SMART CHATBOT SYSTEM ARTIFICIAL INTELLIGENCE BASED PYTHON PROJECT

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SMART UNIVERSITY CHATBOT USING AI AND PYTHON

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***Abstract*-The days of solely engaging with a service through a keyboard are over. Users interact with systems more and more through voice assistants and chatbots. A chatbot is a computer program that can converse with humans using Artificial Intelligence in messaging platforms. Every time the chatbot gets input from the user, it saves input and response which helps chatbot with little initial knowledge to evolve using gathered responses. With increased responses, precision of the chatbot also gets increases. The ultimate goal of this project is to add a chatbot feature and API for International Islamic University Chittagong. This project will investigate how advancements in Artificial Intelligence and Machine Learning technology are being used to improve many services. Specifically it will look at development of chatbots as a channel for information distribution. The program selects the closest matching response from closest matching statement that matches input utilizing WordNet, it then chooses response from known selection of statements for that response. This project aimed to implement online chatbot system to assist users who access University website, using tools that expose Artificial Intelligence methods such as Natural Language Processing, allowing users to communicate with University chatbot using natural language input and to train chatbot using appropriate Machine Learning methods so it will be able to generate a response. There are numerous applications that are incorporating a human appearance and intending to simulate human dialog, yet in most part of the cases knowledge of chatbot is stored in a database created by a human expert.**

***Keywords*- Chatbot; Artificial Intelligence; Machine learning; WordNet; Natural Language Processing**

I. INTRODUCTION

The improvements in the fields of inter-networking and information technology have been intricate in executing an Artificial Intelligent (AI) systems. These systems are drawing nearer of human activities, for example, choice emotionally supportive networks, robotics, natural language processing, and so forth. Indeed, even in the artificial intelligent fields, there are some hybrid strategies and adaptive techniques that make increasingly complex techniques and intelligent systems that could comprehend human language. Artificial intelligent systems learn themselves and retrieve insight by perusing required electronic articles that have been existed on the web.

A chatbot (otherwise called a chatterbox, Bot, or Artificial Conversational Entity) is an AI program [2] that copies human discussions including content and communication in natural language utilizing artificial intelligence methods, for example, Natural Language Processing (NLP), picture and video processing, and voice analysis. Chatbot for University management system has been created utilizing artificial intelligence algorithms that examine the user queries. This chatbot system is an internet application that gives an answer to the broken down queries of an user. Users simply need to choose the classification for inquiries and afterward ask the question to the bot that utilizes for noting it. Artificial intelligence has been incorporated to respond to the user's inquiries. Then the user can procure the fitting solutions to their inquiries.

The appropriate responses are given utilizing artificial intelligence algorithms. Users won't need to go actually to the University or University website for requests. Users need to enlist to the system and needs to login to the system. After login users can get to the different helping pages. There will be different helping pages through which users can chat by asking questions related with University activities. The system answers to users' queries with the assistance of effective Graphical User Interface (GUI). The user can question about the University related activities with the assistance of this web application. University related activities, for example, admissions, academics, Intake, and other social activities. It will support the undergraduates/other user to be refreshed about the University activities. A chatbot is an Artificial Intelligence program that can converse with people in natural language, the manner in which we collaborate with one another. It can trade a human for some undertakings of replying inquiries. A chatbot is a specialist that assists users in utilizing natural language. It was worked as an

endeavor to trick people. A few uses of chatbots, for example, User care, customer support and so on utilizes Artificial Intelligence Markup Language (AIML) [3] to visit with users. One of the foremost objectives of chatbots is to take after a smart human and entangle the recipient of the discussion to comprehend the genuine working along with different designs and abilities for their use has generally widened. These chatbots can demonstrate adequate to trick the user to believe that they are "talking" to an individual, however, they are limited in improving their insight base at runtime, and have typically next to zero methods for keeping track of all the discussion information. Chatbots utilize AI to arrive at counterfeit intelligence helping them to comprehend the user question, what's more, give a suitable reaction. The chatbots are created utilizing the Artificial Intelligence Markup Language (AIML) for imparting or cooperating with the user. This comprises software that will be made up of utilizing Artificial Intelligence and will assist the user in chatting with a machine. The user can ask the systems like typically did to other humans.

The remaining of paper as follows: section-II provides literature survey and section-III presents proposed system with methodology. Section-IV propounds results and discussion and finally, section-V concludes the paper.

II. LITERATURE REVIEW

By utilizing the field of Artificial Intelligence, one can develop numerous applications one of that is mentioned in this paper is a University chatbot system. In spite of the fact that chatbot can be deployed in various fields like marketing, education, banking, clinical and finance. Research is being done in making the regular rule based chatbots to be informative, responsive and complete the correspondence in a conversational human language. This requires the incorporation of Natural Language Processing (NLP) and Machine Learning (ML) technologies into the University chatbot system. There are various approaches to do as such. Selecting a fitting technique depends on the area of the chatbot, the functionalities it expects to give, the language of correspondence, the end client, and so forth. Some of the approaches are versed in this literature survey.

Michael Maudlin created "Chatter Bot Algorithm" in 1994 and published in the book Julia and was used to answer the queries. Taking this initial idea, further projects were developed to create a chatbot system. The user need to login to Chat-Bot application. At exactly that point the user is permitted to submit complaints and queries. When user query is submitted to the bot, context of the query is recognized and NLP is applied. WordNet calculation [4] and grammatical forms labeling are utilized to distinguish the feeling of the words. User questions are checked in the knowledge database. If the appropriate response is discovered, at that point that answer is sent to that user. If a particular query isn't found in the database such inquiries are replied by administrator. When the administrator answers the query, at exactly that point the appropriate response is sent to the user. Question alongside answer is put in database so that at whatever point such inquiries will be posed with the intention that they get addressed legitimately from the database. Because of this administrator doesn't have to address same query physically any longer. Different algorithms such as Porter Stemmer Algorithm [5] is used for expelling suffixes from words in English. Word request vector process is used for estimating word request closeness between two sentences. Sentences with precisely same words yet in different order may bring about altogether different meaning. The user is permitted to ask any number of questions with respect to institution. Chatbots after receiving query from user checks confidence [6] score and gives legitimate response to the user question. The keyword match calculation is done where the user inquiry went through 3 keyword matching algorithm [7]. If this matching of keywords fails then at that point query is sent through 2 and 1 keyword matching with the database. Even then if the query doesn't get the right keyword match, at that point the chatbot application sends No Answer Found as a reply.

The utilization of logic adapters to choose a response is another algorithm used for chatbot applications. The aim of an input adapter is to get input from bot source, and then convert it into a format that makes chatbot understand. The chatbot system uses a special logic adapter that allows to pick the fitting response from all the responses. The Multi Logic Adapter is used to choose a single response from the responses returned by all of the logic adapters that the chat bot has been configured to use. Preprocessing of information is done by word embedding. Here each word is mapped to a vector and the vector structure is spoken to in one-hot encoded structure [8] which implies 1 represents the presence of word and 0 for everything else. Natural Language ToolKit (NLTK) is a python library which offers assistance for Natural Language Processing (NLP). NLTK [9] has inbuilt tokenizers. The NLTK incorporates a wide scope of tokenizers which are as per the following norm, letters, path, words, keywords, class, N-gram, pattern and so on. The most usually utilized tokenizer is the word-punkt tokenizer [10] which parts the sentences at the blank spaces. The precision, speed and effectiveness of the NLTK tokenizers is exemplary. Administrator signs in to the portal and can perform activities like erase invalid answer or to include explicit answer of a specific inquiry. With the assistance of computerized reasoning, the chatbot application answers the question asked by the users.

III. METHODOLOGY OF PROPOSED SYSTEM

This University Chatbot System is a web based application which gives responses to the user queries. The system architecture of the chatbot system is shown in the Fig. 1. Firstly, Chatbot responds to the user by greeting him/her and then asks user to login into the system by providing his/her mail. Then the user finds the buttons in the UI which corresponds to the different categories of the University. After going through the buttons the chatbot system asks the user, is it helpful in giving the response. If the user is not able to find the required response he/she can continue the chat with the University chatbot system by briefly elaborating their queries. Then chatbot system applies Machine Learning algorithms to the break down the user queries.

Once the user asks query, the keywords in the query is detected using WorldNet Algorithm. As the query description can change from one person to another person. The same query may be asked in a different ways by the users. One user asks a query so simply and clearly while another user may request same query in a completely different manner. So it is required to find what is the exact information user seeks to know and to find a correct response for the corresponding user query. The chatbot system firstly removes the stop words from the user input, if they are present in the queries asked by the user. After removing the stop words from the user queries, tokenization and lemmatization [11] process are done.

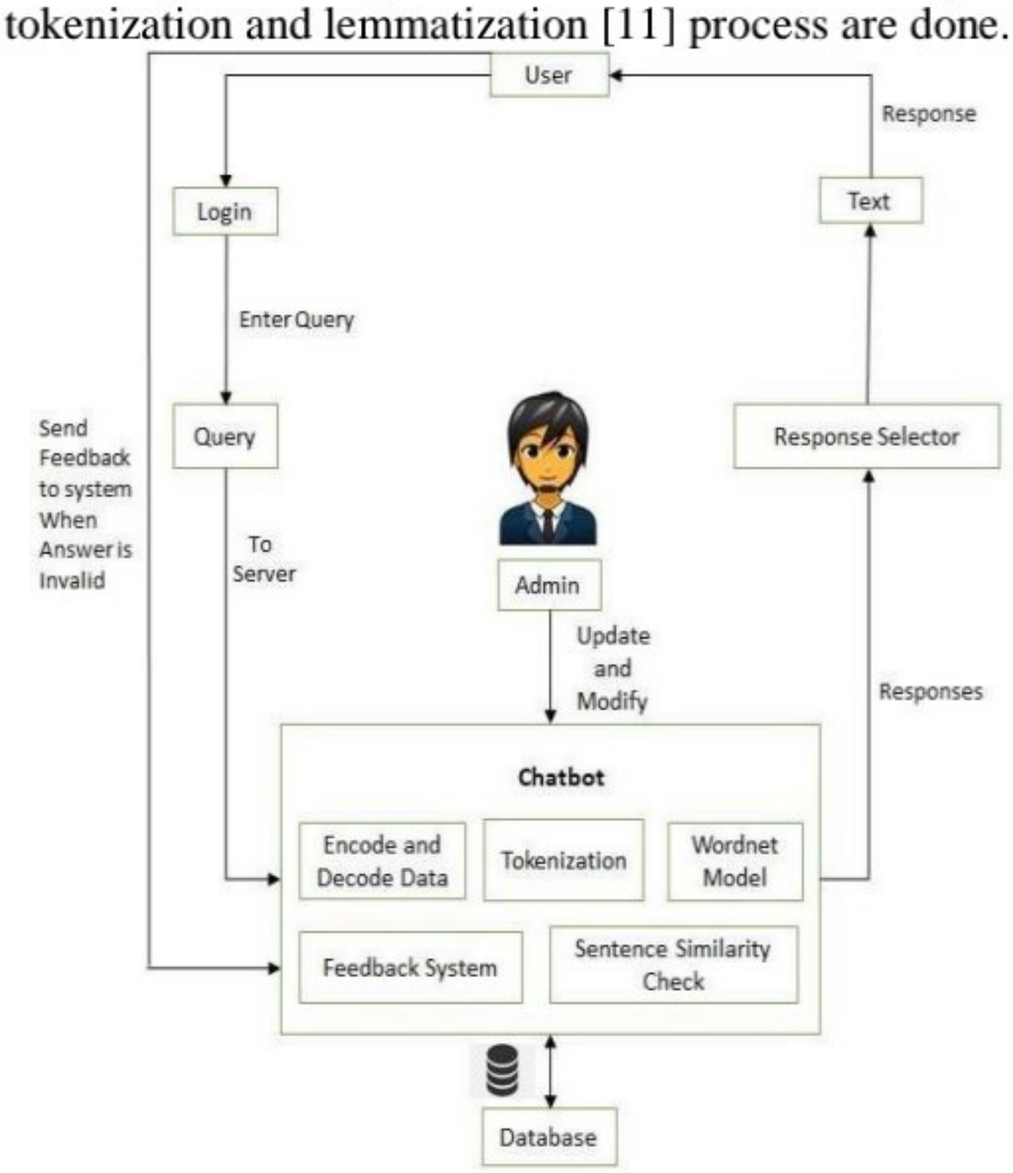

Fig. 1. University Chatbot system architecture

Tokenization is a process of taking a set of text or text and breaking it up into its individual words or sentences. Lemmatization is the process of gathering the different inflected forms of a word so they can be dissected as a solitary item and is a variation of stemming. From there spell checker [12] is used to identify and rectify spelling mistakes present in the query, then by using the sentence similarity and WordNet Algorithm [13] a suitable response is explored in the knowledge database [14]. WorldNet is a semantic and lexical database for the English language. It is used to group English words into the set of synonyms called synsets [15], it gives short definitions and utilization models, and records various relations among these synonym sets or their individuals. If the response is found in the database it is displayed to the user, else the system notifies the admin about missing response in the database and gives a predefined response to the user. Admin can write the missing response into the database by logging into the admin block in website so that if the user asks the same query next time, he/she may get the suitable response. At the end of conversation the University chatbot system collects the feedback from users to improve the system efficiency.

The functions of the user are to ask queries, provide feedback and so on. All the functions to be performed by the user are outlined below in detail as shown in Fig. 2.

a. ***Login:*** After clicking on the chatbot provided in the University website. The chatbot system greets the user and requests the user to provide the mail id. After which the chatbot starts chatting with the user.

b. ***Botindex:*** When the user proceeds to choose chatbot to get an answer to his/her query, the chatbot displays a page to select few options regarding University and identifies his/her category of query. If the user gets his query cleared then the task of chatbot is completed.

c. ***Asking Queries:*** If the user is not satisfied with rule based response, then the chatbot system requests to enter his/her query in words and the suitable response is given by

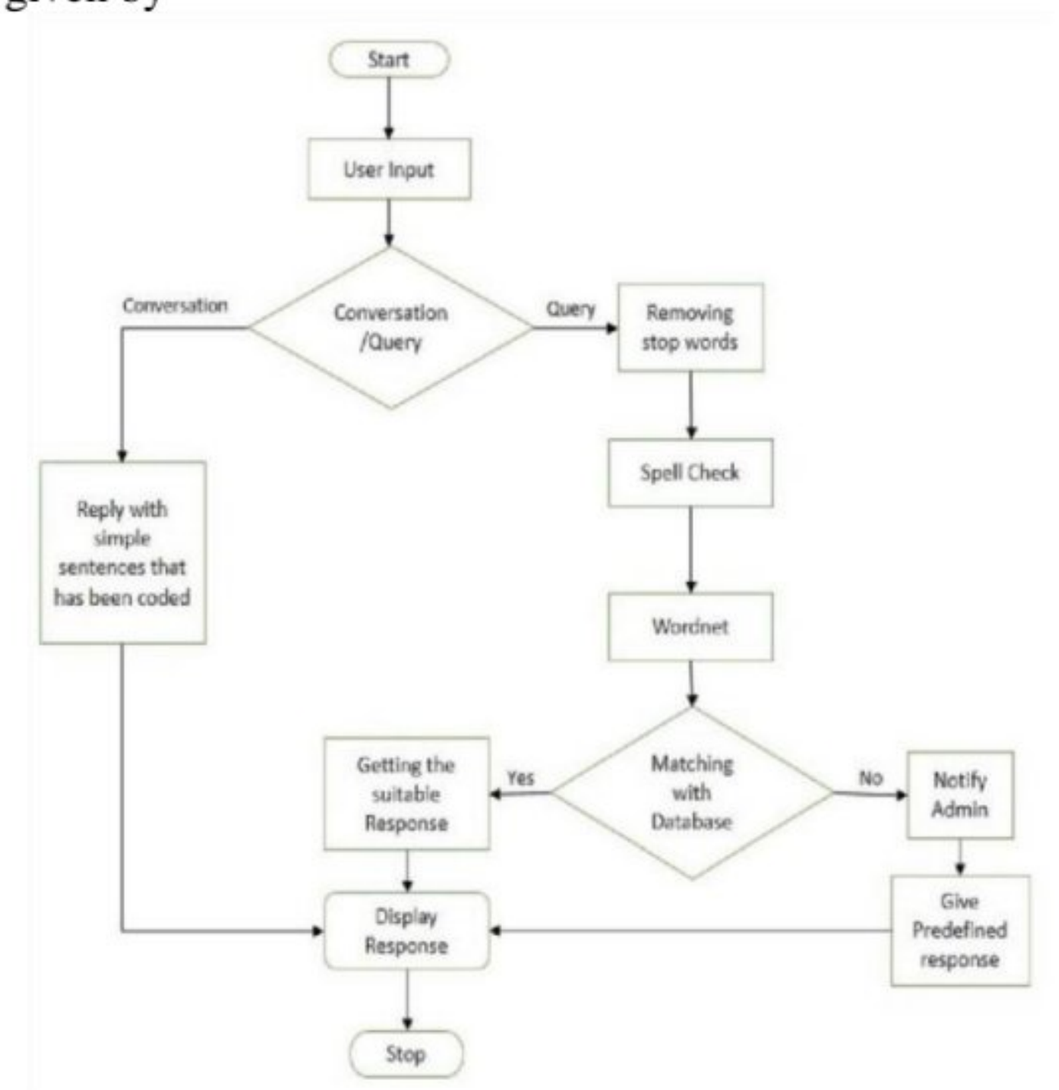

Fig. 2. Flowchart for User Module

the chatbot. User's query is first checked in database. If the query is valid then suitable response is given to the user. If the query is invalid then chatbot requests user to ask queries regarding the University.

d. ***Providing feedback:*** After the chat, the chatbot takes feedback from the user. Feedback is taken in order to know the users experience with the chatbot. If the user gives feedback positively then the bot thanks the user and provides a box to enter any further queries. If the user gives feedback negatively then bot asks the user to elaborate his/her query in order to respond. Username of the user is also stored and helps admin to track user actions.

At the other end, admin who is responsible for maintaining the University chatbot system up to date has several functions to perform such as add the query to the database, modify the data, delete the data, and view feedback given by user and so on. All the functions to be performed by the admin are outlined below in detail as shown in Fig. 3.

a. ***Login:*** System has only one admin (there is no registration for admin). Admin has to login by providing his/her username and password entered password is encrypted using SHA-256 Encryption algorithm. The login details are validated against the username and password which are stored in the database and are encrypted using SHA-1 Encryption algorithm. If the details provided are matching with the database then the admin can get the access of University chatbot system.

b. ***Add query:*** If admin proceeds to add dataset, then the chatbot allows to add the query in three options that is addition of question, addition of answer and selecting the respective category into which dataset is added.

c. ***View dataset:*** If admin proceeds to view dataset, then the chatbot allows to view the dataset category wise. The chatbot also gives an additional two options that is delete the dataset and modify the dataset.

d. ***Delete query:*** If admin proceeds to delete query, then the chatbot allows to delete the query from view page itself by selecting respective category.

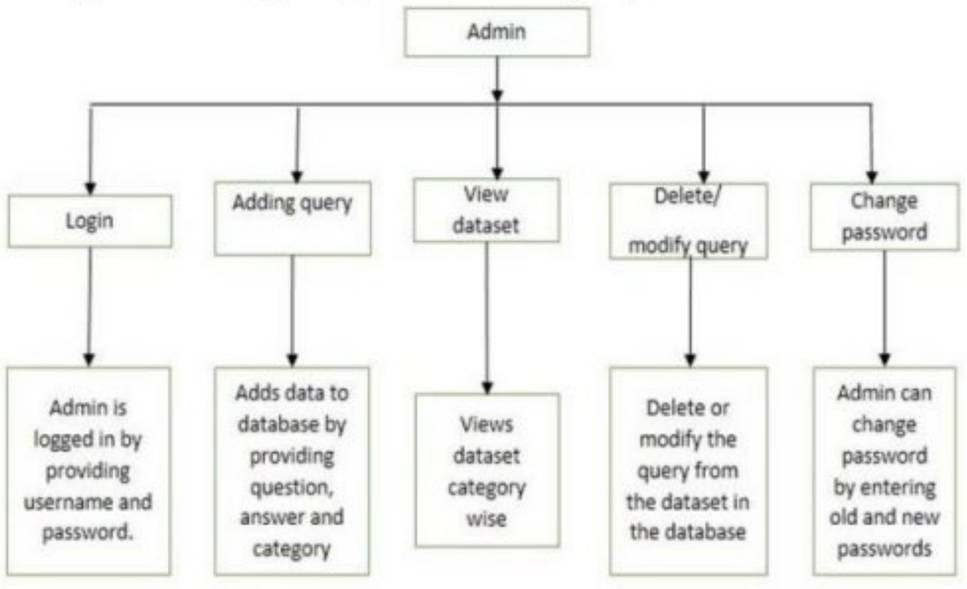

Fig. 3. Flowchart for Admin Module

e. ***Modify query:*** If admin proceeds to modify existing query, then the chatbot allows to modify the query from view page itself by selecting respective category.

f. ***Change password:*** If admin wants to change the password, then the chatbot allows to change the password. To change the password, admin must provide old password, new password and re-enter the new password in the change password webpage. Thus creating a new password which is encrypted and stored in the code.

g. ***Viewing invalid dataset:*** If admin proceeds to view invalid dataset, then the chatbot allows to view the dataset category wise. The invalid data is the data which the user has given negative feedback or the queries for which the chatbot is unable to respond. The chatbot also gives an additional two options that is delete and modify corresponding query.

h. ***Edit Static answers:*** The text displayed when user selects buttons in GUI of the chatbot system can be updated or modified by the admin. The admin can update the information which is obtained by selecting the button in the webpage or can change the function of the button by rewriting it in the database.

All the functions permit the administrator to perform any action through the website without going through the database.

IV. RESULTS AND DISCUSSION

Chatbot system is implemented to meet academic requirements of the users. Simulation or Generating response from a chatbot is a knowledge-based one. Wordnet is responsible for retrieving the responses and in this case, it contains all logics that is triggered whenever the user context is matched. When a user begins asking queries in the chatbot Graphical Use Interface (GUI). The query is searched in the database. If the response is found in the database it is displayed to the user else the system notifies the admin about the missing response in the database and gives a predefined response to the user.

Admin can write the missing response into the database by logging into the admin block in website. The chatbot is based on AIML language which is type of Extensible Markup Language (XML). This helps the different type of user to get the information like latest news, university rank holders, timetables, updates regarding University exams and activities and other academic information. Some pictures of the proposed chatbot system is shown in Fig.4, 5 and 6 respectively. By giving choices users can discover their answers in a single click.

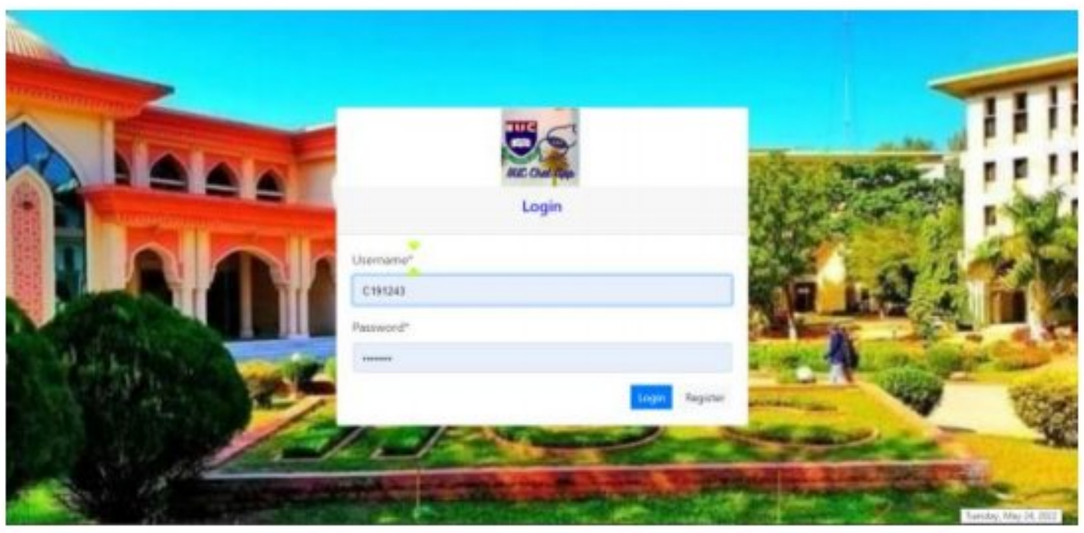

Fig. 4. Ask user info for login

As soon as user chooses a particular category, the chatbot collects user mail id. If the users query is not solved by options then chatbot system gives additional dialogue box to write his/her question regarding University. User can ask any number of queries to chatbot system regarding University. Some sample queries asked by the user are shown in Fig. 5. Chatbot system answers all the queries of users without any delay.

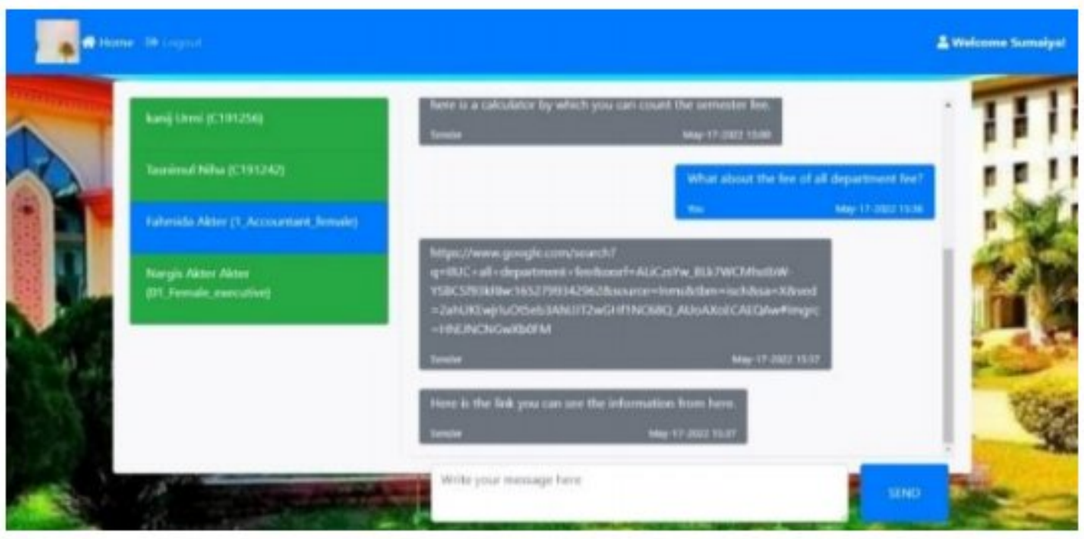

Fig. 5. Chatbot answering queries of student

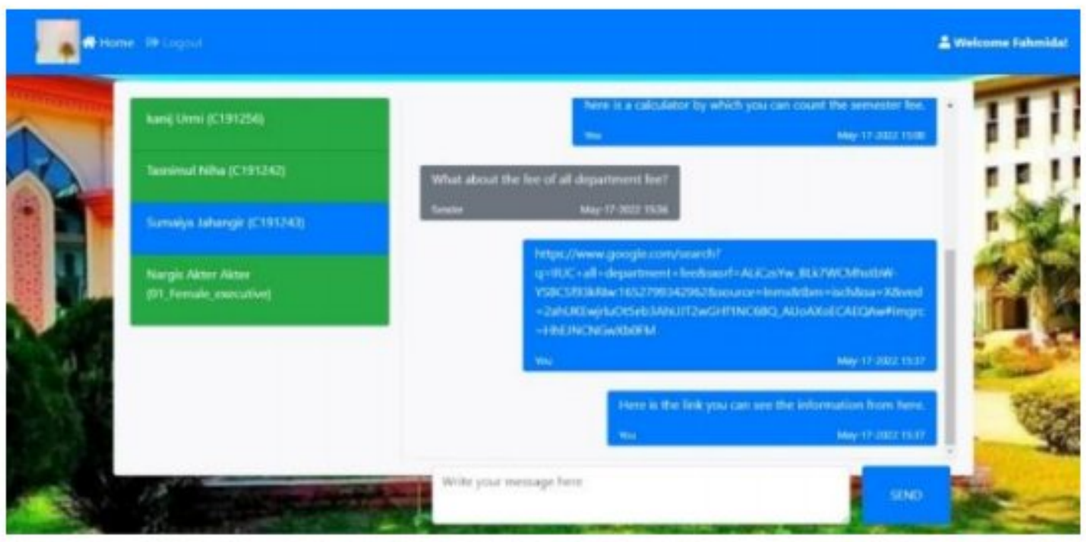

Fig. 6. Chatbot answering queries of Executive feedback

After the chat, chatbot system asks user to provide feedback as shown in Fig. 6. This feedback system is employed to know whether the user is satisfied with the chatbot response to the user queries. This feedback is stored in the database which can be used by university to know how efficiently chatbot is answering user queries.

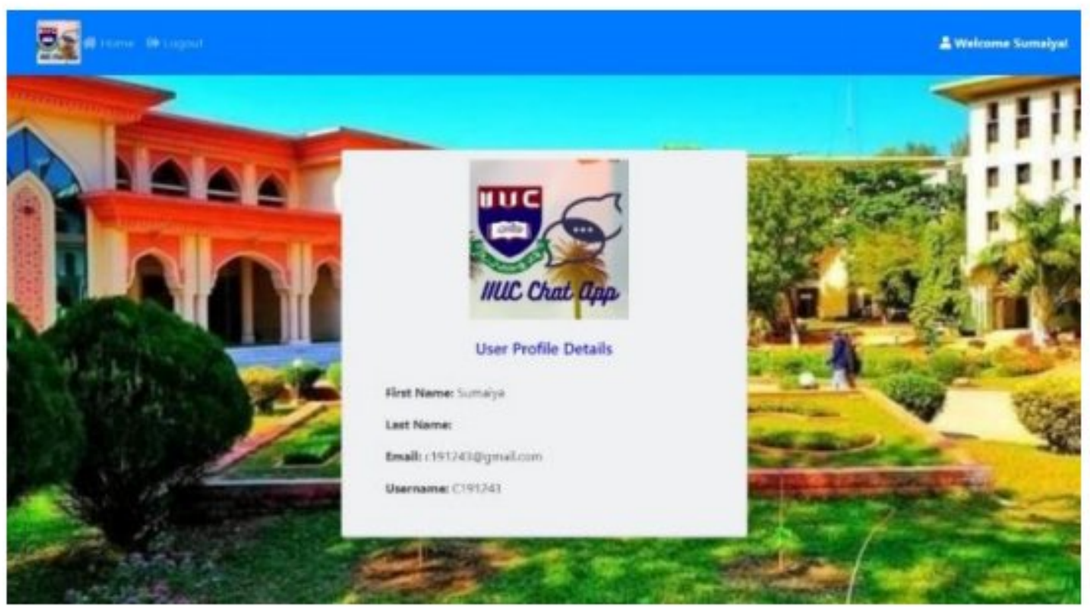

Fig. 8. Chatbot answering user profile

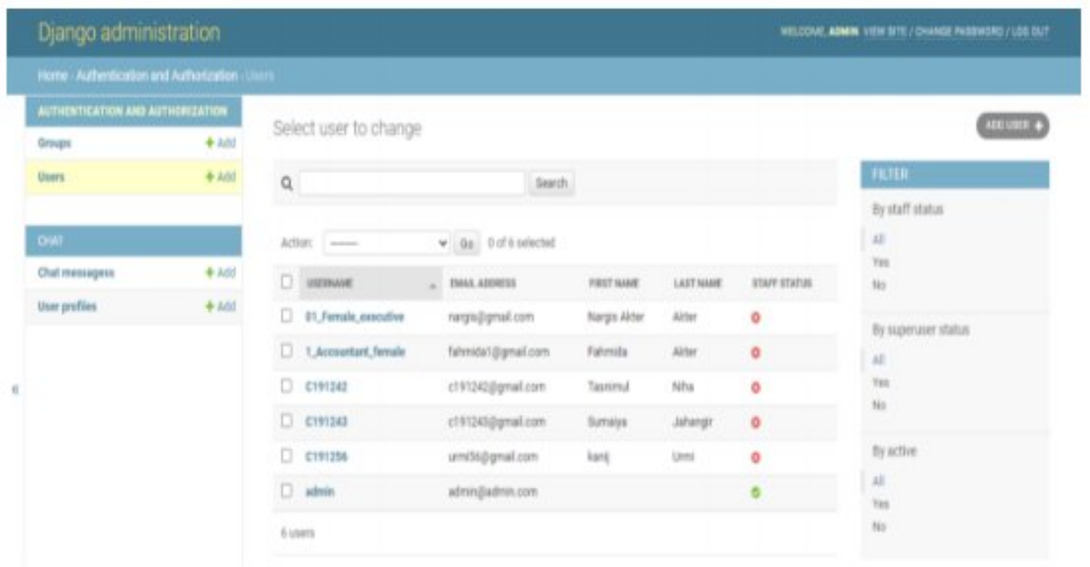

Fig. 7. Admin menu page

Fig 9: Logout From the system

Admin need to provide username and password in order to login. Only with proper authentication, admin is allowed to go into the database. After admin provides proper username and password, admin gets logged into admin menu page as shown in Fig. 7. Where admin can perform operations such as add data to dataset, modify the existing data set, view all invalid queries, edit the predefined data, view user feedback, delete the existing data and change password of admin module. All the changes made here are directly changed in database.
If the user is not satisfied with the chatbot responses then he/she gives negative feedback. If admin finds the questions to be valid then admin can add answer to the particular query. If not then admin can delete the question, just by a single click.

V. CONCLUSION

In this project we made a University specific chatbot system that can be custom fitted to education domain chatbot, the addition of this chatbot system in the University website will make the webpage more user interactive as it responds to the user queries very accurately as it is a domain specific chatbot system, and furthermore we had investigated our University chatbot system design stages and a few different techniques by which the precision of the chatbot system can be made much better. To make the responses given by the chatbot system more meaningful and accurate the administrator has to train the chatbot system with more information regarding to University and increase the scope of knowledge base. Nevertheless, gathering feedback from the potential user can be helpful in developing the University Chatbot system, ultimately servicing the user queries.

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