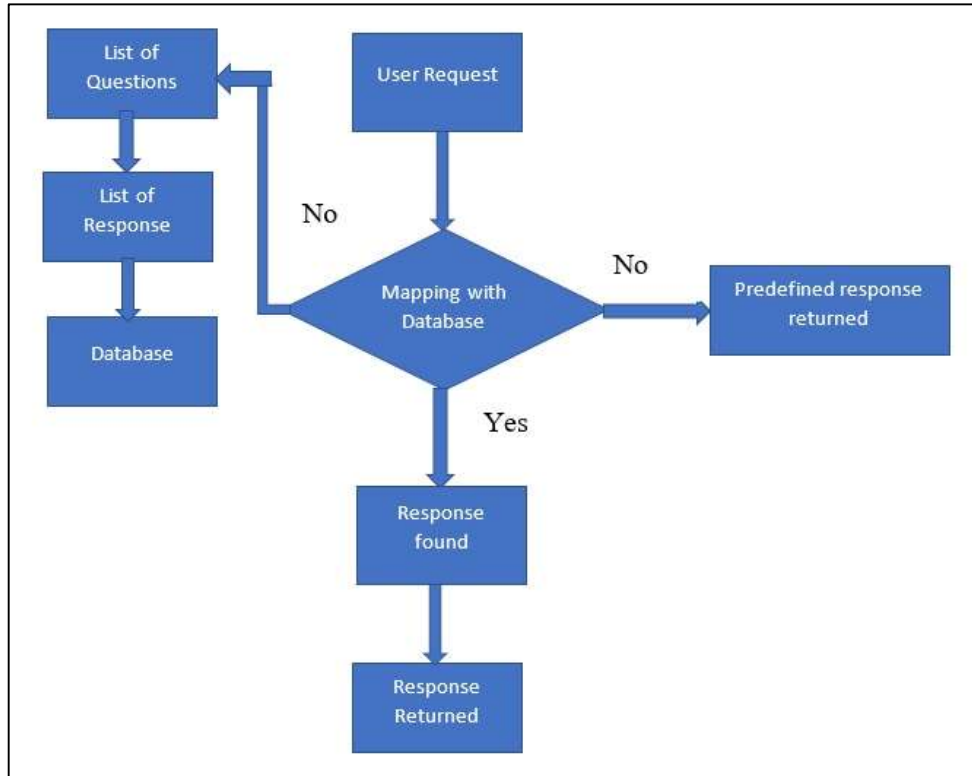
In Machine learning approach, the training of questions and answers will be performed by machine itself with the help of machine learning algorithms. Before creating Chatbot, the data related to the Chatbot domain is applied to the Chatbot and it will be trained automatically. Addition to data, frequently asked questions and answers are also used for training the Chatbot questions. Using these data and frequently asked questions and answers, the engine generates a list of question and response. The Chatbot created using this approach sounds more like a human, because it handles the request without the intervention of human. The machine learning algorithm used in the system receives and analyses the data and produces the predictions of the output. The more data they receive, the more optimized their performance. So as time goes by, the Chatbots intelligent increases.

#### **4 METHODOLOGY**

Pattern matching approach is used in this paper for the creation of SKPC Chatbot for College website. This Chatbot is developed using Python library to generate automated responses to a user's query. In pattern matching approach, collecting queries and Frequently Asked questions from the user is the first step in the creation of college website Chatbot. As a second step, a list of responses was prepared for the collected list of queries. As a last step, the collected queries along with responses were stored in the program. Hence, the creation of SKPC Chatbot consists of the following steps,

1. Prepare a List of questions,
2. Find out the response for the list of questions prepared in step 1.
3. Store the list of questions along with response in the program

The process flow for the SKPC College Chatbot is as follows.

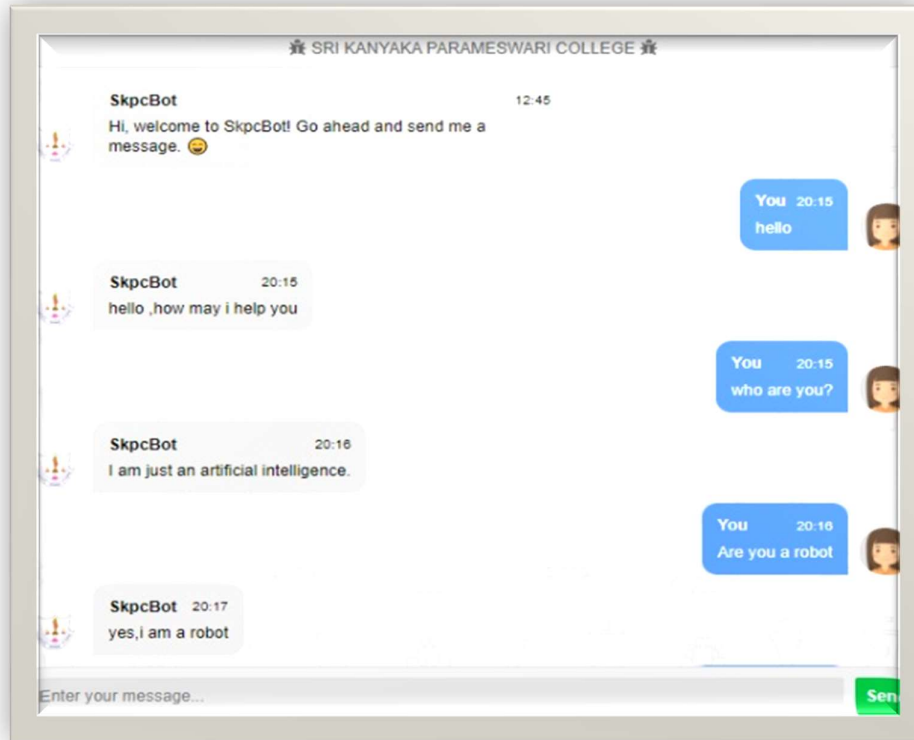


**Figure 1 : Methodology for the development of Chatbot**

Whenever user requests any information in the Chatbot, it will check for the related pattern in it and returns responses to the user. This Chatbot takes the query from the user which can be a student or a parent, the Chatbot will check for the related pattern with the knowledge base and returns the response. This Chatbot enables the communication between the user and the website with just a single click on the Chatbot.

## 5 RESULTS AND DISCUSSION

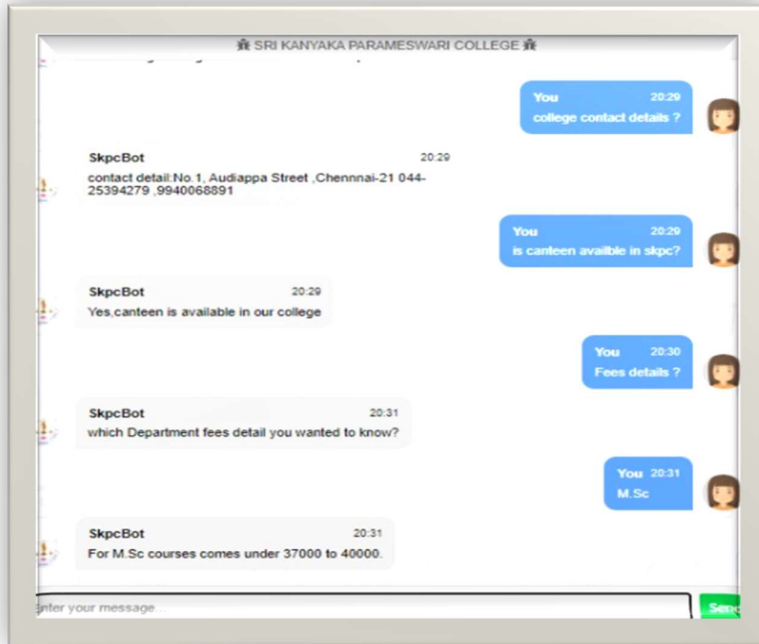
The proposed system was implemented in python and it was tested successfully to provide effective communication to the user. Chatterbot is a python library specifically designed to generate chatbots. This algorithm uses a selection of machine learning algorithms to fabricate different types of responses to users when they request queries. Chatterbot makes it easy to develop Chatbot. With the help of Chatbot, user can enquire about college related information within a short span of time. This system not only reduces the time but it reduces the efforts of the student or parent to travel all the way to the institution for getting information. Even for the institution, it reduces the man power required for the college administration. This system developed a college Chatbot for website to make the users or visitors to view the information effectively and efficiently.



**Figure 2 : Screenshot of SKPC Chatbot**

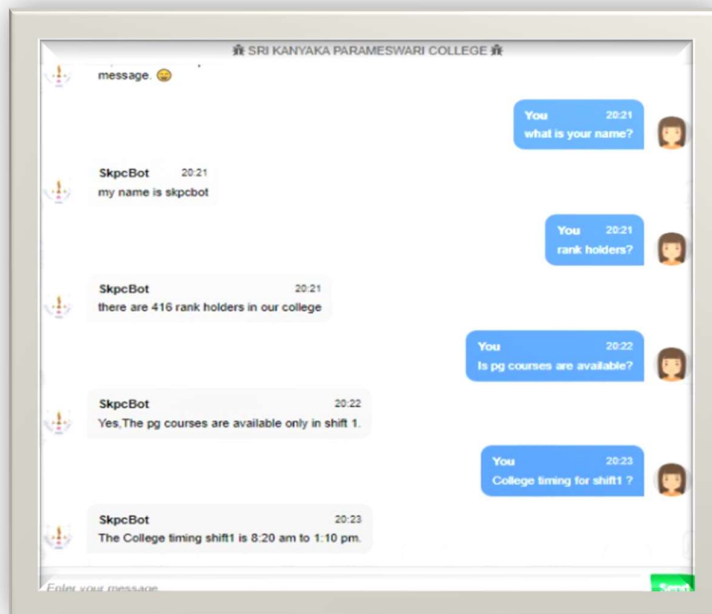
Figure 2 shows the landing page of the SKPC Chatbot. Initially it will welcome the user and it will initiate the text conversation by asking how may I help you. Whatever the query asked by the user related to College will be answered by this Chatbot. The College website contains the course details, faculty details, classroom details, laboratory details, rules and regulations of the college, fee structure of each and every course, About the College, Contact us, Department details, history of the college, Gallery contains the previous conducted events photos and rank details of the students. All the above details have been provided to this Chatbot and it will response if the query matches with the pattern they have stored inside the Chatbot.

The following Figure 3. Shows the contact details of the College, Canteen details for their queries like what is the college Contact details? And is the canteen available?. When the user asked what the fees details? Then the Chatbot Checks for the pattern but it does not find suitable answer for this because the Department pattern is missing in this query. Hence, Chatbot immediately responded through Which Department Course fees you wanted to see? After this, user typed the correct query by M.Sc fees? Chatbot responded the correct fees details of the course M.Sc.



**Figure 3 : Fees Details returned by SKPC Chatbot**

Figure 4 shows the other queries like name of the Chatbot and how many rank holders are there in College, Whether the PG courses are available in the college or not and timings of the College.



**Figure 4 : Response returned by Chatbot for college related queries**

This SKPC College Chatbot proved the effective conversation between the user and the system. It not only eliminates the time and cost required for the user to travel from his place to College in order to collect the above details but it also eliminates the communication barrier between the user and College Admin.

## 6 CONCLUSION

This Chatbot was developed with the main objective of identifying the user queries and returning responses based on pattern matching approach. Frequently asked questions and expected questions were stored along with the answers in this Chatbot. This system was developed a college website Chatbot in which user can ask a question related to the details available in the college website. This system checks the question and returns the response quickly. In the future, this Chatbot can be enhanced using machine learning algorithm to make the communication more interactive and effective.

### References

- [1] Babu, Emil, and Geethu Wilson. "Chatbot for college enquiry." *International Journal of Creative Research Thoughts* (2021).
- [2] Feine, Jasper, Stefan Morana, and Alexander Maedche. "Designing Interactive Chatbot Development Systems." *ICIS*. 2020.
- [3] Hiremath, Guruswami, et al. "Chatbot for education system." *International Journal of Advance Research, Ideas and Innovations in Technology* 4.3 (2018): 37-43.
- [4] Khan, Mohammad Monirujjaman. "Development of an e-commerce sales Chatbot." *2020 IEEE 17th International Conference on Smart Communities: Improving Quality of Life Using ICT, IoT and AI (HONET)*.
- [5] Lalwani, Tarun, et al. "Implementation of a Chatbot System using AI and NLP." *International Journal of Innovative Research in Computer Science & Technology (IJIRCST) Volume-6, Issue-3* (2018).
- [6] Punith, S., et al. "Research Paper on Chatbot for Student Admission Enquiry." *Journal of Advancement in Software Engineering and Testing* 3.1 (2020).
- [7] Shingte, Kshitija, et al. "Chatbot Development for Educational Institute." *Available at SSRN 3861241* (2021).
- [8] Shivam, Kumar, et al. "Chatbot for college website." *Int J Comp Technol* 5.6 (2018): 74-77.
- [9] Susanna, Ms Ch Lavanya, et al. "College enquiry chatbot." *International Research Journal of Engineering and Technology (IRJET)* 7.3 (2020): 784-788.
- [10] Tamrakar, Rohit, and Niraj Wani. "Design and development of CHATBOT: A review." *Proceedings of International Conference On "Latest Trends in Civil, Mechanical and Electrical Engineering"*. <https://www.researchgate.net/publication/351228837>. 2021.
- [11] Venusamy, Kanagaraj, Navaneetha Krishnan Rajagopal, and Muhammed Yousoof. "A study of human resources development through chatbots using artificial intelligence." *3rd International Conference on Intelligent Sustainable Systems (ICISS)*. IEEE, 2020.