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Project Chatbot Using Python

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Abstract – ChatBot can be described as software that can chat with people using artificial intelligence. This software is used to perform tasks such as quickly responding to users, informing them, helping to purchase products and providing better service to customers.

We are going present 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.

Key Words: telecommunication, intelligence.

1. INTRODUCTION

Chatbots, also known as conversational agents, are designed with the help of AI (Artificial Intelligence) software. They simulate a conversation (or a chat) with users in a natural language via messaging applications, websites, mobile apps, or phone.

There are two primary ways chatbots are offered to visitors:
Web-based applications, Standalone applications

Chatbots represent a potential shift in how people interact with data and services online. While there is currently a surge of interest in chatbot design and development, we lack knowledge about why people use chatbots.

2. Body of Paper

This chatbot system is used to reduce the time and effort of human. Also in this system chatbot is used to chat with user and predefined Q & A are defined. Human efforts are reduced in due to this bot.

- 24-7 availability – Unlike humans, chatbots once installed can attend queries at any time of the day.
- Learning and Updating – AI-based chatbots are capable of learning from interactions and updating themselves on their own.
- Multiple Customer Handling – They can handle as many queries as required at once, this is a major benefit of using chatbots

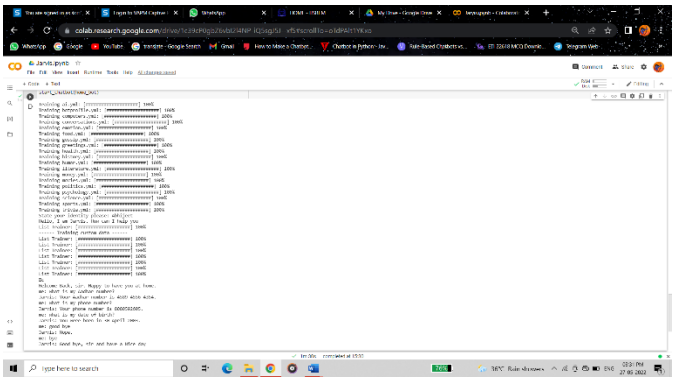

Fig -1: Figure

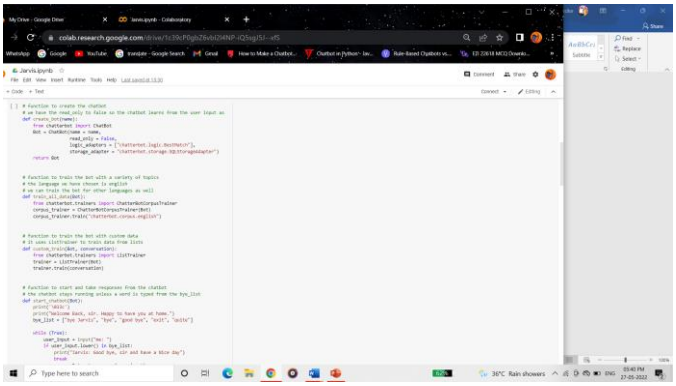

Fig -2: Figure

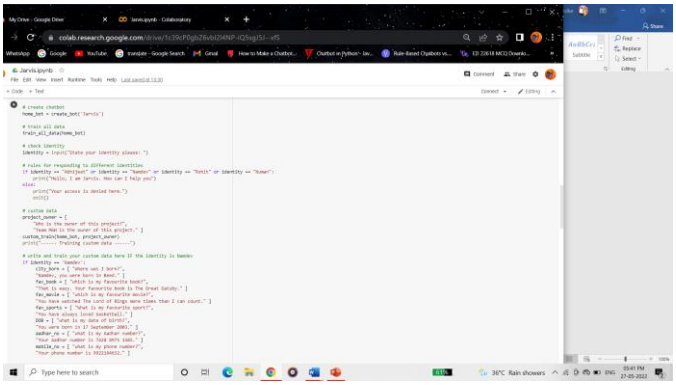

Fig -3: Figure

Fig -4: Figure

3. CONCLUSIONS

With a chatbot, your organization can easily offer high-quality support and conflict resolution any time of day, and for a large quantity of customers simultaneously. Chatbots boost operational efficiency and bring cost savings to businesses while offering convenience and added services to internal employees and external customers. They allow companies to easily resolve many types of customer queries and issues while reducing the need for human interaction.

4.ACKNOWLEDGEMENT

We would regard this project as the culmination of efforts put by various persons during this academic year. We express the whole hearted thanks to our guide Mrs. Sanghita Deb for such priceless and affectionate guidance throughout the project, without which this report would only be a dream. We also express our sincere thanks to Head of Department Computer Technology Mr. Ambulge S. S for providing all necessary prerequisites. We express our deepest regards towards the staff members and friends for their constant support. We express whole hearted thanks to our principal of VAPM, Almala College Mr. Dharashive P. S for providing all necessary infrastructures, labs, etc.

5.ADVANTAGES

- Less cost
- 24/7 Availability
- Learning and updating
- It manages multiple clients
- It is easy to use
- Human effort is less

6.ADVANTAGES

- It takes more time for installing the app
- Security is less

7.FUTURE SCOPE OF PROJECT

By making the some upgradation in it will be very inficient to handle the data. with the help of our software it will be easy for the user and companies to main their data with the help of intelligent assistance.

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Deep Learning Chatbot using Python

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ABSTRACT

Many organizations are executing Chatbots to address client inquiries and contact clients. As indicated by Mindshare, 63% of shoppers would consider utilizing a chatbot when visiting a business or brand's site. One of the fundamental AI chatbot benefits is that it can convey moment satisfaction. Individuals would much preferably visit online over set aside the effort to call an organization's 800-number.During these difficult Situations it is hard for individuals to go to the stores to purchase something, to emergency clinic for a little clinical test, finding support for an item that you purchased and so forth So these sorts of easier errands, which don't require actual presence, can be supplanted by chatbots. So we will make a chatbot, which when given reasonable purpose documents dependent on a specific item or necessities, can prepare on it utilizing various Layers Neural Networks and make a model. Utilizing this model our chatbot can answer client inquiries.

Key words : Intents, Layers, Neural networks, Deep learning, Chatbot.

1. INTRODUCTION

In this day and age, the way we associate with our advanced gadgets is generally confined in view of what highlights and how much openness every gadget offers. There is an expectation to absorb information related to each new gadget we interface with. Chatbots take care of this issue by connecting with a client utilizing text independently. Chatbots are right now the most effortless way. We have software to be local to people since they have an encounter or conversation with someone. Since chatbots copy a real individual, Artificial Intelligence (AI) strategies are utilized to construct them. One such procedure inside AI is Deep Learning which impersonates the human mind. It discovers patterns from the training data and utilizes the same patterns to process new data. Deep Learning is promising to take care of long standing AI issues like Computer Vision and Natural Language Processing (NLP), with Google putting $4.5 million in Montreal AI Lab notwithstanding a government AI award of $213 million. The current chatbots which are near, such as Siri, Alexa, Cortana and Google Assistant face challenges in understanding the aims of the client and consequently become hard to manage. In particular, these chatbots can't monitor the specific circumstance and endure in long-going discussions. Another inadequacy of these chatbots is they are planned explicitly for assisting a client for certain particular issues, consequently confining their area. They can't make an intelligent and connected discussion between two individuals on famous points like ongoing news, governmental issues and sports.

In this paper we initially discuss what is Deep learning and find out which model is compatible to train a chatbot and show you a way to create a deep learning based chatbot which can understand the human language and give appropriate responses.and the steps to create the chatbot.

2. LITERATURE SURVEY

According to research "**Chatbot Utilization for Medical Consultant System**" Medical services are essential requirements for human existence despite the fact that they ordinarily have restricted assets. Current advances are used for expanding administration capacity and diminishing the activity cost. Pre-programmed message frameworks or chatbots, which are broadly known in the field of online organizations, can be applied to clinical benefits. Hence, the target of this work is to carry out the medical consultant system administration by utilizing chatbot Technology. It was executed dependent on the data of the side effects and treatment records assembled from the DoctorMe application. The test outcomes show the capacity of the proposed system. Besides, it tends to be utilized as a rule for future improvement and furthermore a rule for future study.[1]

According to research "**Deep Learning Techniques for Implementation of Chatbots**" Different methodologies for the advancement of chatbots and various innovations in the making of chatbots created in light of those endeavors. NLTK is a module in python which is ready to perform Natural Language Processing. It is utilized to take

input in the form of speech and produce responses which people can understand[2]

According to research "**The Stanford CoreNLP Natural Language Processing Toolkit**" the design and utilization of the Stanford CoreNLP toolkit, an extensible pipeline that gives crucial natural language analysis. This toolkit is broadly utilized, both in the exploration NLP group and furthermore among business and government clients of open source NLP innovation. [3]

According to research "**A Rule based Approach to Word Lemmatization**" This paper thinks about the consequences of two word lemmatization algorithms, one dependent on if-then principles and the other dependent on ripple down rules enlistment algorithms. It presents the issue of lemmatization of words from Slovene free content and clarifies why the Ripple Down Rules (RDR) approach is very appropriate for the undertaking.[4]

According to research "**Creating and Evaluating Chatbots as Eligibility Assistants for Clinical Trials: An Active Deep Learning Approach towards User-centered Classification "** they have created a conversation manager, criteria classifier. Using conversation manager users can chat with the chatbot. The criteria classifier module is used to map the criterion into the five predefined categories. criteria classifier processes criteria as vectors of word embeddings. The active learning algorithm, selects the criterion that the model has the least confidence about its category for the human oracle to label. Once the label/class is received from the human oracle, the algorithm propagates the label to the neighboring criteria to increase the number of samples in the training set. The algorithm is also responsible for selecting a validation set from the ones with labels, either annotated by the human oracle or inferred by the model. The convolution neural network is then trained on the training set and tested on the validation set. Based on the confidence of the model's prediction on the validation set, the active learning algorithm again selects new criteria with low confidence for the human oracle to label. The process repeats until a certain number of iterations is met..[5]

According to the "**A Survey on Chatbot Implementation in Customer Service Industry through Deep Neural Network**", the strategies for creating rules for chatbot have been advanced. strategies for creating chatbots have depended on hand-written rules and templates. With the rise of deep learning these models were quickly replaced by end-to-end neural networks. All the more specifically, Deep Neural Networks is a powerful generative-based model to take care of the conversational response generation problems. This paper led an inside and out review of ongoing literature, examining more than 70 publications related to chatbots published in the last 5 years. Based on a literature survey, this examination made a comparison from chosen papers according to the strategy adopted. This paper also introduced why current chatbot models fails to take into account while generating responses and how this affects the quality conversation.[6]

According to the research "**Intent Detection-Based Lithuanian Chatbot Created via Automatic DNN Hyper-Parameter Optimization"** they handled a purpose recognition issue for the Lithuanian language with the real supervised data. Their main principle of focus is on the upgrade of the Natural Language Understanding (NLU) module, responsible for the comprehension of user's questions. The NLU model is prepared with an appropriately selected word vectorization type and Deep Neural Network (DNN) classifier. During their experiments, they have tentatively investigated fastText and BERT embeddings.[7]

According to research "**Chatbot Technologies and Challenges**" they gave an outline of the innovations that drive chatbots, including Information Extraction and Deep Learning. They have additionally examined the contrasts among conversational and transactional chatbots - the former defined manually on free-form chat logs, while the last are characterized physically to accomplish a particular objective like booking a flight. They have likewise given an outline of commercial tools and platforms that can help in creating and deploying chatbots. At last, they have introduced the limitations and future work difficulties around here.[8]

According to research "**Accessible conversational user interfaces: considerations for design**"a scope of current guidance and flow direction, reports, exploration and writing on open plan for various disability groups, incorporating clients with psychological well-being issues, mental imbalance, medical issue, intellectual incapacities, dyslexia or learning challenges, and tangible, versatility or ability weaknesses. They grouped the components from this assortment of directions that seem applicable to the plan of available CUIs, and cases where direction presents issues which are less decisive, and require further investigation. [9]

According to research **"Ensemble-based deep reinforcement learning for chatbots"** ,trainable chatbots that show familiar and human-like discussions remain a major challenge in artificial

intelligence. Deep Reinforcement Learning (DRL) is promising for tending to this test, however its fruitful application remains an open inquiry. This article portrays a novel ensemble-based methodology applied to esteem based DRL chatbots, which utilize limited activity sets as a type of importance portrayal. In their methodology, while exchange activities are obtained from sentence clustering, the training datasets in our ensemble are obtained from discourse clustering. The latter plan to induce specific agents that figure out how to communicate in a specific style.[10]

3. DEEP LEARNING

Deep learning is a part of AI which is totally founded on Artificial neural networks, as neural networks will impersonate the human mind so deep learning is additionally a sort of copy of the human cerebrum. In deep learning, we don't have to explicitly program everything. The idea of deep learning isn't new. It has been around two or three years at this point. It's famous these days in light of the fact that prior we didn't have that much handling power and a ton of information. Over the last 20 years, the processing power has increased dramatically, deep learning and AI came into the light.

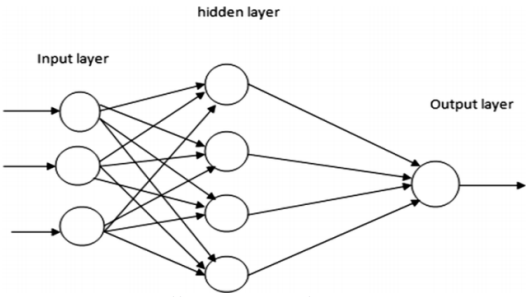

Figure 1: different layers of Neural Networks

Figure 1 depicts the different layers of Neural Networks. Neurons in deep learning models are hubs through which information and calculations stream. Neurons work like this:

- They get at least one info signal. These info signs can emerge out of either the crude informational collection or from neurons situated at a past layer of the neural net.
- They perform certain estimations.
- They convey some yield messages to neurons deeper in the neural net through a neurotransmitter.

Neurons in a deep learning model are equipped for having synapses that associate with more than one neuron in the former layer. Every synapse has a related weight, which impacts the former neuron's significance in the general neural network.Weights are a vital point in the field of deep learning in light of the fact that changing a model's loads is the essential route through which deep learning models are prepared. You'll see this by and by later on when we fabricate our first neural networks from scratch. Once a neuron gets its inputs from the previous neurons in the previous layer of the model, it includes each sign increased by its comparing weight and gives them to an initiation function.The actuation work computes the yield as an incentive for the neuron. This yield esteem is then given to the following layer of the neural organization through another synapse.

4. INTENT BASED CHATBOT

A chabot is an Artificial Intelligence(AI) based programming that can simulate conversation between clients in Natural language through messaging applications, web-based media platforms, applications and through the phone.

There are various kinds of chatbots that are accessible, for example, Rule-based and NLP bots and so on Rule-based chatbots communicate with clients based on preset rules. The user info should coordinate with those pre defined rules to find a solution. NLP chatbots learn dialects along these lines so that kids get familiar with a language. Subsequent to having taken in various models, they can make associations between questions that are asked in an unexpected way. Along these lines, the bot comprehends what the inquiry is about without being absolutely modified for it and a proper answer can be given. In a discussion structure, this is likewise called Conversational artificial intelligence.

5. METHODOLOGY

To create an intent based chatbot, we have created a json file, which consists of all the intents. The intent we have created is based on the healthcare system.

Intents: In the intent file lists where we'll store our natural language data. We have our json file as I mentioned earlier which contains the "intents". It is interchangeable. We can change the intent file anyway we want.

We'll train our chatbot using this intent file so that it can understand the user's intentions and reply accordingly.

We have a whole bunch of libraries like nltk (Natural Language Toolkit), which contains a whole bunch of tools for cleaning up text and preparing it for deep learning algorithms, json, which loads json files directly into Python, pickle, which loads pickle files, numpy, which can perform linear algebra operations very efficiently, and keras, which is the deep learning framework we'll be using.

Modules we have used:
train_chatbot.py — the code for reading in the natural language data into a training set and using a Keras sequential neural network to create a model
chatgui.py — the code for cleaning up the responses based on the predictions from the model and creating a graphical interface for interacting with the chatbot
classes.pkl — a list of different types of classes of responses
words.pkl — a list of different words that could be used for pattern recognition
intents.js on — a bunch of JavaScript objects that lists different tags that correspond to different types of word patterns
chatbot_model.h5 — the actual model created by train_chatbot.py and used by chatgui.py.

The figure below shows the workflow of the project.

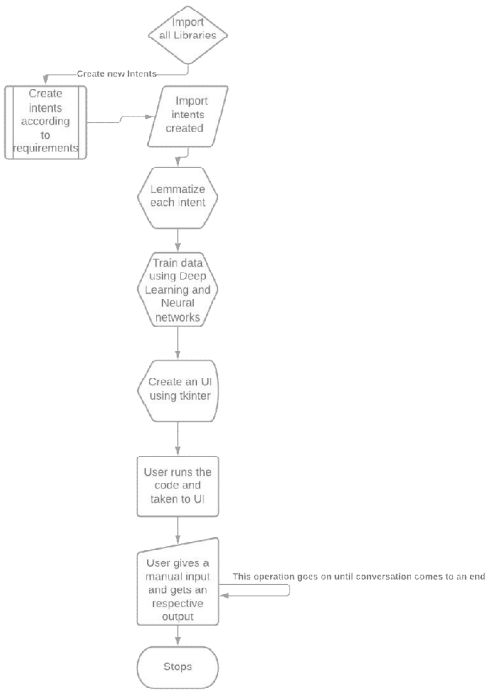

Figure 2: Flow diagram of proposed methodology

For creating our intent-based chatbot, Firstly created an intent file which contains all the patterns of how chatbot will answer user queries. Then we lemmatized the word and extracted words, classes and documents from the intent file using nltk modules. Now we have to create training data using these words, classes and documents. After creating the training data, we have created the neural network model which contains three layers, the first layer will contain 128 neurons and the second layer will contain 64 neurons and the third layer is the output layer. Then, we optimized the neural network model using the Stochastic Gradient Descent (SGD) optimizer.. Then we have created some methods which will take the user inputs and form an output based on prediction of the deep learning model created.. To converse between users, chatbot needs to have an interface which we developed using the xvfb framework and created a simple user interface of chatbot using python with the help of Tkinter module.

6. ANALYSIS AND TESTING

The given figure below is the data flow diagram of our chatbot. One can understand and analyze how and where the data is at a particular moment of time.

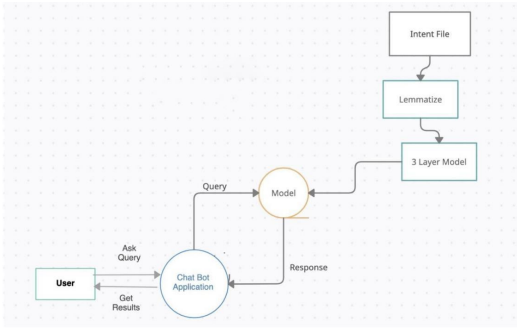

Figure 3: Data flow diagram

From Figure 3 we can know where the particular data is at a particular time in our system. So if we look at the flow of data. Firstly the user enters the query in the chat box and clicks on send. After clicking on send the query is imputed to the deep learning model that is previously trained sequential deep learning model. The model gives an intent list as an output then we compare the probabilities of original intent and the output intent. The intent with the higher probability is selected and one response is randomly selected from that tag and is displayed to the user.

We chose boundary value analysis to test our chatbot. We cannot perform automated testing of our prototype using tools because of multiple output situations. We have developed our chatbot based on some intents. An intent file can't be able to describe all possible scenarios that a user might ask a chatbot to perform. That's why we need to test it based on boundary values which are extreme possible test cases and see how our chatbot will respond to it.we have tested the conditions of boundary with few valid test cases and some invalid test cases and observed whether we got desired output or not

7. RESULTS

The result of our chatbot always varies as it is a natural language chatbot that can give the same answer in many different ways. The chatbot always keeps learning as the number of users increase or use it more.The accuracy of the chatbot also increases with the usage of the bot.

8. CONCLUSION

In conclusion we have made a chatbot in python that can understand user queries and reply accordingly. In the intent file wetarined our chatbot on, we can add more patterns and improve patterns which will be helpful when replying to the users and improves the accuracy of our chatbot. Deep Learning enabled chatbots are becoming more and more popular because of their applications and problems it can tackle. It can also be very helpful in teaching and has a lot of applications in teaching the visually impaired.

9. FUTURE WORK

Our chatbot prototype can not only be used for one purpose. It can be used in many fields based on the intent file used to create a training dataset for the deep learning model to train. A report button can be added in the chatbot which a user can use when he feels the chatbot is not giving him the appropriate answer so that the bot can add the reported data to the intent file and keep learning itself. This drastically improves the performance of the chat bot and it becomes more and more perfect by prolonged usage.

10. ACKNOWLEDGMENT

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CHATBOT IN PYTHON

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Abstract - *A chatbot is a computer software program that conducts a conversation via auditory or textual methods. This software is used to perform tasks such as quickly responding to users, informing them, helping to purchase products and providing better service to customers. Chatbots are programs that work on Artificial Intelligence (AI) & Machine Learning Platform. Chatbot has become more popular in business groups right now as it can reduce customer service costs and handles multiple users at a time. But yet to accomplish many tasks there is a need to make chatbots as efficient as possible. In this project, we provide the design of a chatbot, which provides a genuine and accurate answer for any query using Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA) with python platform*.

Key Words: **Artificial Intelligence Markup Language (AIML), Latent Semantic Analysis (LSA), Pattern Matching, Chatbot, Flask Web-Framework, HCI**

1. INTRODUCTION

A chatbot is an automated software program that interacts with humans. A chatbot is merely a computer program that fundamentally simulates human conversations. A chatbot that functions through AI and machine learning has an artificial neural network inspired by the neural nodes of the human brain. Chatbots are programs that can do talk like human conversations very easily. For example, Facebook has a machine learning chatbot that creates a platform for companies to interact with their consumers through the Facebook Messenger application. In 2016, chatbots became too popular on Messenger. By the consequences is noted that 2016 was the entire year of chatbots. The software industry is mainly oriented on chatbots. Thousands of chatbots are invented on startups and used by the businesses to improve their customer service, keeping them hanging by a kind communication. According to research, nowadays chatbots are used to solve a number of business tasks across many industries like E-Commerce, Insurance, Banking, Healthcare, Finance, Legal, Telecom, Logistics, Retail, Auto, Leisure, Travel, Sports, Entertainment, Media and many others. Thus that was the moment to look at the chatbots as a new technology in the communication field. Nowadays various companies are using chatbots to answer quickly and efficiently some frequented asking questions from their own customers.

AIML and LSA are used for creating chatbots. Artificial Intelligence Markup Language (AIML) and Latent Semantic Analysis (LSA) are used for developing chatbots, which are used to define general pattern-based queries. This pattern can also be used to give random responses for the same query in the chatbot. LSA is a Latent Semantic Analysis technology in python, which is utilized to discover likenesses between words as vector representation. So that the unanswered queries by AIML will be viewed as a reply by LSA.

2. RELATED WORK

Chatbots: Are They Really Useful?

Author: Bayan Abu Shawar, Eric Atwell

The paper is basically focused on an academic paper highlighting some case studies and including a brief history of chatbots that extends back to the earliest experiments such as ELIZA (c. 1966). The paper is based on making a chatbot using AIML patterns with ALICE.[1]

A Web-based Platform for Collection of Human Chatbot Interactions

Author: Lue Lin, Luis Fdo. D'Haro, and Rafael Banchs

The paper presents a chatbot design which is work on the web-based framework. Lue Line, Luis Fernando D'Haro and Rafael E. Banchs in HAI 2016 proposed the Web Chat which was a crowd-sourced initiative that could collect and annotate human chatbot interactions. [12]

The anatomy of ALICE

Author: Wallace, Richard S.

In this paper, Dr. Richard S. Wallace proposed the technical presentation of Artificial Linguistic Internet Computer Entity (A.L.I.C.E.) as well as Artificial Intelligence Markup Language (A.I.M.L.), which are set in the background by philosophical and historical ruminations occurring on human consciousness. [13]

CHARLIE: An AIML-based Chatterbot as an Interface in INES

Author: Mikic, Burguillo, Llamas, Rodr´ıguez, Rodr´ıguez

The paper focuses on the description of this chatbot called CHARLIE (CHAtteR Learning Interface Entity). CHARLIE can communicate with students in natural language and answer general or domain-specific questions. The student can also

request questionnaires or free questions from the bot to test their knowledge.[10]

An e-business chatbot using AIML and LSA

Author: N. Thomas

In this paper, Thomas T provided the way by which the chatbot is planned in a manner that for a single template, it gives irregular responses. LSA based inquiries are giving the right reactions to random responses. [18]

3. ARTIFICIAL INTELLIGENCE MARKUP LANGUAGE

Extensible Markup Language (XML) is the base for the derivation of Artificial Intelligence Markup Language (AIML). It has a class of data object called an AIML object that describes the behavior of computer programs. It consists of units or tag called topics and categories. In AIML, categories are basic units of knowledge. There each category consists of a pattern that contains input and template which contain the answer of chatbot based on queries. To build a Chatbot, mainly a flexible, easy to understand and universal language is needed which will be AIML. AIML, a derivative of XML, is one of the widely used approaches that satisfy the requirements based on general queries. AIML represents the knowledge put into Chatbots and is based on the software technology developed for A.L.I.C.E. (the Artificial Linguistic Internet Computer Entity). It has the ability to characterize the type of data object and describe partial conductance of the programs that it processes. These objects consist of two units: topics and categories. Thus the data contained in these categories are either parsed or unparsed.

The purpose of the AIML language is to simplify the job of conversational modeling, in a "stimulus-response" process. It is also a mark-up language based on XML and depends on tags which are the identifiers that make snippets of codes to send commands into the Chatbot. The data object class is defined in AIML as an AIML object, and the responsibility of these objects is modeling conversational patterns. Each AIML object is the language tag that associates with a language command using patterns. The general structure of AIML objects is put forward by List of parameters the most important object among the AIML objects is category, pattern, and template. The task of the category tag is defining the various patterns and their answer based templates. The pattern tag identifies the input from the user and the task of template tag is to respond to the specific user input, these are the most frequent tags and the bases to design AIML Chatbots with an intelligent response to natural language speech conversations. Let's see the structure of category, pattern, and template object which is shown below:

```
<category>
        <pattern>User Input</pattern>
            <template>
                Corresponding Response to input
            </template>
</category>
```

4. SYSTEM DESIGN

Systems design is the process of defining the architecture, components, modules, interfaces, and data for a given system to satisfy specified requirements. Systems design could be the application of various systems theory to product development. There is some overlap with the disciplines of systems analysis, systems architecture and system designing.

A chatbot is a computer program, which is designed to simulate a conversation with human users using patterns, especially over the internet. They are our online assistants that offer different services through chatting over the internet. To build artificial intelligence chatbots through Python, you will require an AIML package (Artificial Intelligence Markup Language). First, we need to create a standard startup file without any pattern and load aiml b in the kernel. Add random response patterns that would make dialogue interesting.

Now, to code your own AIML files, look for some files which are available beforehand. For example, browse all among files from the Alice Bot website. The startup file we will be creating will act as a separate entity. As a result of which, we will have more AIML files without a source code modification. The program will start running when there are enough AIML files for loading. This was an introduction to how to make AI chatbot using Python. Now, let's proceed further and see which particular library can be implemented for building an AI Chatbot.

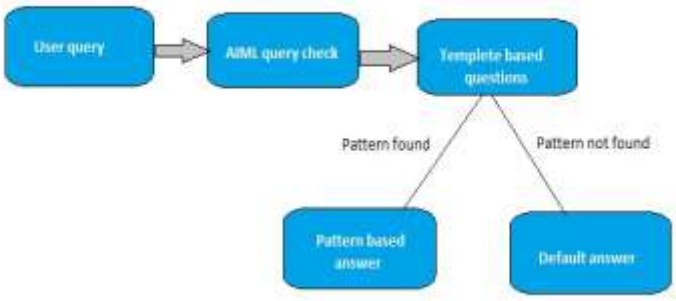

Fig 4.1: System Architecture

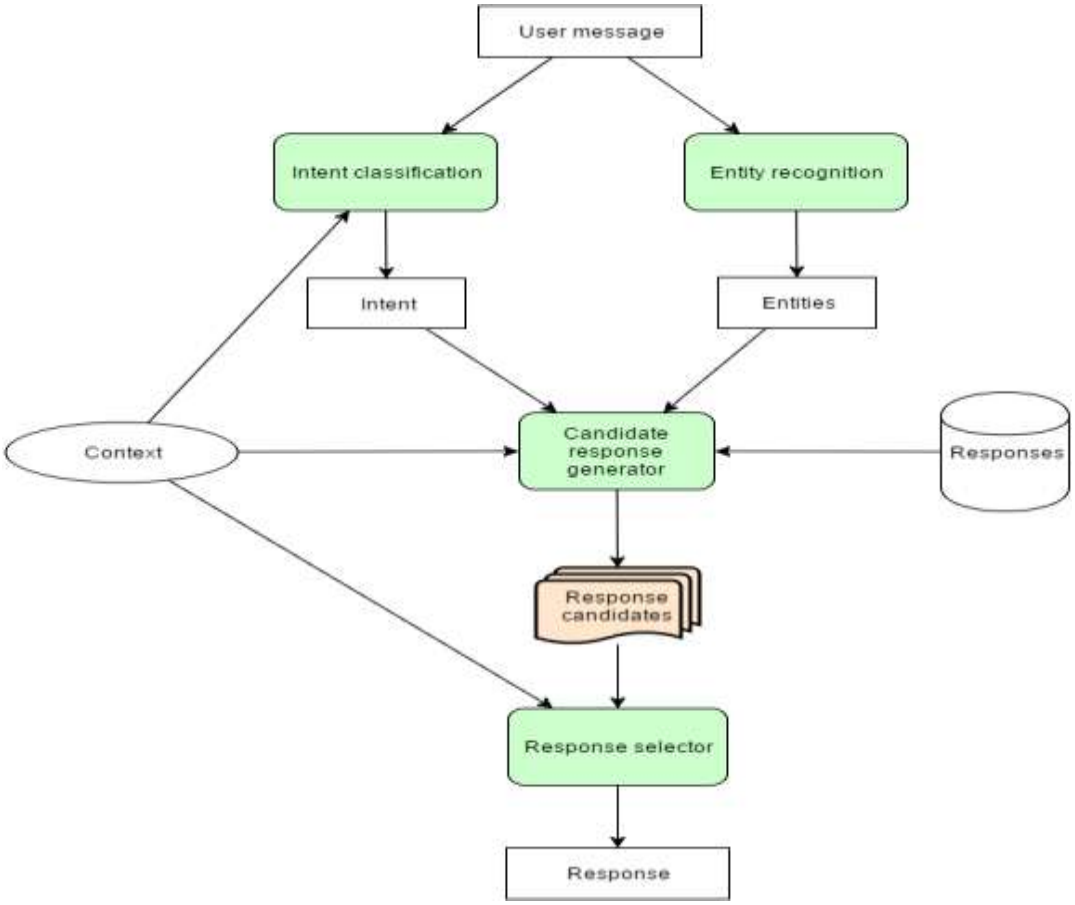

Fig 4.2: System Module

5. PROPOSED SYSTEM

In this work, we have developed an interactive chatbot using the Flask framework in python, and the workflow of the proposed framework is shown in Fig-5.1. User discussion, as a rule, begins with the simple welcome or general questions. User inquiries are first taken care of by AIML check, to check whether the entered inquiry is AIML script or not. AIML is characterized by general inquiries, queries, and welcome which is replied by utilizing AIML formats.

Once the bot-user types in the query in the chatbot, the AIML developed chatbot will identify the category that contains the query pattern. Here the bot-user is expected to type in the query in a predefined pattern. Once the query pattern is matched, the template of the category that contains the response is sent back to the bot-user.

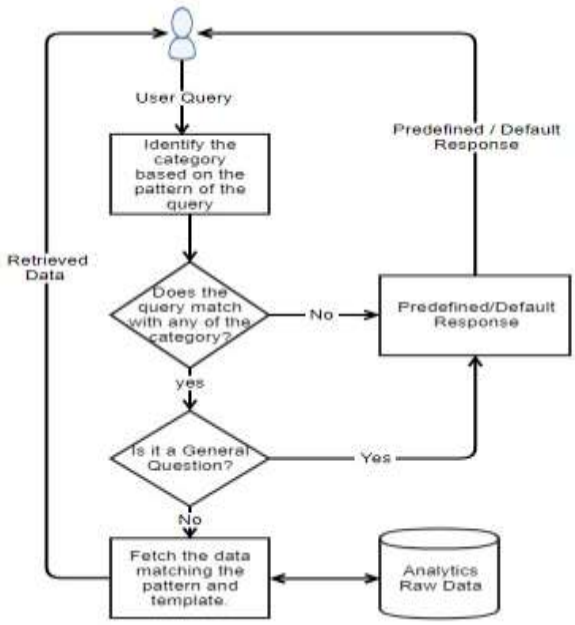

Fig 5.1: Proposed Model

6. IMPLEMENTATION

This section covers the design and implementation of a different module of the bot, which contains the design of the PYTHON module, the Translator API and the AIML module.

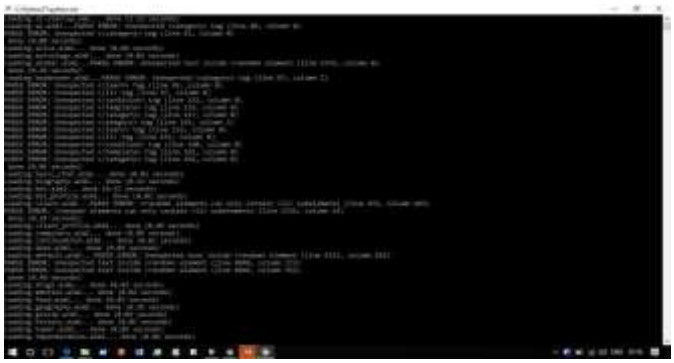

Fig 6.1: Implementation

Fig 6.2: Chatbot Interface

Fig 6.3: Conversation

7. CONCLUSION

In this project, we have introduced a chatbot that is able to interact with users. This chatbot can answer queries in the textual user input. For this purpose, AIML with program-o has been used. The chatbot can answer only those questions which he has the answer in its AIML dataset. So, to increase the knowledge of the chatbot, we can add the APIs of Wikipedia, Weather Forecasting Department, Sports, News, Government and a lot more. In such cases, the user will be able to talk and interact with the chatbot in any kind of domain. Using APIs like Weather, Sports, News and Government Services, the chatbot will be able to answer the questions outside of its dataset and which are currently happening in the real world.

The next step towards building chatbots involves helping people to facilitate their work and interact with computers using natural language or using their set of rules. Future Such chatbots, backed by machine-learning technology, will be able to remember past conversations and learn from them to answer new ones. The challenge would be conversing with the various multiple bot users and multiple users.

As future work, we can make a chatbot that is based on AIML and LSA. This technology will enable a client to interact with a chatbot in a more natural fashion. We can enhance the discussion by including and changing patterns and templates for general client queries using AIML and the right response are given more often than LSA.

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Chatbot Using Python

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Abstract: *Nowadays it is the era of intelligent machine. With the advancement of artificial intelligent, machine learning and deep learning, machines have started to impersonate as human. Conversational software agents activated by natural language processing is known as chatbot, are an excellent example of such machine. This paper presents a survey on existing chatbots and techniques applied into it. It discusses the similarities, differences and limitations of the existing chatbots. We compared 11 most popular chatbot application systems along with functionalities and technical specifications. Research showed that nearly 75% of customers have experienced poor customer service and generation of meaningful, long and informative responses remains a challenging task. In the past, methods for developing chatbots have relied on hand-written rules and templates. With the rise of deep learning these models were quickly replaced by end-to-end neural networks. More specifically, Deep Neural Networks is a powerful generative based model to solve the conversational response generation problem. This paper conducted an in-depth survey of recent literature, examining over 70 publications related to chatbots published in the last 5 years. Based on literature review, this study made a comparison from selected papers according to method adopted. This paper also presented why current chatbot models fails to take into account when generating responses and how this affects the quality conversation.*

Keywords: Artificial Intelligent, Deep Learning, Chatbot, Deep Neural Networks.

I. INTRODUCTION

A chatbot is an AI-based software designed to interact with humans in their natural languages. These chatbots are usually converse via auditory or textual methods, and they can effortlessly mimic human languages to communicate with human beings in a human-like manner. A chatbot is arguably one of the best applications of natural language processing. Today, we have smart AI-powered Chatbots that use natural language processing (NLP) to understand human commands (text and voice) and learn from experience. Think about Apple's Siri, Amazon's Alexa, and Microsoft's Cortana. Aren't these just wonderful?

Customer satisfaction with a company's services is often seen as the key to success and long-term competitiveness for a company. The insurance industry such as credit card insurance, is getting a lot of attention as customer satisfaction. Credit card insurance is a competitive market so a strong marketing strategy is vital [1]. Its inclusions are confusing and complex, in a world dominated by cashless payments, consumers are using credit cards at a growing rate. Most credit cards offer their consumers some form of embedded complimentary insurance product. Consumers are often not aware of these complementary products and it is difficult to understand the inclusions and benefits. For example, the majority of cards and accounts include complimentary travel insurance, however, customers are not aware of the detail around what this cover includes if the cover includes family or travelling companions, how the cover is activated and who to call when they need help or need to make a claim. In addition, insurance personnel required reference materials, policies and procedures. Getting all of this information they need is a challenge. Insurance personnel had to sift through long documents to find the answer. As a result, the only way to get help quickly was to pick up the phone and talk to underwriting or sales support – even for answers to FAQs or to basic "how-to" questions. This overloaded the call centers, resulting in long wait times as it takes a long time to process a single request. As a result, customer experience their interactions disappointed and dissatisfied which reduces the throughput and business performance drastically. Research showed that nearly 75% of customers have experienced poor customer service [2-4].

The technology platforms allow modelling the entire credit card insurance ecosystem with Artificial Intelligent (AI) to simulate scenarios of different economic, market and individual conditions. There is an increase in the demand for AI

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capabilities to interact 5 with customers in benefits, insurance coverages and claims processes. Because it removes human factors and provides 24-hours service. This will advise the customer on the most appropriate course of action such as help customers to make clearer and easier to understand embedded benefits into a credit card, summarize level of coverage and insurance claims process. It will allow customers to utilize credit card coverages with the peace of mind, knowing they have independent experts looking after them.Furthermore, it can generate revenue and save costs for the credit card insurance industry. In order to truly be effective and make business processes automated an alternate system is required. An advance dialogue system known as AI chatbot application system could automate the entire business processes. Thus, chatbot application system must have natural language processing (NLP), deep neural networks (DRN) so that it can understand what customers are looking for. In the case of the credit card insurance industry, chatbot can be used to answer basic questions, resolve insurance claims, sell products and make sure customers are properly covered by their insurance. AI chatbot can analyse data better than humans to more accurately predict each customer's risk, thereby providing customers with the right amount of insurance and companies with protection from risky customers

II. Literature Review

Endurance: A Companion for Dementia Patients: Many people suffering with dementia retain much of their conversational abilities as their illness progresses. However, the shame and frustration that many dementia sufferers experience often make routine, everyday talks with even close family members challenging. That's why Russian technology company Endurance developed its companion chatbot. Many people with Alzheimer's disease struggle with short term memory loss. As such, the chatbot aims to identify deviations in conversational branches that may indicate problem with immediate recollection – quite an ambitious technical challenge for an NLP- based system. In addition, since the chatbot is a cloud- based solution, physicians and family members can review communication logs taken from the bot to identify potential degradation of memory function and communicative obstacles that could signify deterioration of the patient's condition. Interestingly, the as-yet unnamed conversational agent is currently an open- source project, meaning that anyone can contribute to the development of the bot's code base. The project is still in its earlier stages, but has great potential to help scientists, researchers, and care teams better understand how.

Alzheimer's disease affects the brain. A Russian version of the bot is already available, and an English version is expected at some point. Casper: Helping Insomniacs Get through the Night: If you suffer from insomnia, you'll know that the feeling of almost suffocating loneliness – the idea that everyone else in the world is resting peacefully while your own mind betrays you with worries and doubts – is among the worst parts of not being able to sleep. Enter Casper's amazingly named Insomno bot 3000 (which truly is one of the most tongue in cheek, retro-futuristic names for a chatbot I've ever come across), a conversational agent that aims to give insomniacs someone to talk to while the rest of the world rests easy. At this point, Insomno bot 3000 is a little rudimentary. The responses offered by the agent aren't quite right. But I'm not sure whether chatting with a bot would help me sleep, but at least it'd stop me from scrolling through the never-ending horrors of my Twitter timeline at 4 a.m Med What: Making Medical Diagnoses Faster :If you're the kind of person who has WebMD bookmarked, it might be worth checking out Med What. This chatbot aims to make medical diagnoses faster, easier, 19 and more transparent for both patients and physicians – think of it like an intelligent version of WebMD that you can talk to. MedWhat is powered by a sophisticated machine learning system that offers increasingly accurate responses to user questions based on behaviors that it "learns" by interacting with human beings. In addition to the ever growing range of medical questions fielded by MedWhat, the bot also draws upon vast volumes of medical research and peer-reviewed scientific papers to expand upon its already considerable wealth of medical expertise. In many ways, MedWhat is much closer to a virtual assistant (like Google Now) rather than a conversational agent. It also represents an exciting field of chatbot development that pairs intelligent NLP systems with machine learning technology to offer users an accurate and responsive experience. 20

III. Methodology

The proposed solution is to create a chatbot to simulate a human conversation to assist users with their banking needs and to provide a more personal experience. Advancements in artificial Intelligence, machine learning techniques, improved aptitude for decision making, larger availability of domains and corpus, have increased the practicality of integrating a chat bot into applications (Dole et al., 2015). Users will be able to ask any banking related queries in natural language that they

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are comfortable using such as; view account information, transactions and check balance. The chatbot will identify and understand what the user is asking and generate an appropriate response based on the conversational context. Immediate responses will be provided by the chatbot to redeem the need for the user to have to call or visit their local banks branch and wait in queue in order to get through to an advisor for assistance. Chatbots are computer programs that interact with the users using natural languages.This technology started in the1960's. The aim was to see if chatbot system could fool users that they were real humans. However, chatbot systems are not only built to mimic human conversation, and entertain user. we investigate other applications where chatbots could be useful such as education, information retrival, business and e-commerce. The need of conversational agent has become acute with the widespread use of the personal machines with the wish to communicate and the desire of their makers to provide natural language interfaces. Just as people use language for human communication, people want to use their language to communicate with the computers. Zadrozny et Al(2000) agreed that the best to facilitate Human Computer Interaction (HCI) is by allowing users to express their interest, wishes or queries directly and naturally by speaking, typing and pointing. This was the driver behind the development of the chatbots. A chatbot system is a software program that interact with the user using natural languages. Different terms have been used for chatbot systems such as : machine conversation systems, virtual agent, dialogue system and chatterbot. The purpose of the chatbot system is to simulate a human conversation, the chatbot architecture integrates a language model and computational algorithms to emulate informal chat communication between a human user and a computer using natural language.

A chatbot is a computer program designed to simulate a conversation with human users, especially over the Internet, — is the definition for chatbots on Oxford Dictionaries. I'd rather say: chatbots are AI software installed on communication platforms, which can answer some basic questions about a certain brand. The first modern chatbots are launched since 2010 from the biggest companies like Apple, Google, Amazon, and Microsoft. Their purpose was to simplify the communication: reducing the needed time to type on the search engine, press search and check out the results. Also, to give the impression to users that they are provided by human touch. In 2016, chatbots became too popular on Messenger. By the consequences is noted that 2016 was the year of chatbots. The software industry is oriented on chatbots. Thousands of chatbots are invented on startups and used by the businesses to improve customer service, keeping them hanging by a kind communication. According to a research, today chatbots are used to solve several business tasks across many industries like E-Commerce, Insurance, Banking, Healthcare, Finance, Legal, Telecom, Logistics, Retail, Auto, Leisure, Travel, Sports, Entertainment, Media and many others.That was the moment to look at the chatbots as a new technology in communication. The companies were using chatbots to answer quickly and efficiently some frequented asking questions from their customers. Some experts are claiming that more than 85% of customer interactions will be managed without a human by 2020. Since the success in commercial utilization, the idea is created that chatbots are saving humanity from loneliness and depression. If you want to prove it, just try "chatbots depression loneliness " in every search engine. Plenty of results are about the goods of chatbots. The problem with chatbots is a problem with technology in general: they tend to hide the problem and serve this as a solution. The founders, marketers, and influencers try to convince us that we can contend mental illnesses "using better" our smartphones. Probably they want to expand the market for their products (like chatbots, apps, etc.) to every single person on earth, by the evidence is that loneliness and depression are exact consequences of those products. Even why the scrolling addiction is becoming more serious every year, the recipe of entrepreneurs is to raise the dose of their recent products

IV. Conclusion

The insurance industry has long been bogged down by outdated practices. However, the combination of a new wave of thinking and newly developed artificial intelligence technology has the potential to completely change the customer experience to provide great service in a way that resonates with modern customers. This study presents sequential attention mechanism in deep recurrent neural networks, an architecture for the development of AI chatbot system with self-learning capabilities. The main aim is to fill in a gap in this research area and providing a flexible chat interface for question answering.

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A Real Time Chatbot Using Python

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Abstract: ***Real-time chatbots developed using Python have emerged as powerful tools for enhancing customer support, improving user experiences, and streamlining business processes. Leveraging Python's extensive libraries and frameworks, such as NLTK, Flask, and telebot, developers can build intelligent and scalable chatbot systems.This paper provides an overview of the key components and techniques involved in developing a real-time chatbot using Python. It explores the process of requirement gathering, use case definition, conversation flow design, and performance optimization. Integration with backend services, error handling, validation, and user experience (UX) design are also discussed.***

The utilization of natural language understanding (NLU) algorithms and techniques allows chatbots to interpret and comprehend user intents, providing accurate and context-aware responses. Integration with REST APIs, Flask, and telebot facilitates seamless communication and interaction between the chatbot and users. Furthermore, the paper highlights the importance of security, privacy, and ethical considerations in chatbot systems. It emphasizes the significance of continuous testing, feedback iteration, and user-centric design principles to refine the chatbot's performance and enhance the user experience.

Looking ahead, future work in real-time chatbot development using Python includes advancements in natural language processing (NLP), personalized user experiences, multi-modal capabilities, and the integration of voice assistants. Ethical considerations and explainable AI techniques will also be critical for building trustworthy and responsible chatbot systems.

In conclusion, real-time chatbots developed using Python offer immense potential for transforming customer support, automating processes, and delivering personalized and efficient services. With ongoing advancements in NLP, AI, and user interface design, the future of real-time chatbots holds exciting possibilities for enhanced user interactions and seamless automation.

Keywords: Chatbot, Natural Language Processing (NLP).

I. INTRODUCTION

"Digitalization, the surge of mobile and internet connected devices has revolutionized the way people interact with one another and communicate with business". Millennials are accepting and supporting new technology into the routine of their everyday life, this is becoming more prevalent as technology companies are streamlining Artificial Intelligence (AI) into the product they offer, such as; Google Assistant, Google Home and Amazon Alexa.

Many companies offer the 24×7 customer care services which are usually done by chat bots which simulates the human like chats with customers helping them in usual problems they face by using algorithm to check the most asked questions by people.

Our project is a chat bot which is designed for educational purpose. Now a days many students use mobile phones. It is an integrate part of people's life. Our project is a chat bot which is designed for educational purpose for student. This bot provides single platform for the different problems regarding to students. This chat bot is available anywhere at any time and it can consult problems and doubts of students. It provides latest, convenient and reliable information to students. It provides answer material in form of links to that pdf or any other format.

II. NEED FOR PROJECT

Now-a-days the world is changing drastically, development in IT and electronics field and innumerous research in field of science led to the new technologies to develop every day. So, to keep up with drastically changing technologies the universities usually update the syllabus of technical studies. Usually, the changes in study pattern and syllabus are more often in field of science.

These frequent changes in syllabus led to the confusion among students about what to study or even what is our correct syllabus. This also sometimes led to unavailability of standard study materials. Due to this, students refer bulky reference books in which they find few topics of syllabus in one and other in another. So usually, students prefer searching for study materials on internet and searches through multiple sites and sometimes they are confused about what is genuine and what is not.

Even that many students have fill-up many types of forms during their academics and errors in those forms can be the reasons of losing opportunities in carrier. Students need a guidance for form filling such as scholarship, university admission, university exams, competitive exams, courses, etc. Even about carrier choices, competitive exams etc.Students also requires information such as paper pattern, previous year question papers, etc.

III. LITERATURE SURVEY

There are several researches and development in field of Artificial Intelligence (AI) and rapid expansion digital networks has made communication more convenient and hence increased the need of quick as well as all time available services. Chatbot is one of the popular and highly expanding way of service providers. Here are few researches which we have referred to understand and design our project.

1) Shreyashkar Sharma (July 2020) describes the different steps of chatbot implementation this chatbot using python programming language. The chatbot can be implemented in three ways. First of it is pattern matching, this is the first developed method in history of chatbot and it uses the method of comparing words given by the user to recognize the intention and provide relevant output. Second method is Natural Language Understanding (NLU), in this method it uses the speech or text sent by user and converts it to computer understandable data it's called as natural language processing.
2) Jaimit Dholakia (April 2020) explains in detail about how he used python programming and worked with flask API. His research was the guide and inspiration for using FLASK framework in our project. Flask API works as a connector for this different applications and programs used in our project.
3) Kshitija Shingte, Anuja Chaudhari, Aditee Patil, Anushree Chaudhari, Sharmishta Desai (June 2021) has elaborated about how they have designed the chatbot for educational pourpose. Even though this chatbot was designed for same profession i.e. educational field but there was a slight difference in pourpose of designing. It was a good guide for knowing how one can design a chatbot.
4) Ujjwal Kumar, Murai Jha, Sonam Sirohi, (May 2022) have done the research on using telegram platform for chatbot which can work in text as well as has text-to-speech facility. It describes the process of developing a bot on telegram. Some advance topics which we may work in future are discussed like text-to-speech conversion.
5) Teddy Surya Gunawan, Asaad Balla Falelmula Babiker, Nanang Ismail, Mufid Ridlo Effendi (January 2022) they have done research and development on designing a chatbot on telegram using Natural language processing (NLP).

IV. ARCHITECTURE

The chatbot is a student help desk which is available at any time, it is designed on the basis of intellectually independent model. This type of chatbot takes the feedback from client for its queries. Our project is designed on the Telegram platform as it's GUI. This chatbot is built by using different platforms. Fig1. Shows he architecture our project. The given architecture can be divided into Telegram Platform (GUI) (this is the way by which users will interact with or bot), Data Set (which is available on cloud which has intended responses), and last is REST API which work as bridge between our NLP algorithm designed in python, Data set and telegram API.

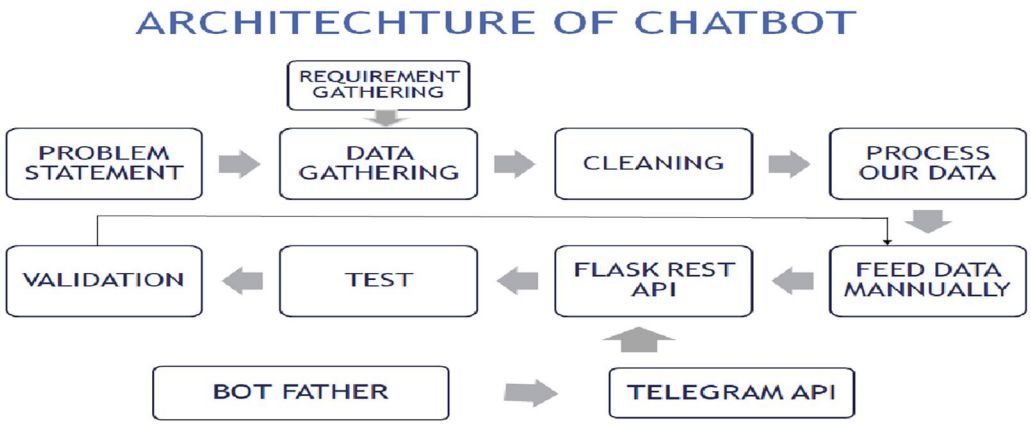

Fig 1 Architecture of Chatbot

1) Problem statement: It is the initial cause of making this bot. It is the issues faced by students to get the relevant study material and information.
2) Requirement Gathering and Data Gathering: This includes the notes, reference books, syllabus, office desk information, etc. as well as the list of phrases of replies that our bot will use to communicate with user. On the basis of the fields of problem domain as well as the data required, we create the table of replies for our bot.
3) Cleaning and Data Processing: In this step we divide our collected Data into Main Dialog and Predefined responses. These main dialogs are further categorized into entities and may have further sub divisions. Were, Predefined responses are categorized as greetings and feedback or enquiry.
4) Manual Data Feeding: The raw data or information to be provided by Admin can be in form of pdf, links to web page or even images in any case; these are converted into link format by admin and provide manually to categorized data set. This data is updated time to time by admin, this is to ensure that bot provides latest information to user.
5) Flask Rest API: Flask is a framework provided by python, it works as bridge between these different platforms. The rest API provides the data from our knowledge base in usable URL format. Our bot is providing the study material in form of links which directly opens the pdfs in the cloud which user can download. Providing data in form of links helps in giving quick response as it requires less data usage to transfer over the internet.[1]
6) Telegram API and Bot Father: Telegram API is an interface provided by Telegram for using programs for auto replies to in our account. Bot father is a service provided by telegram which identifies and manages all bots over telegram platform. It tokenizes the user bot to authenticate and provide end to end encryption for security of bot.
7) Test and Validation: Testing of bot is required to check the proper functioning of it. We have tested our codes by giving the various cases as a user and observe it's responses.

Working Of Chatbot On Basis Of Response Based On User Input

As disscussed earlier our bot gives two types of responses to user they are predefined response and main dialog. The response is created from main dialog when user inquires for the defined entiry which is available in our knowledge base. Were as when user enquires with greetings or with something which is not understandable to bot it gives predefined reponse as feedback.

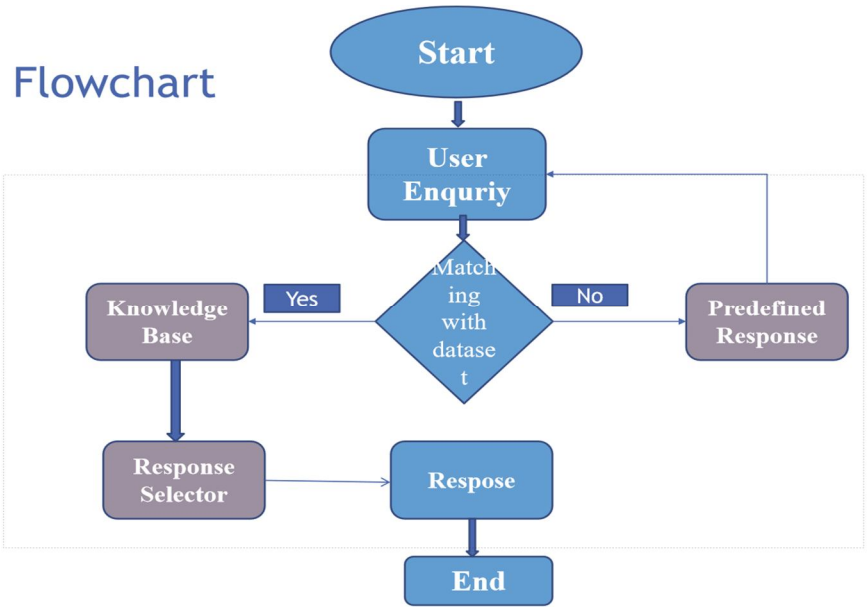

Fig.2 Flowchart of Response

When user gives the text to chatbot it fragments these sentences into words. Then it checks for the grammer or spelling mistakes and guess the intended words by user. It identifies the keyword or entity from the sentences. These entities are checked in the knowledge base and if there are more than one responses to be generated for this entity then it asks for the feedback to get more prcise inforamation about what user is asking for. If the identified words are greetings like "Hello" or "Hii"or else then it gives predefined greeting response. But if the user gives any readom word which are not understandable to bot then it gives predefined response for not understanding the intentions of user.

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V. RESULT AND DISCUSSION

The Chatbot developed for the students was initially planned to design using Google service called Dialog Flow. This service makes it easier for designing the robust dialog charts for chatbot. Hence, it is easier for designing the replies for bot. But as this service is paid service we decided to use telegram as it is open source. These are the result of our bot.

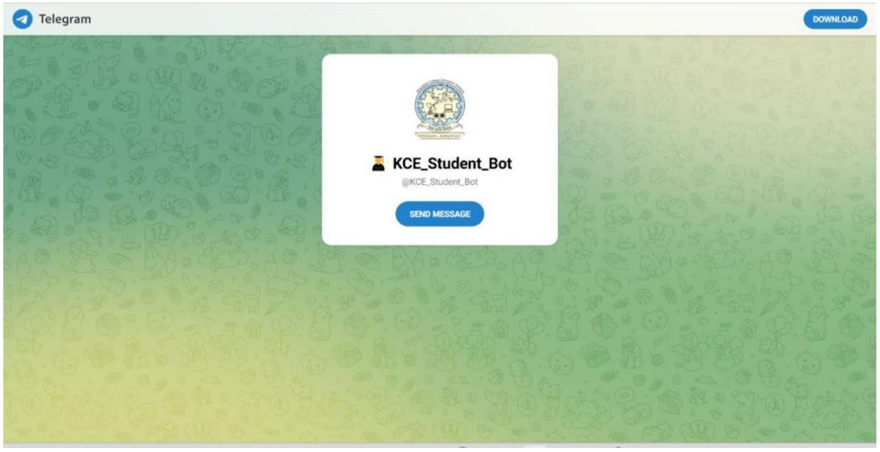

Fig. 3. The Main Screen of Chatbot

When we first go to chatbot on telegram it shows the above screen as shown in figure 3.

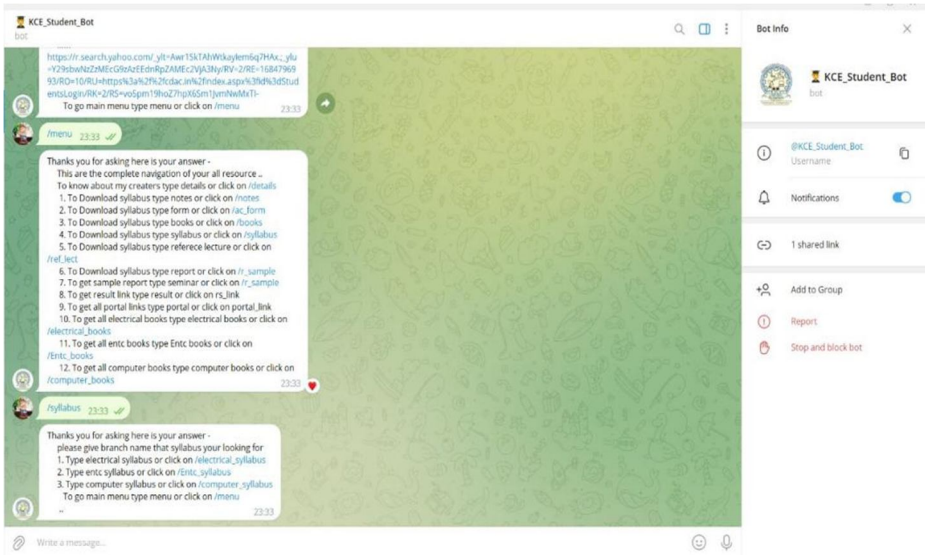

Fig. 4. Output Screen of Chatbot

When user asks questions or interacts with our bot by the screen shown in fig. 4. This screen is the main interface seen by user on telegram. The reply of chatbot is in the form of links.

VI. CONCLUSION

In conclusion, real-time chatbots developed using Python offer numerous benefits and possibilities for various applications. They provide instant assistance and support to users, enhance customer experiences, and improve operational efficiency. Python's rich ecosystem of libraries and frameworks, such as NLTK, Flask, and telebot, enables developers to build intelligent and scalable chatbot systems. Throughout the development process, various components and techniques are involved. These include natural language understanding (NLU), backend service integration, error handling, validation, and user experience (UX) design. The use of REST APIs, Flask, and telebot facilitates seamless communication and interaction between the chatbot and users.

Key considerations in real-time chatbot development include requirement gathering, use case definition, conversation flow design, and performance optimization. The integration of machine learning, natural language processing (NLP), and AI techniques further enhances the chatbot's capabilities, enabling it to understand user intents, personalize responses, and continuously learn and improve.

Ensuring security, privacy, and ethical considerations is vital in chatbot systems, and user feedback and testing play a crucial role in refining the chatbot's performance and user experience.

Overall, real-time chatbots developed using Python have the potential to transform customer support, streamline processes, and provide personalized and efficient services. As advancements in NLP, AI, and user interface design continue, the future of real-time chatbots holds even more exciting possibilities for enhanced user interactions and seamless automation.

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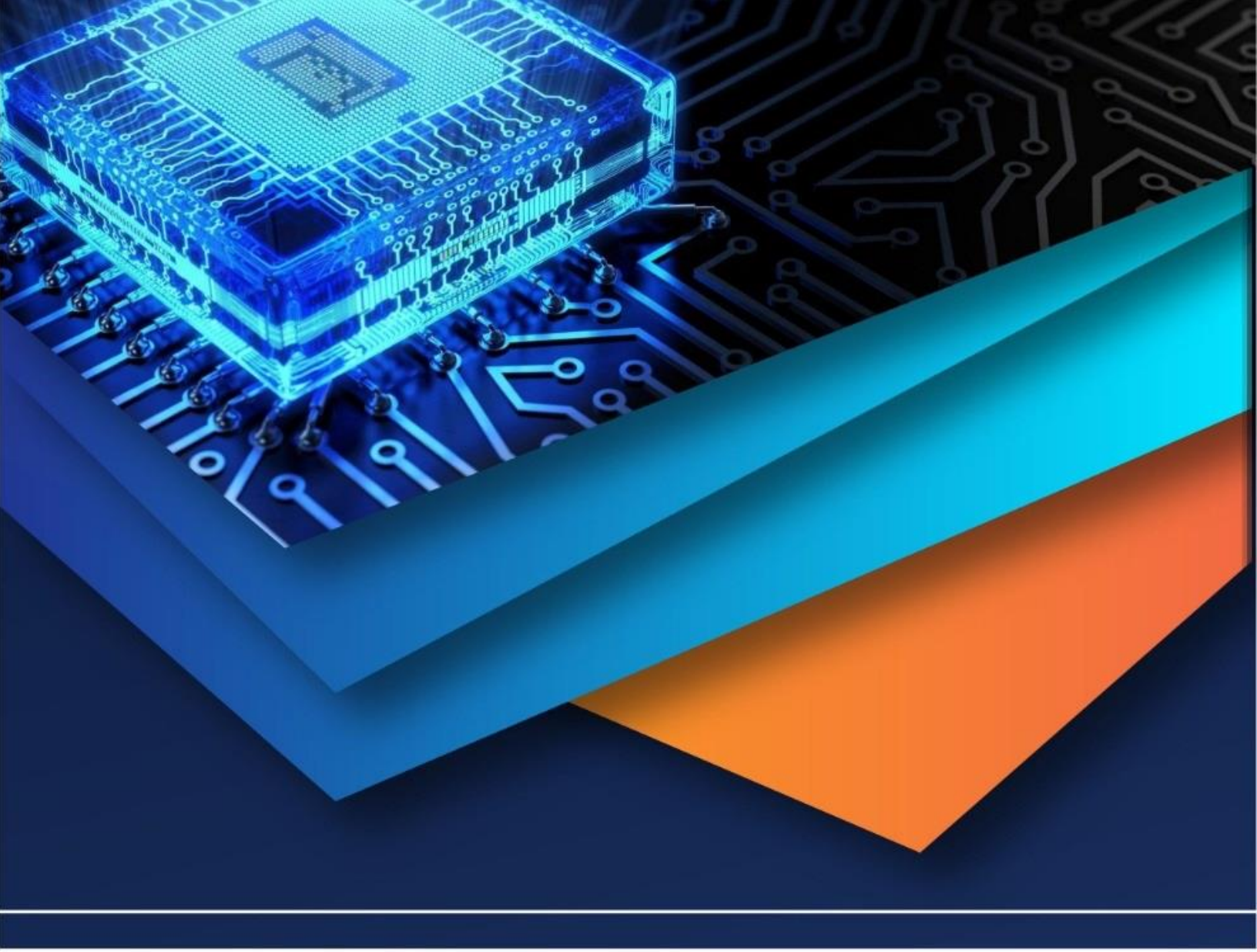

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CHATBOT DEVELOPMENT USING PYTHON

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ABSTRACT

A chatbot is an artificial intelligence computer program which performs communication using audio and video system. A person can ask any questions and chatbot will answer accordingly. Nowadays a chatbot is highly popular and takes speed as a computer communication application. Chatbot system is in trend, thus it is being used on many websites. With the chatbot, one doesn't have to wait to talk to the customer helpline, they don't even have to search for shopping through Websites. A chatbot is used in many areas like order food, product suggestions, customer support, weather, personal finance assistance, scheduled a meeting, search and track flights, send money, and many more. The main objective that we will discuss in this paper is about creating a web API, and also about sample web and text messaging interfaces that demonstrate the use of API. In this research paper we are trying to understand these Chatbots and understand their shortcomings.

Keywords: Chatbot, Python, Flask, Answer Agent, Artificial Intelligence Etc.

I. INTRODUCTION

ChatBot have been gaining popularity over the years and can be seen on almost every website we visit. They are been increasingly used by business for customer support and are predicted to improve customer service for many industries in the coming years. A ChatBot is standout amongst the most progressive and promising tools of communication among peoples and machine. Famous ChatBots like Google Assistant , Amazon Alexa , Siri , Slack , and many more are in trend. This are very helpful but in this era of enhancing technology day by day gets updated , and accordingly , user expectations also increase. So a user want more automation in ChatBot.

Shortcomings Of ChatBot are

- Chatbots have limited responses, so they're not often able to answer multi-part questions or questions that require decisions. This often means your customers are left without a solution, and have to go through more steps to contact your support team.
- One of the main drawbacks of the Chatbot is that they cannot make decisions. Due to this lack of decision making ability, they are not able to make decision. Decision making fails in this case.
- Chatbots are not able to do customer retention. A customer retention ability plays a very much vital role in every organization. Retaining the customers holds a more important role than making new customers also. A Chatbot only tries to help the customers at the level of which it can do. It has a very less capability in retaining customers.
- Some customers do not want to talk to chatbots due to their same response for many different query and customer is not satisfied with their response. Chatbots are easily identified. And they query for which they do not the response the ask for apology.
- Chatbots can surely save a lot of time and money but installing a Chatbot can empty your bank account because because it is very much costlier. You will have to hire proper professionals who have knowledge and have rightly programmed the Chatbot that can match the integrity of your organization.

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II. MODELING AND ANALYSIS

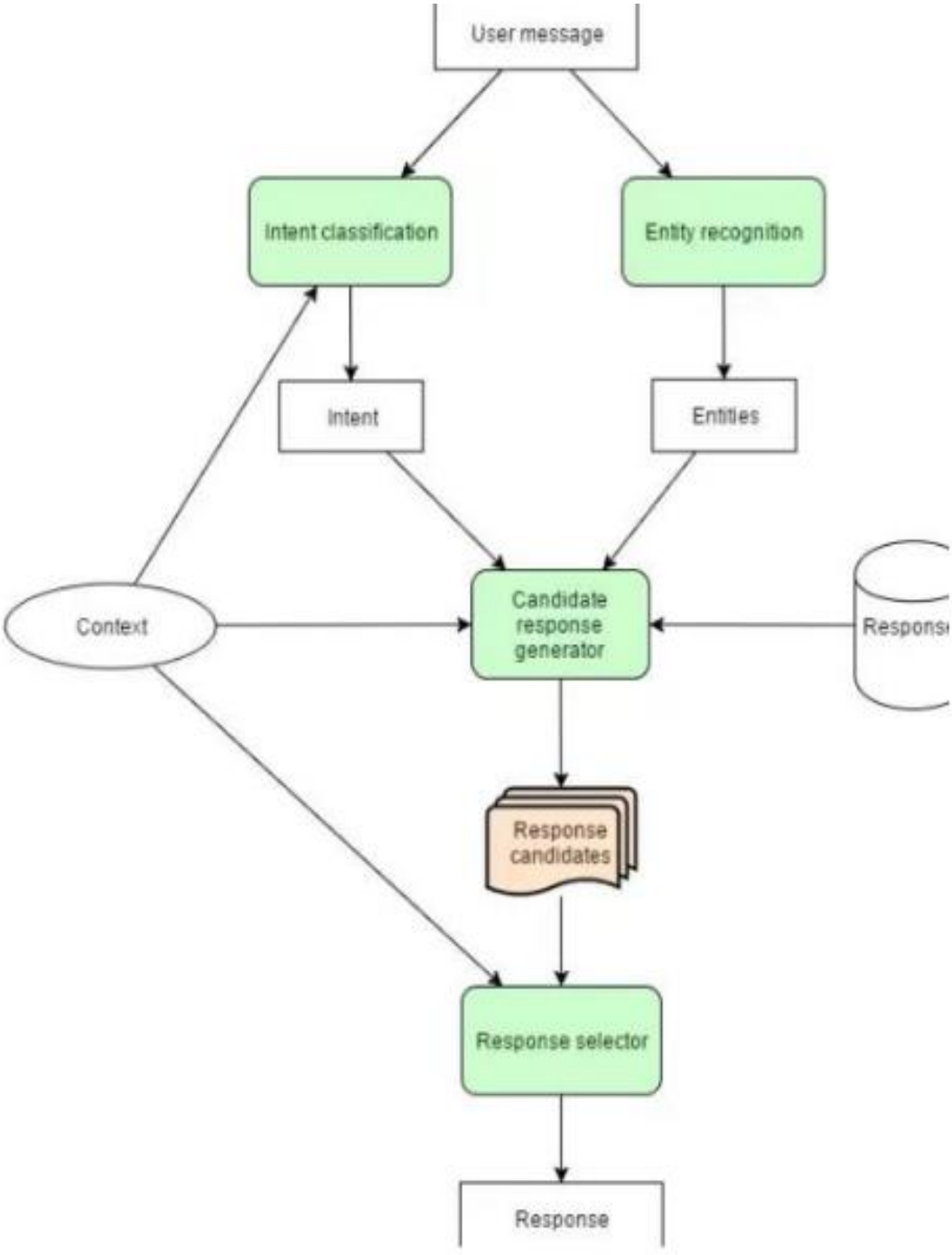

Figure: Data flow Diagram of ChatBot

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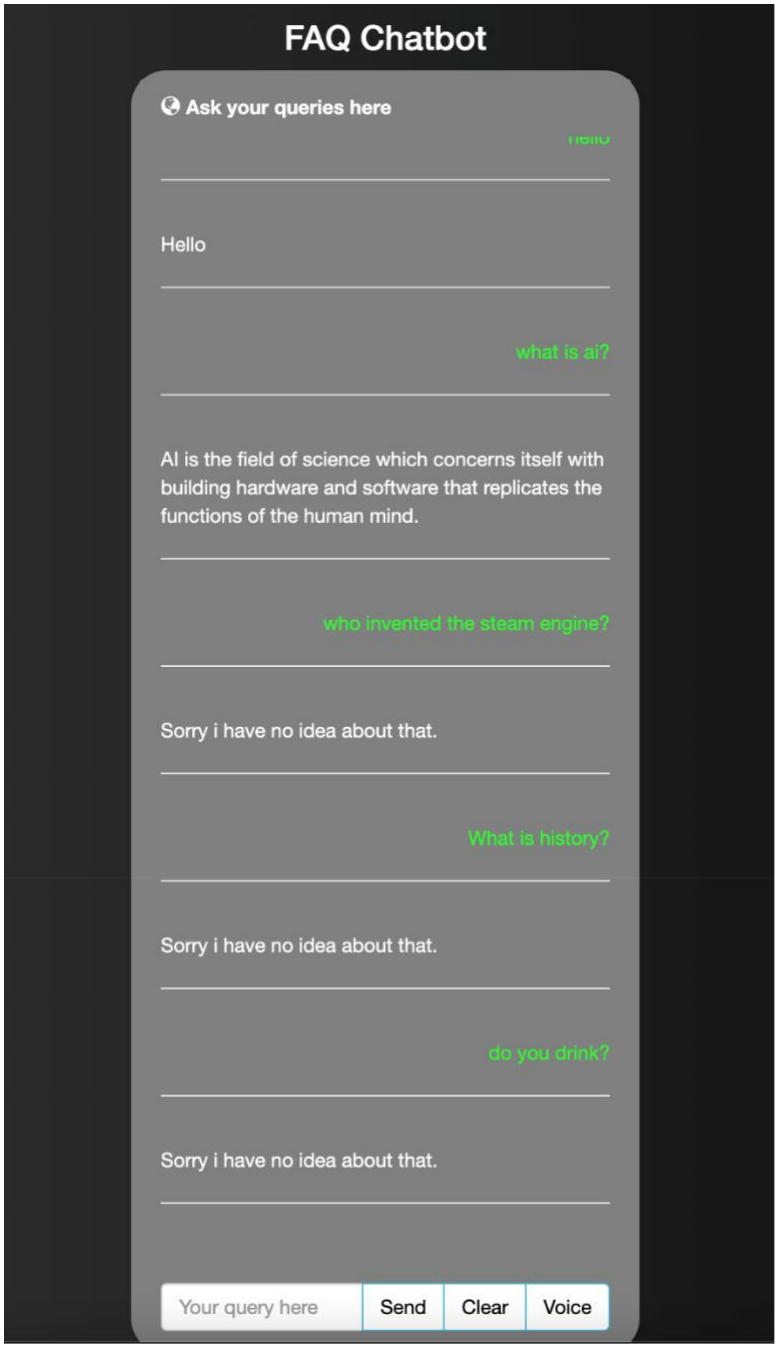

Fig: ChatBot Front View

III. RESULTS AND DISCUSSION

A ChatBot is a normal application which has a database, it has an app layer and APIs to call the other external administrations. However, bots cannot comprehend about what the customer has planned. It is a very much common problem that must be tackled. Bots are generally trained according to the past information which is only available to them. So in most of the organizations, chatbot maintains their logs of discussions so that they can understand their customers behaviour. Developers utilize these logs to analyse what clients are trying to ask. Developers coordinate their with their client inquiries and reply with the best appropriate answer with the blend of machine learning tools and models. Training a chatbot is very much faster and also on a large scale as compared to human beings.

1. **Python:** The language used by us in the creation of chatbot is python. Using python is beneficial as it has many pre built library as chatterbot and AI chatbot which are pre build and help in getting responses from user. It is also easy to understand and implement.

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2. Intents.json : The response which the chatbot will give will be processed through the intents.json file or the yaml file we have created. This is so as the question which the user will ask will give response through the yaml file.

If the question asked is in yaml then the chatbot will give response and if the question is not in yaml file the chatbot should give response he cannot give response to it.

IV. CONCLUSION

A database is used in many applications for the connection of Chatbots. Every customer or user needs appropriate answers and so database is used to so that purpose can be solved. Human language can be transformed into the data transformation with the help of NLP. NLP helps to transform with a blend of text and patterns because of which it gets applicable responses. There are many NLP applications programming interfaces and services that helps in development of Chatbots. And make it possible for all sort of businesses – small, medium or large-scale industries. The primary point here is that smart bots can help increase the customer base by enhancing the customer support services, thereby helping to increase sales.

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CHATBOT DEVELOPMENT USING PYTHON

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School of Computing Science and Engineering

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Abstract:

A chatbot is an artificial intelligence computer program which performs communication using audio and video system. A person can ask any questions and chatbot will answer accordingly. Nowadays a chatbot is highly popular and takes speed as a computer communication application. Chatbot system is in trend, thus it is being used on many websites. With the chatbot, one doesn't have to wait to talk to the customer helpline, they don't even have to search for shopping through
Websites. A chatbot is used in many areas like order food, product suggestions, customer support, weather, personal finance assistance, scheduled a meeting, search and track flights, send money, and many more. The main objective that we will discuss in this paper is about creating a web API, and also about sample

web and text messaging interfaces that demonstrate the use of API. In this research paper we are trying to understand these Chatbots and understand their shortcomings.

Keywords:

Chatbot, Answer agent, Machine Learning, Intelligent, Natural Language Processing, Artificial Intelligence.

Introduction:

Chat has become the center of focus in this current era, thus the bots are being utilized to deliver information engagingly and conveniently. A chatbot is standout amongst the most progressive and promising tools of communication among people and machines. Famous chatbots like Google Assistant, Amazon Alexa, Siri, Facebook, Slack, and many more are in trend. These are very much helpful, but in this era of enhancing technology, day by day technology gets updated, and accordingly, user expectations also increase. A user wants more automation in the chatbot. Although every system is not perfect there is always a flaw in the system, so as in the chatbot there are some problems that the user has experienced while using a chatbot. Chatbot can be described as an answering system where a system will be able to answer

questions or statements submitted by users and allow users to control over the content to be displayed.

A bot is trained on and according to the training, based on some rules on which it is trained, it answers questions. It is called ruled based approach. Using these ruled based approach, creation of these bots becomes relatively straight forward. But it is not sufficient for the bot to answer questions whose pattern does not match with the rules on which it is trained. The language by which these bots can be created are Artificial Intelligence Markup Language(AIML). It is a language based on XML which allows the developer to write the rules which bot will follow.

Description:

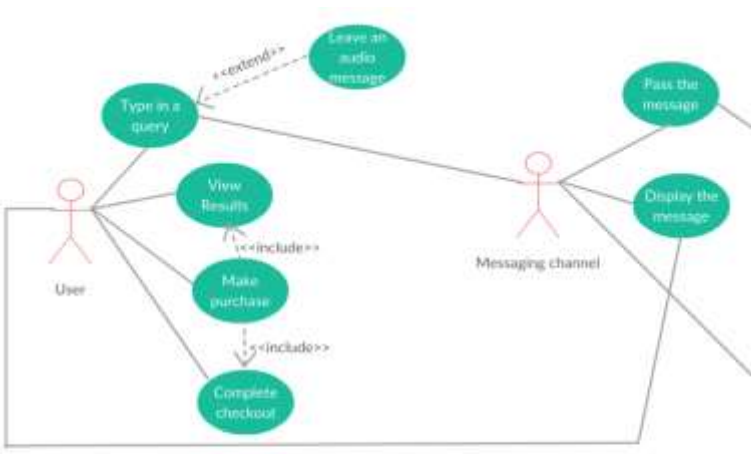
A CHATBOT is a normal application which has a database, it has an app layer and APIs to call the other external administrations. However, bots cannot comprehend about what the customer has planned. It is a very much common problem that must be tackeled. Bots are generally trained according to the past information which is only available to them. So in most of the organizations, chatbot maintains their logs of discussions so that they can understand their customers behavior. Developers utilize these logs to analyze what clients are trying to ask. Developers coordinate their with their client inquiries and reply with the best appropriate answer with the blend of machine learning tools and models. Training a chatbot is very much faster and also on a large scale as compared to human beings. A customer support chatbot is filled with a very large number of conversation logs which help the chatbot to understand what kinds of questions shoul be asked and answers should be given. While a normal customer service representatives are given manual instructions which they have to go thorough with. The working of chatbots is based on three classification methods:

1. *Pattern Matches*: The pattern matches to group thr texts are utilized by the bots and it so it produces an appropriate response to the customers. The standard structured model of these patterns is "Artificial Intelligence Markup Language".

2. *Natural Language Understanding (NLU)*: Finding the way to convert the user's speech or text into structured data is called Natural Language Processing. It is used to get relevant answers for the customers.

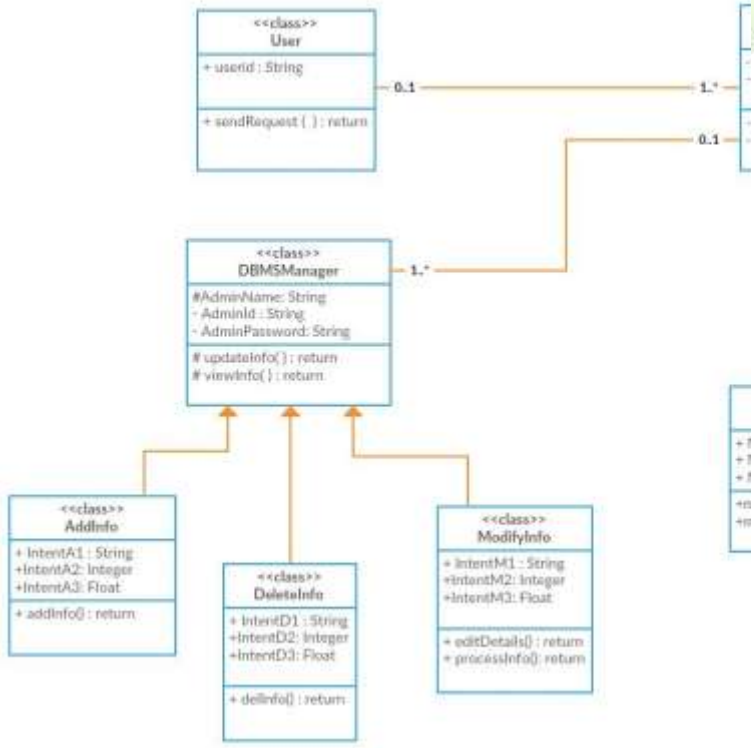
To develop a chat bot one must be very clear about what one wants from that chatbot. Often they are developed for business platforms like Net Banking sites to handle costumer Q&A. Another type of chatbots widely developed and used are smart assistants like SIRI, Google assistant, Alexa, Cortana etc.

Following is a simple class diagram of chatbot showing basic functionalities of it:



The above image clearly explains how a chat chatbot handles costumer Q&A in a business platform.

With the help of following class diagram we can understand the functionalities of a chat bot



The above image shows the class diagram of facebook chatbot. Both diagrams also show the difference between mentioned verities of chatbots.

Shortcomings of chatbots:

1. One of the significant limitations of the Chatbots is that they do not understand human context. Many times this behavior of Chatbots leads to an irate customer because Chatbots are programmed in such a way that they can only perform functions that are taught to them.
2. One of the main limitation of the Chatbot is that they cannot make decisions. Due to this lack of decision making ability, the are not able to differentiate between what is good and what is bad. Decision making fails in this case.
3. Chatbots are not able to do customer retention. A customer retention ability plays a very much vital role in every organization. Retaining the customers holds a more important role than making new customers also. A Chatbot only tries to help the customers at the level of which it can do. It has a very less capability in retaining customers.
4. Most of the customers do not want to proceed their chat with the Chatbot as soon as they understand they are chatting with Chatbot because Chatbot have a same answer for many type of query and costomer goes off unsatisfied. Chatbots can be easily identified because they have same type of answer for most of the query. For the data which chatbot do nat have ,they ask for the apology.
5. Chatbots can surely save a lot of time and money but installing a Chatbot can

empty your bank account because because it is very much costliar. You will have to hire proper professionals who have knowledge and have rightly programmed the Chatbot that can match the integrity of your organization.

6. One of the major limitation of the Chatbots is the lack of emotion. They cannot connect with the customers because they do not understand about the seriousness of any topic or how low is the situation is. This effects the business and crucial growth of the organization.
7. The Chatbots answers the queries only by the data which is available in the system. One of the harsh truth is that Chatbots have a zero research skills. They cannot research on any topic and give answers.

Conclusion:

A database is used in many applications for the connection of Chatbots.Every customer or user needs appropriate answers and so database is used to so that purpose can be solved. Human language can be transformed into the data transformation with the help of NLP. NLP helps to transform with a blend of text and patterns because of which it gets applicable responses. There are many NLP applications and programming interfaces and services that helps in development of Chatbots. And make it possible for all sort of businesses – small, medium or large-scale industries. The primary point here is that smart bots can help increase the customer base by enhancing the customer support services, thereby helping to increase sales.

Acknowledgements

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ARTIFICIAL INTELLIGENCE CHATBOT USING PYTHON

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ABSTRACT: A Chabot is artificial intelligence (AI) computer software that can simulate a conversation using textual or audio techniques. The basis of chat bots is artificial intelligence, which analyses a customer's data and blends the response with them. AI-powered bots can take over a variety of duties since they are considerably more powerful—and can execute numerous tasks at once. Natural language processing enables a bot to converse in the most natural manner possible. A balanced blend of innovative technology and human intervention is the optimal user-Chabot connection.

KEYWORDS: Chabot, Chabot architecture, Artificial Intelligence, NLU (Natural language understanding), NLP (Natural language processing)

I.INTRODUCTION

Artificial Intelligence (AI) increasingly integrates our daily lives with the creation and analysis of intelligent software and hardware, called intelligent agents. Intelligent agents can do a variety of tasks ranging from labor work to sophisticated operations. A chatbot is a typical example of an AI system and one of the most elementary and widespread examples of intelligent Human-Computer Interaction (HCI). It is a computer program, which responds like a smart entity when conversed with through text or voice and understands one or more human languages by Natural Language Processing (NLP). Chatbots are also known as smart bots, interactive agents, digital assistants, or artificial conversation entities.

II.LITERATURE SURVEY

Alan Turing in 1950 proposed the Turing Test (“Can machines think?”), and it was at that time that the idea of a chatbot was popularized. The first known chatbot was Eliza, developed in 1966, whose purpose was to act as a psychotherapist returning the user utterances in a question form. It used simple pattern matching and a template-based response mechanism. Its conversational ability was not good, but it was enough to confuse people at a time when they were not used to interacting with computers and give them the impetus to start developing other chatbots. An improvement over ELIZA was a chatbot with a personality named PARRY developed in 1972. In 1995, the chatbot ALICE was developed which won the Loebnier Prize, an annual Turing Test, in years 2000, 2001, and 2004. It was the first computer to gain the rank of the “most human computer”. ALICE relies on a simple pattern-matching algorithm with the underlying intelligence based on the Artificial Intelligence Markup Language (AIML), which makes it possible for developers to define the building blocks of the chatbot knowledge. Chatbots, like Smarter Child in 2001, were developed and became available through messenger applications. The next step was the creation of virtual personal assistants like Apple Siri, Microsoft Cortana, Amazon Alexa, Google Assistant and IBM Watson.

III.PROGRESS IN CHATBOT

A.A review on Chat Interface This unit is the front end of the system. It is responsible for collecting the user queries from the user which are the input to the system. It is also responsible for displaying the system generated results to the user. Therefore, it can be said that the chat interface is the face of the system through

which the entire communication takes place. It is the mediator of conversation between the system and the user. The query that user fires on the chat interface is passed on to the chatting backend which acts as a message delivering system between the Chat interface and the Machine Learning Layer. This interface can be accessed either as a website or as a smart phone app. The type of interface depends on the requirements of the user that are to be satisfied by the system. If the system is accessed from a smartphone, the interface will be in the form of an app and if the system is accessed from a website, then the interface will be in the form of a website. For building apps on the smartphone, it will require to use android for android phones or Swift for iOS. In this case, only the interfacing platform will be programmed on android and the complete backend processing of the system will take place on a server on which the system will be deployed.

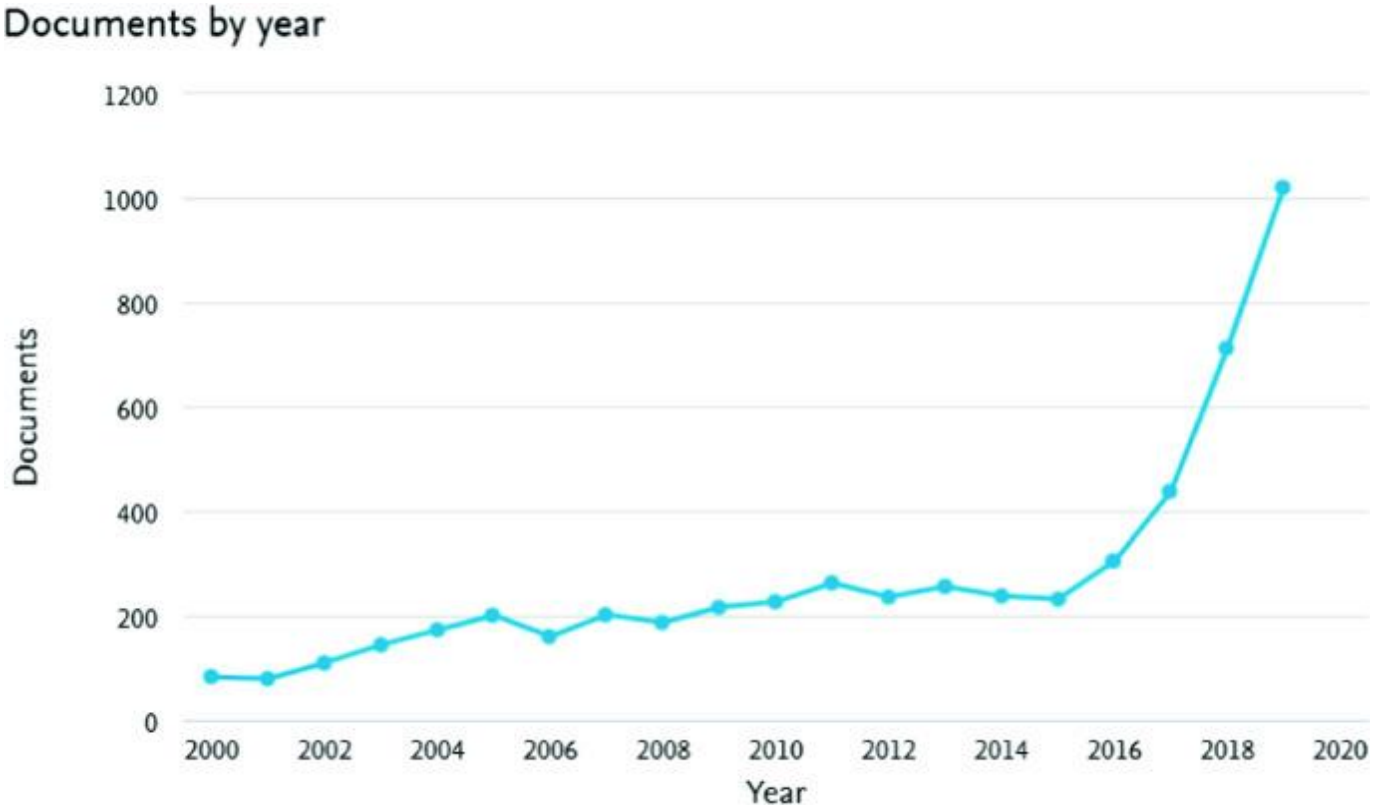


Fig 1: Development of Chabot

- Smart chat bots made up of NLU, NLG and ML engines have the following components:

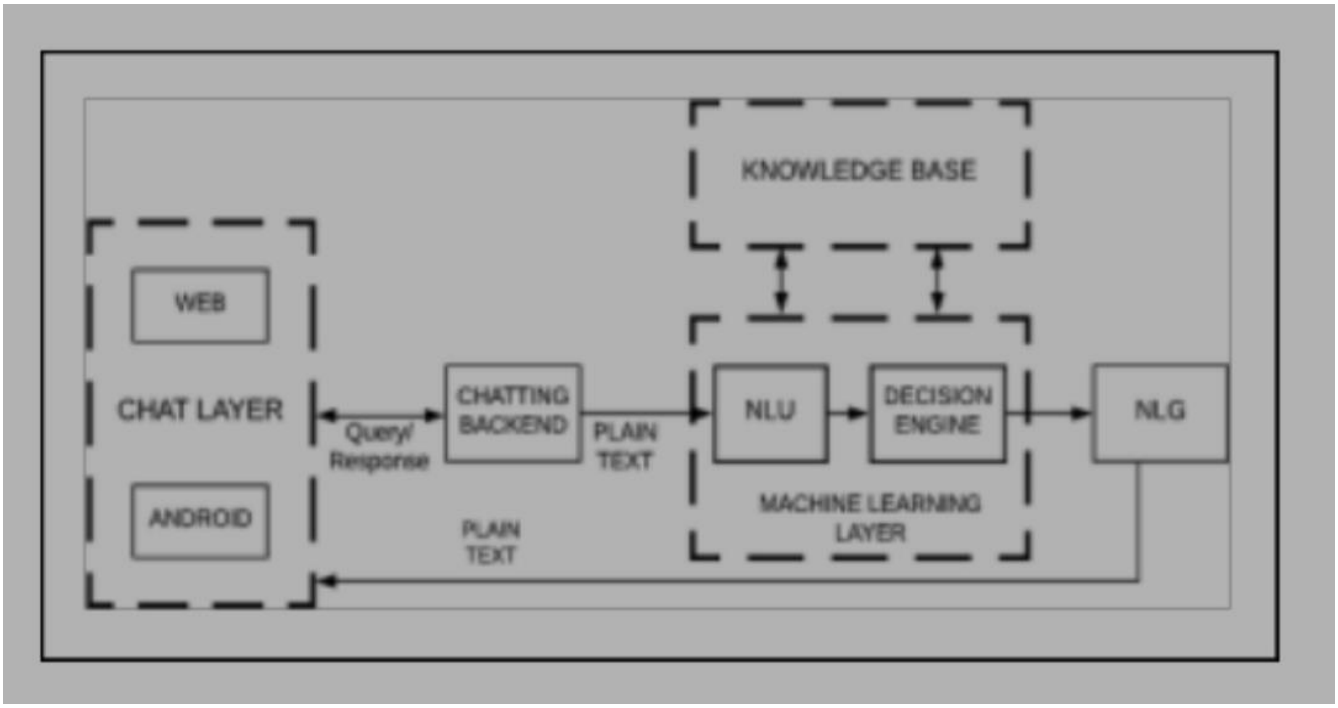


Fig 2: Architecture Of Chabot

B.**A review on NLU Engine** NLU i.e., Natural Language Understanding is a subpart of NLP (Natural Language Processing) which enables the system to understand the natural language or the conversation a language spoken by the users. The conversational language used by humans for day -day conversations is not as perfect the formal language. It does not focus much on the vocabulary and the grammar. Hence, it becomes difficult for a system to understand the intent of the sentence. The input received from the user is in unstructured text format which cannot be understood by the system directly. It understands input only in structured formats. The unstructured text received from the user is converted to structured format by extracting important words and patterns from the user text using the NLU techniques. Humans are capable of understanding any mispronunciations, homophones, swapped words, shortened form of words (like „its‟ for „it is‟), slang words or phrases and also words which are not used in formal vocabulary but exist in regular conversations.

C.**A review on Word Segmentation** also referred to as tokenization is the process of splitting text into smaller and meaningful units. These units could be paragraphs, sentences, clauses, phrases, words or letters. The smallest unit are the letters. Word segmentation is the splitting of sentences into individual words separated by blank spaces. The tokenized units of the sentences are called as tokens. The tokenizers split the sentences into words and punctuations marks as independent units. The most commonly used tokenizer is of space type, i.e., it splits the sentences into words at the blank spaces. It is also required that the tokenizer should consider abbreviations, acronyms, dates, numbers in decimal formats, etc., which cannot split at punctuations and blank spaces, as they will lose their meaning if done so.

D.**A review on POS Tagging** POS Tagging is the process of assigning grammatical annotations to individual words in the sentences. These annotations include the Parts-Of-Speech Tags. They denote the grammatical importance of the word in the sentence based on the dependency of that word with other words in that phrase, clause, sentence, paragraph, etc. The common POS tags are noun, verb, pronoun, etc. There are number of ways which can be used to perform the POS Tagging.

F.A review on Dependency Parsing A dependency parser is used to establish the relationship between words in a sentence based on the grammatical tags attached to it. It is the next step after parsing. A dependency tree or graph is created for every sentence. This tree is called as the parsing tree or the dependency tree. There are a number of ways by which the parsing can be implemented.

E.A review on Synonym and Pattern Recognition For information retrievals, no matter how big our data is,

no sentence sent by the user can be perfectly same to any sentence in the database. But there can be sentences with the same intent. After understanding the intent of the user sentence, the database is checked for a sentence with the same intent. The matched sentences have difference of words which are used to express the same content.

G.A review on Decision or ML Engine Scripted or monotonous chatbots have predefined replies to be given. They provide replies to the user from a set of predefined replies categorized on the basis of the query given by the user. Inclusion of ML in chatbots enables it to compute the replies from scratch. It is used to make predictions to predict the responses for the user queries and also to update the system from its experiences. It keeps updating the databases as and when it encounters something new from the user. This engine uses supervised or unsupervised or both techniques to analyze what the user requires. It further uses a model to interpret the intent of the user and provides the appropriate results. The results may be in the form of predictions or any form of analysis which are based on the execution and analysis of mathematical models. Most of the machine learning models are based on statistical and probabilistic evaluations of the instances occurring and the calculations makes a prediction for the test instance.

H.A review on NLG Engine NLG performs the reverse task of NLU. It is the process of converting the system produced results into natural language representations which can be easily understood by the user. In other words, NLG is the process of generating text/speech from system generated patterns. The results produced by the system are in the structured format so that they can be easily understood and processed by the system. NLG represents the System knowledge base in a natural or conversational language representation which can be easily understood by the user. There can be a number of ways in which in which a same sentence can be said. The sentences can have two voices i.e., active or passive voice. Also, there can be similarity between two sentences, but they might involve the usage of synonyms. Hence, while providing a response to the user, the NLG unit needs to calculate all the possibilities to interpret the same sentence, and then select the most appropriate one.

IV.PROPOSED SYSTEM

- **Context identification:** The input text is pre-processed to standardize it according to the system's requirements. The proper context is detected based on the keywords used in the text.
- **AIML Response system:** the user is attempting to have a normal conversation with the bot, and the input is mapped to an appropriate pattern in AIML files. The user receives the response if it is available.
- **Query Analysis and Response System:** upon receiving the personal queries like hey, hello, what are you doing?. The input text is analyzed to extract keywords. The user's request for information is understood based on the keywords, and the information is retrieved from the database.

1. When a user wants a information that he needs that will be provided through this module. If the user's input matches a pattern in the AIML files, the user will receive the appropriate response. If the AIML files do not contain an item for that query pattern, keywords are retrieved from the input.
2. For suppose, if the sentence is retrieved with confidence > 0.5 , we return the answer of that question as the response. And if the bot was not understand what the user is given to it will generates it is understand, give some information, like that.
3. Once the user is satisfied with the response which is generated by the bot and does not wish to chat further, he/she has the option to say goodbye and terminate the activity.

Advantages

- **Real time** responses to all recurring questions
- **Available** 24\7
- Conversational intelligence, personalization
- **Web, mobile, messaging** applications implementation
- Eliminate tedious time-consuming tasks

V.SYSTEM ARCHITECTURE

Typical chatbot architecture should consist of the following:

- Chat window/ session/ or frontend application interface.
- The deep learning model for Natural Language Processing [NLP].
- Corpus or training data for training the NLP model Application Database for processing actions to be performed by the chatbot.

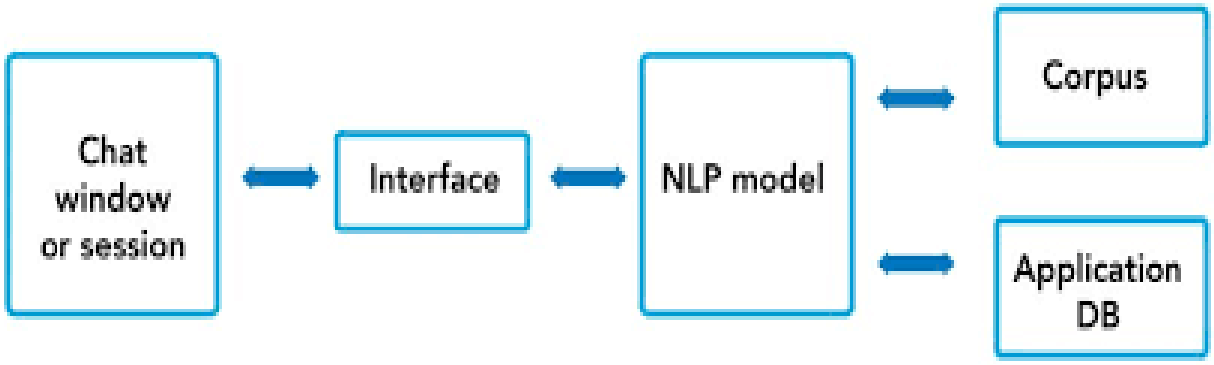


Fig 3: System Architecture

A) Corpus or Training Data: Corpus means the data that could be used to train the NLP model to understand the human language as text or speech and reply using the same medium. Corpus is usually huge data with a lot of human interactions.

B) **Chatbot window:** We have designed a function which enables the user to interact with bot using text. The function keeps the chat window alive unless it is asked to break or quit. The name of our text bot is Jason.
C) Evaluate or test the chatbot: There could be multiple paths using which we can interact and evaluate the built text bot.

D) **Data pre-processing**
Text case [upper or lower] handling: Convert all the data coming as an input [corpus or user inputs] to either upper or lower case. This will avoid misrepresentation and misinterpretation of words if spelt under lower or upper cases.

E) Tokenization: Convert a sentence [i.e., a collection of words] into single words.

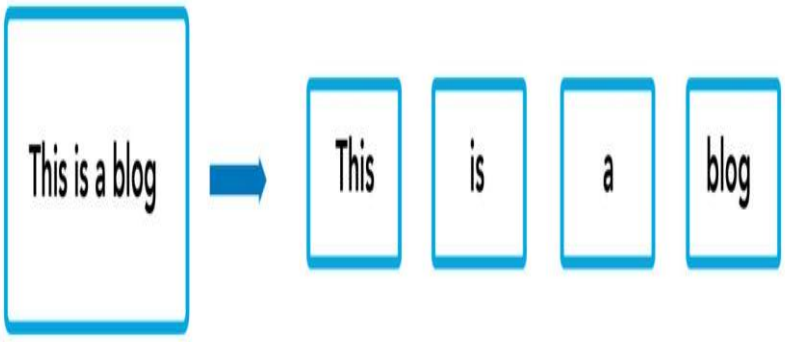
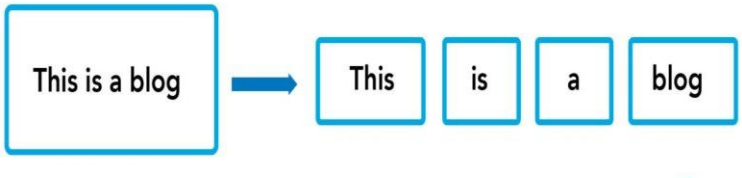


Fig 4: Tokenization process

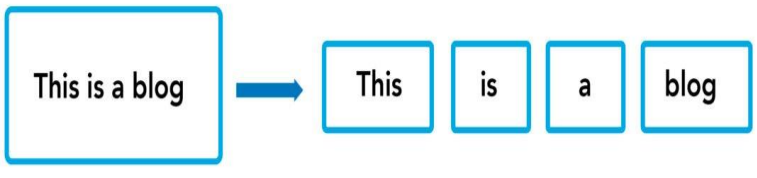
F) Stemming: It is a process to find similarities between words with the same root words. This will help us to reduce the bag of words by associating similar words with their corresponding root words.



Original word	BOW Vector			
This	1	0	0	0
is	0	1	0	0
a	0	0	1	0
blog	0	0	0	1

Fig 5: Stemming process

G) Generate BOW [Bag of Words]: Process of converting words into numbers by generating vector embeddings from the tokens generated above. This is given as an input to the neural network model for understanding the written text.



Original word	BOW Vector			
This	1	0	0	0
is	0	1	0	0
a	0	0	1	0
blog	0	0	0	1

Fig 5: Bag of words

VI.MODULES

It has three python code modules.

- **Intents.json:**intents classification or recognization it is a type of getting a spoken or written text and then classifying it based on what the user wants to achieve.
- **Trainer.py:** Defines the Chatbot overall file structure and contains the intent, actions, slots, stories, domain, config and endpoint details. The code will train an NLU and dialogue model to retrieve weather from the Yahoo weather API. Model folder contains the trained models. It will also start the server with actions and also runs the chatbot on the command line. Execute only this code as it will trigger the actions and run.py.
- **Run.py:** triggered by trainer.py. contains the modules to run the chatbot module in the command line.

VII.IMPLEMENTATION

- The implementations of a chatbot involve a variety of techniques. Understanding what the chatbot will offer and what category falls into helps developers pick the algorithms or platforms and tools to build it. At the same time, it also helps the end-users understand what to expect.
- The requirements for designing a chatbot include accurate knowledge representation, an answer generation strategy, and a set of predefined neutral answers to reply when user utterance is not understood. The first step in designing any system is to divide it into constituent parts according to a standard so that a modular development approach can be followed.
- The process starts with a user's request, for example, "What is the meaning of environment?", to the chatbot using a messenger app like Facebook, Slack, WhatsApp, WeChat or Skype, or an app using text or speech input like Amazon Echo.
- After the chatbot receives the user request, the Language Understanding Component parses it to infer the user's intention and the associated information (intent: "translate," entities: [word: "environment"]).
- Once a chatbot reaches the best interpretation it can, it must determine how to proceed. It can act upon the new information directly, remember whatever it has understood and wait to see what happens next, require more context information or ask for clarification.
- When the request is understood, action execution and information retrieval take place. The chatbot performs the requested actions or retrieves the data of interest from its data sources, which may be a database, known as the Knowledge Base of the chatbot, or external resources that are accessed through an API call.
- Upon retrieval, the Response Generation Component uses Natural Language Generation (NLG) to prepare a natural language human-like response to the user based on the intent and context information returned from the user message analysis component. The appropriate responses are produced by one of the three models: rule-based, retrieval based, and generative model.
- A Dialogue Management Component keeps and updates the context of a conversation which is the current intent, identified entities, or missing entities required to fulfill user requests. Moreover, it requests missing information, processes clarifications by users, and asks follow-up questions. For

- example, the chatbot may respond: “Would you like to tell me as well an example sentence with the word environment?”.

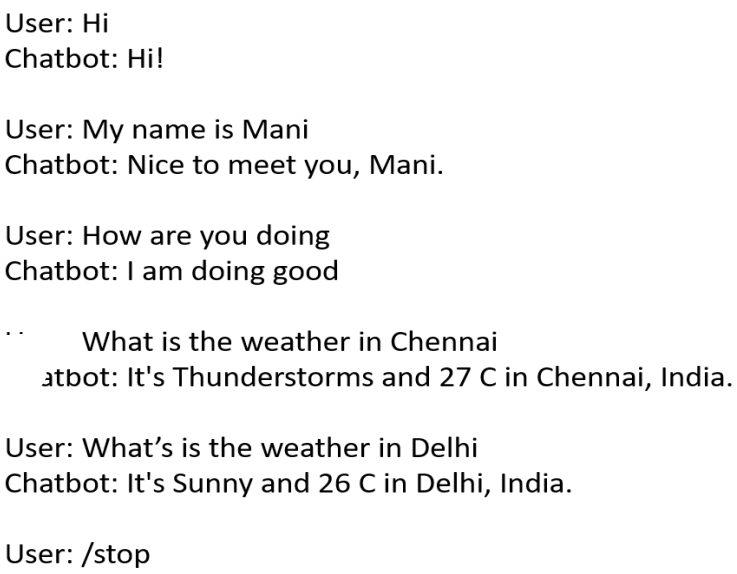


Fig 6: Chatting process

VII.RESULT

The purpose of a chatbot system is to simulate a human conversation. Its architecture integrates a language model and computational algorithm to emulate information online communication between a human and a computer using natural language.

VIII.CONCLUSION

chatbots or smart assistants with artificial intelligence, in my opinion, are revolutionizing the world. In comparison to larger chatbots developing a simple chatbot is not a difficult effort, and developers need understand and address concerns such as reliability, scalability, and adaptability, as well as high level of intent on human language. Chatbots are more effective than people in reaching out to a big audience via messaging apps. They have the potential to become a useful information gathering tool in the near future.

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Smart College Chatbot using ML and Python

Conference Paper · December 2020

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SMART COLLEGE CHATBOT USING ML 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 Matrusri Engineering College. 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 college website, using tools that expose Artificial Intelligence methods such as Natural Language Processing, allowing users to communicate with college 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. That, yet these days there are additionally several Natural Language Processing (NLP) [1] 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 college 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 college or college 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 college activities. The system answers to users' queries with the assistance of effective Graphical User Interface (GUI). The user can question about the college related activities with the assistance of this web application. College related activities, for example, admissions, academics, Intake, and other social activities. It will support the undergraduates/other user to be refreshed about the college 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 SURVEY

By utilizing the field of Artificial Intelligence, one can develop numerous applications one of that is mentioned in this paper is a college 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 college 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. PROPOSED SYSTEM

This College 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 college. 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 college 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.

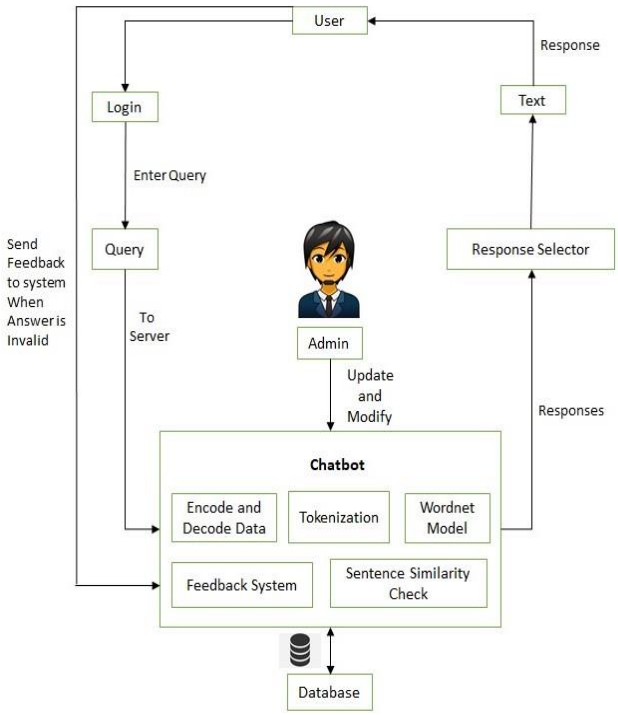

Fig. 1. College Chatbot system architecture

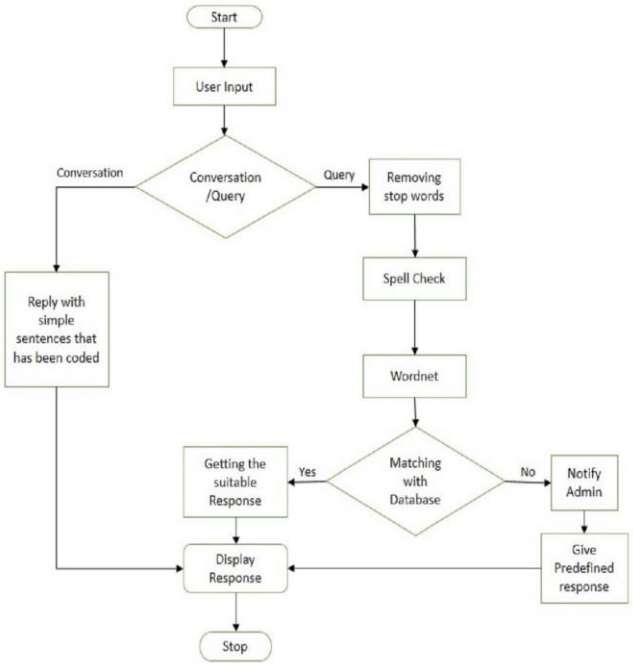

Fig. 2. Flowchart for User Module

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 college 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 college 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 college 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 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 college.

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 college 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 college 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.

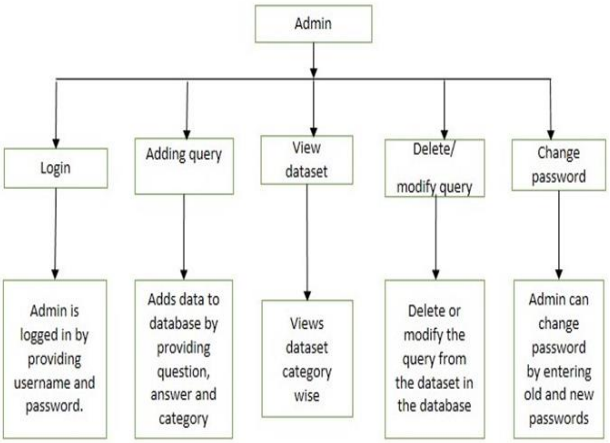

Fig. 3. Flowchart for Admin Module

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 college 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.

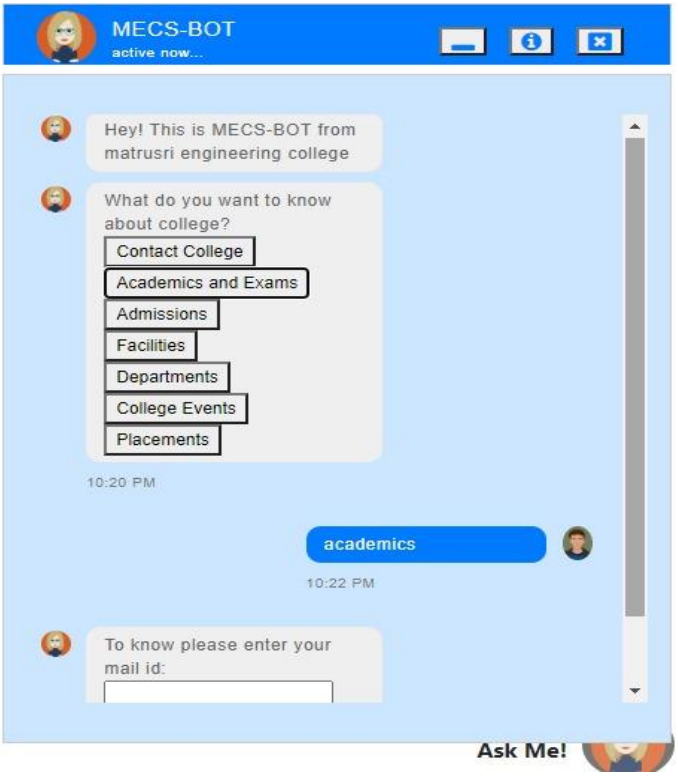

Fig. 4. Chatbot menu containing display of options and asks user to provide mail id

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 college. User can ask any number of queries to chatbot system regarding college. Some sample queries asked by the user are shown in Fig. 5. Chatbot system answers all the queries of users without any delay.

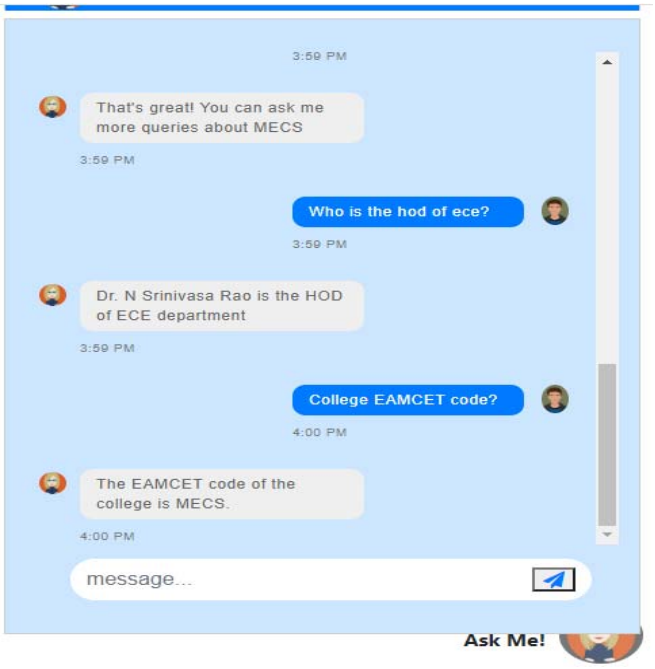

Fig. 5. Chatbot answering queries of users

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

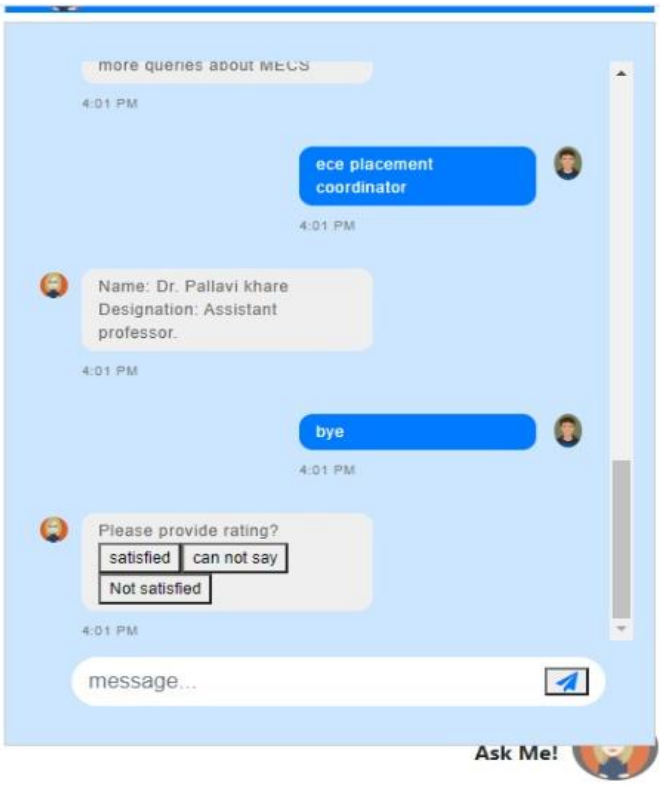

Fig. 6. Feedback System

chatbot response to the user queries. This feedback is stored in the database which can be used by college to know how efficiently chatbot is answering user queries.

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.

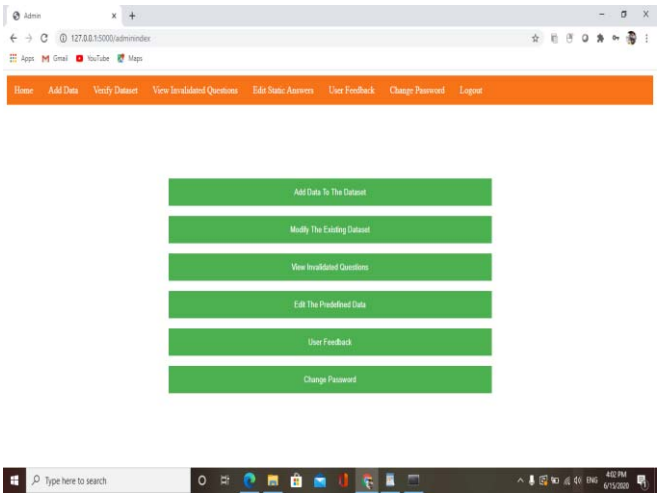

Fig. 7. Admin menu page

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 college specific chatbot system that can be custom fitted to education domain chatbot, the addition of this chatbot system in the college 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 college 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 college and increase the scope of knowledge base. Nevertheless, gathering feedback from the potential user can be helpful in developing the college Chatbot system, ultimately servicing the user queries.

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Design of Chatbot System for College Website

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***Abstract*—** Most of the time, Students need to visit college administration office to collect various information regarding college such as Tuition fees, Term Schedule, etc. during admission process or as per their daily needs. Hence, to overcome this problem, a chatbot can be designed and developed which can be easily integrated with any college website to provide necessary information regarding college. The goal of AI based chatbot is to make an efficient conversation between human and machine via auditory or textual methods. This project uses Natural language processing to process the user's query and generate a meaningful response. Based on the information stored in the database, bot itself determines appropriate response of a particular query fired by user. The Chatbot is based on an Artificial Intelligence algorithm, which analyses user's question and responds with a Naive Bayes' algorithm. This system will be a Web Application and can reduces work of college administration providing information to students. It also reduces the workload on the staff to answer all the queries of the students.

***Keywords*—** Chatbot, Query, Graphical User Interface, Natural Language Processing, Artificial Intelligence.

I. INTRODUCTION

Chatbot is a computer application that mimics human conversations in its natural format along with textual or voice communication. In the utilization of AI techniques together with natural language processing (NLP) [1],[3] chatbot for college website can be designed. This system will be a web application, so it can give solutions to the analysed queries of the user. User simply need to raise the query to the chatbot and the system will reply to the users through the powerful Graphical User Interface (GUI) which is similar to messaging application interface, and provides a friendly environment to the user as they are much aware of operating messaging application[1],[2]. The user can submit the question about the college-related information or activities such as admission process, contact information, address, annual day, sports day, intake and other cultural activities of colleges. Developing a chatbot solves the problems that can arises in gathering required college information. This system can be accessible from anywhere and anytime. Chatbot will deliver efficient and relevant response to the user corresponding to their entered message. Chatbot system will be beneficial for students, parents, teaching and non-teaching staff as well. Presently, there are various chatbots available for the students like UNIBOT, ALICE etc. UNIBOT is designed for the students to ask university related question. For this system a new algorithm is developed to deliver an appropriate response to the user corresponding to their entered message[2]. ALICE is a rule-based chatbot based on the Artificial Intelligence Markup Language (AIML). This System uses NLP and Pattern Matching Algorithm [3],[6],[7] to process user's query[8].

This paper is divided into several sections, where Section I contains the introduction of chatbot system, Section II contains Related Work of chatbot system, Section III explains the Methodology with architecture diagram and flow chart, Section IV contains Results and Section V describes Conclusion and Future Work.

II. RELATED WORK

K. Bala, M. Kumar, S. Hulawale, and S. Pandit et al. [1] Project on Chatbot for college management is developed with the help of AI algorithms which can analyse user's queries. This is a web application that will give answers to the analysed queries of the user. Users will simply need to select the class for queries and ask the question to the bot. In this paper, they have used Porter Stemmer algorithm to answer the user' queries. The Users should register and login to the system. Once login, user can access the various helping pages through which the user can ask queries related to college activities.

P. Nikhila, G. Jyothi, K. Mounika, Mr.K. K. Reddy et al [2] The chatbot named UNIBOT is designed for the students to ask university related question. This system uses the concept of Artificial Intelligence and Machine Learning. The System uses PHP Language for the development of UNIBOT. The query is given as an input to the algorithm, which processes it and gives the corresponding response to the user. The GUI is similar to a Messaging Application. It delivers efficient and relevant response to the user corresponding to their entered query. New algorithm is developed for UNIBOT. It is very efficient, requires less memory and has minimal database hits.

B.Setiaji and F. W. Wibowo et al. [3] Chatterbot is designed with a powerful pattern matching algorithm. This project uses Indonesian conversational pattern and MySQL database. This application is based on a knowledge base which is maintained by admin. It can be miss in defining a sentence and how to response it while connecting chat application to the database. In the pattern-matching operation, knowledge representation and implementation of SQL are important. A data that has been created which is based on the pattern of the conversation must be tested by the help of a series of scenarios. The conversation should be crosschecked to the basic pattern so that it allows you to add some knowledge to the database which is not added before. If the input record in the database does not match, then it will be remodeled.

K. Shivam, K. Saud, M. Sharma, S. Vashishth, and S. Patil et al. [4] In this paper, for designing chatbot, Facebook Messenger is used which is source and uses artificial intelligence to communicate with the user and provide the required information. This Facebook API is integrated with Python backend, webhook is used to deliver the query of the user to the server. This system has used WIT and AI as a pre-trained artificial intelligence module so that one could use its pre-trained neural networks to answer the user's query with efficiency and accuracy.

E. Haller and T. Rebedea et al. [5] This paper describes the concept of identifying vital facts in texts describing the life of a historical figure for building a conversational agent that could be used in middle-school CSCL scenario. This paper presents a way for building a chat-bot that may simulate a historical figure. The system can receive "input" as an understandable text or a web page about the historical figure and has as "output" a trained conversational agent that is in a position to answer all reasonably questions about the life expertise of that user.

S. B. Sonawane, A. S.Badwar, R. H. Dalvi, G. N. More and S. A. Talekar et al. [6] This paper describes the concept of AI based chatbot which is designed for Student Counselling for career guidance. This system uses NLP and Keyword Matching Algorithm to process user's query. This System uses a modular architecture to respond to user input. Each module contains knowledge based initialization mechanism, and logic to handle user requests. The students are able to get proper guidance for career in the field of their choice, also the college list for the same is provided as per requirement.

III. METHODOLOGY

The proposed chatbot system is a web application which gives reply to the question of the user. This system is utilized for talking. A chatbot project is built using artificial algorithms i.e. Naive Bayes' algorithm that analyse user requests and understand the user's message[9]. The system uses Natural Language Processing (NLP) and built-in artificial intelligence to answer the queries asked by the user. For the chatbot development, we have used Python programming language using Django framework and Chatterbot library. It makes it easy to generate automated responses to a user's input with the help of a machine learning algorithm to produce different types of responses. Students just have to query through the bot which is used for chatting purpose. Chatbot will reply to the query with the help of artificial intelligence.

The proposed system will reduce the administration burden and will be able to provide necessary details to students and parents online. Students do not have to visit college administration for every inquiry. Students will get their queries resolved without any hassle to reach out the college administration office. The System will be available for 24/7 to all students and parents [4].

1. User Login:

User just needs to submit his/her queries regarding the college to the bot. User can be student, teacher as well as parents.

2. Chatbot Responding System:

2.1 NLP Processing for Query Analysis :

When a user submitted the query to the system, NLP is applied and sense of the query is detected. Natural Language Processing (NLP) allows chatbot to understand user's messages and respond appropriately.

2.2 Search Questions in database:

Once the query is submitted, furthermore, we have to search the exact answer of the query in our pre-trained database. As the query description can change from person to person. The same question can be asked in different ways from multiple users. One user asks a question so simply and clearly, while another user may ask the same question with different format. So it is necessary to find out what is the correct solution of a submitted query.

2.3 Answer the Queries:

As described above, whenever user submits a complaint, then it is checked that is there such question registered in database. If the answer is matched, then that is sent to that User. If the answer of submitted query is not found in the database, then such questions are answered by admin person. Once he answered the query, the answer is sent to that user. And also it is stored in database so that whenever such questions will be asked they get answer of that query directly from the database. So admin doesn't need to answer the same query again and again. For this we are using powerful Naive Bayes' Algorithm[9].

3. Architecture Diagram of Chabot System:

Figure 1: shows the architecture of the chatbot system for college website.

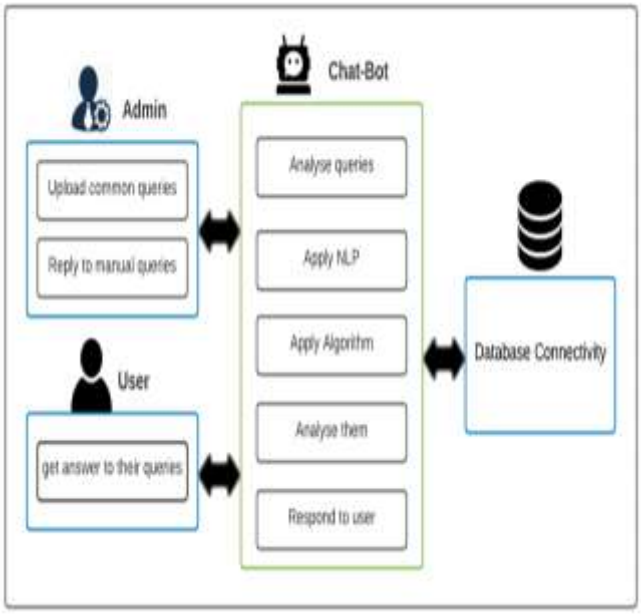

Figure 1: Architecture Diagram of Chatbot System

4. Flowchart of Chatbot System:

The flowchart of the system displays how the chatbot performs. Initially, the user message is pre-processed and connectivity to the database is obtained. Then, based upon conditions satisfied, the chatbot process flows and provide response to the user. If the user cannot find the answer for a query then in such condition chatbot will provide admin's contact details to the user. Admin can view and answer the corresponding query.

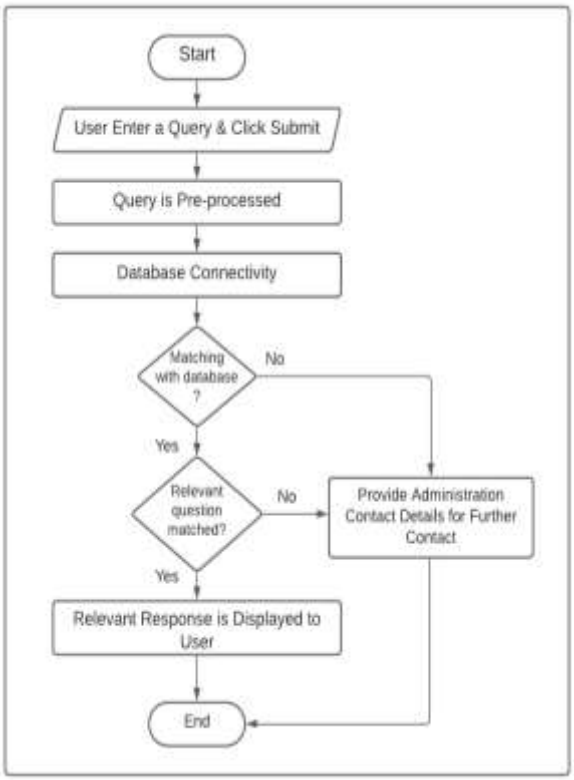

Figure 2: Flowchart of Chatbot System

5. Algorithm Implemented

Naive Bayes' is a powerful algorithm for text classification problems. It is a probabilistic machine learning algorithm which is based on Bayes' theorem[9]. This classifier assumes that the presence of a selected function in a category is unrelated to the presence of another function. In this algorithm a closed domain dataset containing questions/user-responses and corresponding answers is made, which every question is given a label, this will relate the question to its answer. Due to multiple questions could have the same response, there can be multiple questions having the same answer.

The Formula for Naive Bayes' Algorithm is as follows:

$$P(A \mid B) = \frac{(P(B \mid A) * P(A))}{P(B)} \quad (1)$$

Where,

P (A | B) = Probability of 'A' occurring given evidence of 'B' has already occurred.

P (B | A) = Probability of 'B' occurring given evidence of 'A' has already occurred.

P (A) = Probability of 'A' occurring.

P (B) = Probability of 'B' occurring.

6. Different Algorithms Used for Chatbot System:

Some of the most popular algorithms for chatbots are Porter Stemmer[1], Naive Bayes'[9], Support Vector Machines, K-means and atural language processing (NLP). Chatbots mainly use classification algorithms to recognize intent in phrases. Every algorithm has its own advantages and disadvantages according to its working method. Table 1 shows comparison of different algorithms WRT to Naive Bayes' algorithm.

Table 1: Comparison of Different Algorithms

Sr. No.	Porter-Stemmer Algorithm	K-Means Clustering Algorithm	Naive Bayes' Algorithm
1.	The stems generated are not always real words.	Different partitions can result into different final clusters.	Naive Bayes' classifier performs better than other models with less training data if the assumption of independence of features holds.
2.	It has five steps and sixty rules. And takes more time.	Difficult to predict K-Value, hence it is time-consuming.	The algorithm works very fast and can easily predict the class of a test dataset.

3.	This System is limited to English words only.	Doesn't support categorical data.	The algorithm performs well with categorical variables in comparison to numerical variables.

IV. RESULTS AND DISCUSSION

The Chatbot is to carry out a conversation between both human and machine. Figure 3: shows the simple and attractive pop-up Interface for College Chatbot System. Firstly, chatbot will print a welcome message then a user can type and submit the query and bot will provide an appropriate answer to the user's query. In figure 4 'What is college full name?' this question is asked by the user and correct answer is given by the chatbot. The User can query any college related activities through the chatbot system.

Figure 3: Chatbot Interface-1

Figure 4: Chatbot Interface-2

V. CONCLUSION AND FUTURE SCOPE

The aim of the system is to provide a user-friendly and efficient chatbot system for College. The chatbot will be very useful in guiding students to get correct and up-to-date information source. This system will be fruitful for students, teachers as well as parents. They can get information at any time without having to visit the college administration office every time. In the future scope of this project, the system will include voice-based requests and responses. Users are required to provide voice input and the system will output in the form of text. Chatbot will be able to provide a voice output as well, with the help of text to speech or speech to text conversion.

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Chatbot for College Website

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Abstract : A chatbot is a software that is used to interact between a computer and a human in natural language like humans chat. Chatbots chat with the user in a conversation in place of a human and reply to the user. The goal of this report on chatbot was to resemble a human being in the way they interact, trying to make the user think he is chatting with another human being. The chat bot application helps the students to access the university related information from anywhere with internet connection. This system reduces work of college administration providing information to students and also reduces the workload on the staff to answer all the queries of the students.

Keywords : *Chatbot, Artificial Intelligence, Enquiry, AIML, Response , Query.*

1. Introduction

Chat Bot is a computer program that can talk to humans in natural language, the way we interact with each other. It can replace a human for many tasks of answering queries. A chatbot is an agent that interacts with users using natural language. It was built as an attempt to fool humans. Several applications of chatbots such as Customer Service, call centers etc. uses Artificial Intelligence Markup Language to chat with user.

One of the prime goals of chatbots is to resemble an intelligent human and make it difficult for the receiver of the conversation to understand the real working along with various architecture and capabilities for their usage has widely broadened.

These chatbots can prove sufficient to fool the user into believing they are "talking" to a human being, but are very limited in improving their knowledge base at runtime, and have usually little to no means of keeping track of all the conversation data .

Chatbots makes use of machine learning to reach artificial intelligence helping them to understand the user query and provide an appropriate response. The chatbots are developed using the Artificial Intelligence Markup Language for communicating or interacting with the user. This consist a software which will be made up using Artificial Intelligence and will help user to chat with machine.

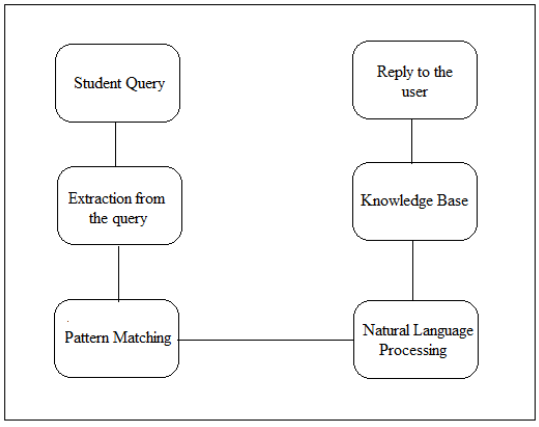

Fig.1 : Data Flow Diagram

2. Literature Review

There are numerous applications that are consolidating a human appearance and proposing to reproduce human exchange, yet in the majority of the cases the information of the conversational bot is put away in a database made by a human specialists. Be that as it may, not very many inquires about have explored making a talk bot with a fake character and identity beginning from website pages or plain content about someone in particular. This paper portrays a way to deal with recognizing the most critical realities in writings depicting the life of an authentic figure for building a conversational operator that could be utilized as a part of center school CSCL situations

This paper portrays an adaptable technique for educating initial counterfeit consciousness (AI) utilizing a novel, Python-executed, basic operator system grew particularly for the reasons for this course. Albeit various operator systems have been proposed in the huge collection of writing, none of these accessible structures ended up being sufficiently basic to be utilized by fourth-year understudies of software engineering. structure that would be reasonable for the points of the course, for the level of registering aptitudes of the planned gathering of understudies, and for the span of this gathering of understudies. The substance of the initial AI course being referred to is an arrangement of assignments that requires the understudies to utilize keen specialists and other AI systems to screen, channel, and recover important data from the World Wide Web. It speaks to, in this way, an amalgamation of the customary objectivist approach and a certifiable situated, constructivist way to deal with instructing programming to amateurs. The fundamental point of executing such an instructional method was to connect with the understudies in figuring out how which they by and by relate while achieving scholarly meticulousness. Classroom encounter shows that understudies take in more viably when the conventional objectivist approach is joined with a constructivist approach than when this standard way to deal with instructing programming to amateurs is utilized alone.

Manmade brainpower machines are made to carry on in wondrous ways, frequently adequate to stun even the most experienced onlooker. Be that as it may, once a specific program is unmasked, once its inward workings are clarified ... its enchantment disintegrates away; it stands uncovered as a simple accumulation of systems ... The eyewitness says to himself "I could have composed that". With that idea he moves the program being referred to from the rack stamped "savvy", to that held for doodads ... The protest of this paper is to cause simply such a re-assessment of the program going to be "clarified". Hardly any system at any point required it more.

3. Proposed System

This System is a web application which gives reply to the question of the user. This system simply need to question through the bot which is utilized for talking. The System utilizes worked in counterfeit consciousness to answer the inquiry. The appropriate responses are suitable what the client questions. In the event that the appropriate response found to invalid, client simply need to choose the invalid answer catch which will tell the administrator about the inaccurate answer. Administrator can see invalid answer through entrance by means of login System permits administrator to erase the invalid answer or to include a particular answer of that comparable inquiry. The User can inquiry any college related exercises through the framework. The client does not need to go to the college for enquiry always. The System examines the inquiry and after that responses to the client. The framework answers to the inquiry as though it is replied by the individual. With the assistance of computerized reasoning, the framework answers the question asked by the understudies. The framework answers utilizing a compelling Graphical UI which infers that as though a genuine individual is conversing with the client. The client can question about the school related exercises through online with the assistance of this web application. This framework causes the understudy to be refreshed about the school exercises.

The proposed system will simply take the query of the user which can be a student or a parent, and will give response according to the query. The system will match the user query with knowledge base and see for the appropriate response. The system can also reply to the general queries of the student. The algorithm of the complete system can be understood by the following flow chart.

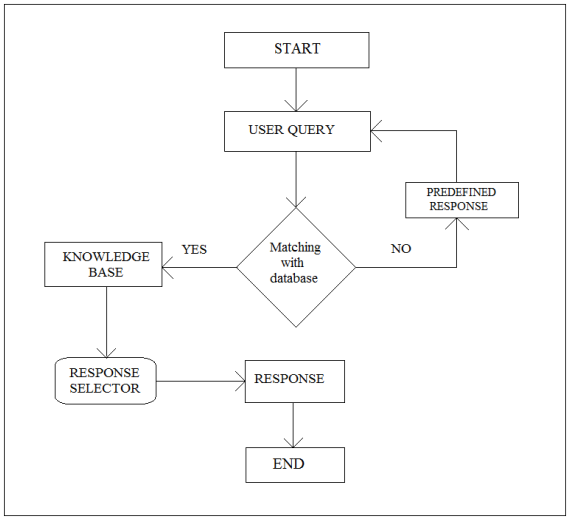

Fig 2 : Flow Chart of Proposed Model

4. Discussion of Current Scenario

- Chat bot system is unknown to people who are not updated with the technology.

- Even if there exist a chat bot system, it is not much accurate in proving the answer or solutions.
- Students need to manually visit to the college to get their queries answered by the college help desk.
- This process consumes lot of time as well as money as the customer needed to visit college if its miles away from home.
- Also, this process may lead to communication gap between student and college.
- No LIVE update platform yet for all student and parent queries
- No alternative available for student and parents beyond visiting college administration.

4.1 Objectives of this system:

- Reduce management effort.
- Provide necessary details to student and pa rent online.
- Provide information about college activities and schedule of current academic year.
- To get rid of manual efforts.
- To reach college administration easily.
- Reducing visit to college administration for every enquiry.
- 24x7 availability for all student and parent queries.
- Creating a situation of delight for parents and student with extra technical support.
- Students will get their queries resolved without any hassle to reach out the college administration.
- This application enables the students to be updated with college cultural activities.
- This application saves time for the student as well as teaching and non-teaching staffs.

5. Data and Results

We have created an application with the help of Facebook messenger API which is open source and uses artificial intelligence to interact with user and provide the desired information. This Facebook API is integrated with Python backend, webhook is used to deliver the query of the user to the server. We have used WIT.AI as a pre-trained artificial intelligence module so that we could use it's pre-trained neural networks to answer the user's query with efficiency and accuracy. We also made some custom modules/entities such as calendar, time-table etc. in the wit.ai module to make it ample to answer college related queries. This application would be available on the college website, for this purpose we have created a static web page to mimic the college website. This webpage is built using html with bootstrapping and design part is done with help of html css.

5.1 Test Cases:

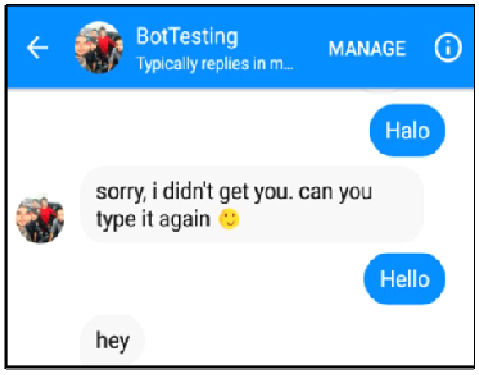

Fig 3: Test Case 1

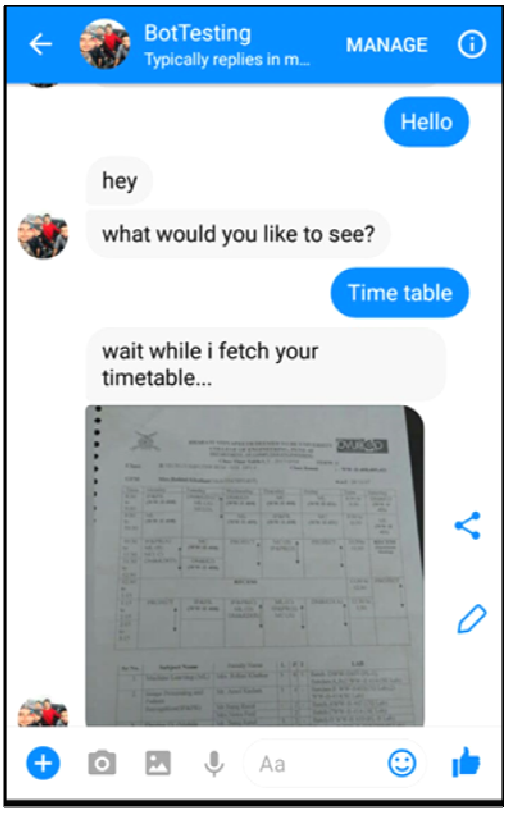

Fig 4: Test Case 2

6. Conclusion

The main objectives was to develop an algorithm that will be used to identify answers related to user submitted questions. To develop a database were all the related data will be stored and to develop a web interface. The web interface developed had two parts, one for simple users and one for the administrator. A background research took place, which included an overview of the conversation procedure and any relevant chat bots available. We created a database , which stores all the information about questions, answers, keywords, logs and feedback messages. A usable system was designed, developed and deployed to the web server.

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IMPLEMENTING A COLLEGE ENQUIRY CHATBOT

A Project

Presented to the faculty of the Department of Computer Science

California State University, Sacramento

Submitted in partial satisfaction of
the requirements for the degree of

MASTER OF SCIENCE

in

Computer Science

by

Ujaliben Kalpesh Bavishi

SPRING
2019

IMPLEMENTING A COLLEGE ENQUIRY CHATBOT

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Ujaliben Kalpesh Bavishi

Approved by:

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Dr. Pinar Muyan-Ozcelik

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Dr. V. Scott Gordon

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Date

Student: Ujaliben Kalpesh Bavishi

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Dr. Jinsong Ouyang Date

Department of Computer Science

Abstract
of
IMPLEMENTING A COLLEGE ENQUIRY CHATBOT
by
Ujaliben Kalpesh Bavishi

This project is focusing on creating a chatbot to be used by students to get their queries responded easily from the college website. The College Enquiry Chatbot has the capacity to make friendly conversations; respond the course and faculty details; give the link for the academic calendar; answer the frequently asked questions; calculate the fees based on the student's input; and give the timings, address, contacts, and events information of the departments like Union, Library, IPGE, and AIRC. To build the chatbot, Microsoft Azure bot service as well as Microsoft cognitive services, namely, Text Analytics, LUIS, and QnA Maker are used.

Most of the existing chatbots lack empathy and fail to accommodate anything outside of the script. In order to address these problems, the College Enquiry Chatbot extends the implementation of the current chatbots by adding sentiment analysis and active learning. Although, sentimental analysis correctly recognizes the user's query as positive, negative and neutral, the system was partially successful in adding empathy to the chatbot. It is because the system requires more rigorous training data to handle all queries which are off-script. However, for such queries, active learning helps to improve the chatbot

performance since it correctly understands the user's questions, asks clarifying question, and then retrains the system to give the response what the user intends to get.

The future work include training the chatbot with more varied data; increasing the scope of the chatbot by adding a speech recognition feature so that users can speak to get responses; and including integration with multiple channels such as phone call, SMS, and various social media platforms.

_____ Committee Chair
Dr. Pinar Muyan-Ozcelik

_____
Date

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1 INTRODUCTION AND MOTIVATION

This project is focusing on creating a chatbot to be used by students to get their queries responded easily from the college website. A chatbot is a program which can do real conversations with textual and/or auditory methods [1]. Using Artificial Intelligence (AI), chatbots can simulate human conversations. There are two categories of chatbots. One category is command based chatbots where chatbots rely on a databank of replies and heuristics. The user must be very specific while asking the questions so that the bot can answer. Hence, these bots can answer limited set of questions and cannot perform function outside of the code. The other category is chatbots based on AI or machine learning algorithms, these bots can answer ambiguous questions which means the user do not have to be specific while asking questions. Thus, these bots create replies for the user's queries using Natural Language Processing (NLP).

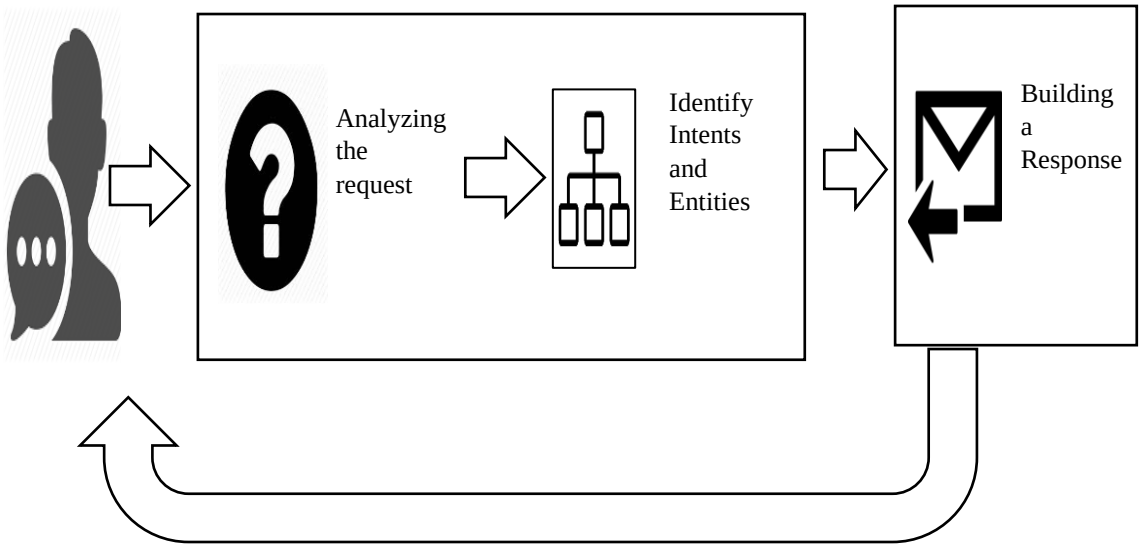


Figure 1: How a Chatbot Works [2]

Figure 1 shows how a chatbot works. Whenever a user asks any query, the bot will first analyze the request, then identifies intents and entities, builds a response and sends it back to the user. Now, intents mean intention of the query and entity means details of that query. For example, if a student wants to know the office hours of a faculty then the intent will be office hours and entity will be name of the faculty in this case.

AI-powered chatbots are motivated by the need of traditional websites to provide a chat facility where a bot is required to be able to chat with user and solve queries. When live agent can handle only two to three operations at a time, chatbots can operate without an upper limit which really scales up the operations. Also, if any school or business is receiving lots of queries, having a chatbot on a website takes off the load from support team. Having a chatbot clearly improves the response rate compared to human support team. In addition, since millennials prefer live chats over a phone call, they find a chatbot, which provide a highly interactive marketing platform, very attractive. Furthermore, a chatbot can automate the repetitive tasks. There can be some scenarios where a business or school receives same queries in a day for many times and support team must respond to each query repetitively. Lastly, the most important advantage of having a chatbot is that it is available 24/7. No matter what time it is, a user can get a query solved. All these advantages of a chatbot constitute the motivation to implement a College Enquiry Chatbot.

Before implementing College Enquiry Chatbot, various existing chatbots were reviewed such as Amazon Shopping App [3], Alexa [4], Bank of America (Erica bot) [5]

and CNN news bot [6]. In order to understand the requirement of a chatbot, consider an example of Amazon Shopping App. In this app, when a customer buys an item, he/she does not have any information about how to return the item. To get this information, the customer must call and wait to talk to customer representative for a long time. However, this whole process is tedious for a customer. Hence, Amazon created a chatbot to answer simple queries of customers.

Similarly, the College Enquiry Chatbot is designed to help students to get their queries solved on a fingertip. The most essential downside I found while utilizing the previously mentioned chatbots is absence of personality and conversational flow. As Storman [7] suggests, the CNN chatbot neglects to give sympathy and effortlessness. To be efficient, the chatbot must have the capacity to relate and associate itself with the user. For example, a discussion with the CNN chatbot is depicted in the article where at whatever point a user says anything aside from news or any current alternatives, it answers with the news comprising of those words and toward the end it says "Not sure I understand what you're looking for. Try again or pick one of the options below." and afterward it gives the choices as programmed. This implies, although it conveys the news proficiently, the CNN bot needs compassion.

Solution to this problem is described by Rahman et al. [8]. This study proposes that “there is a need to understand and consider the stability, scalability, and flexibility issues along with high level of intention of a human language”. Hence, for implementing a chatbot that handles complicated queries, the sentiment analysis is incorporated into College

Enquiry Chatbot. Sentiment analysis aims to obtain writer's feelings expressed in positive, negative or neutral comments. Based on sentiment analysis, the bot is trained to have empathy while answering to the user. For example, if a user says "I am sad today." then bot should reply to it with some empathy like "I'm sorry to hear that, how can I help you today?" and not just reply the standard message like "Sorry did not understand your question."

Another downside which was found during a research on chatbot is that bots are created in such way that they follow a specific route and mostly all of them fails to satisfy anything outside of the previously defined scripts. This means that if they are not part of a predefined scripts, a significant number of the bots will fail in understanding even the most fundamental kind of queries, which results in a repeating and horrendous experience. To resolve this issue, active learning can be introduced to the system to make probabilistic assessments and provide autonomous responses to the users [9]. Active learning is an algorithm which interactively queries user to obtain the desired output. Whenever a user asks anything which is outside of the script the chatbot will ask questions to the user by giving two to three options and based on the user's input, the bot returns the answer to that query. This whole learning process is called as active learning.

2 SYSTEM DESIGN

System design of College Enquiry Chatbot consists of integration of multiple technologies. This system makes use of NodeJS for backend and ReactJS for frontend. Microsoft Azure provides services like Cognitive Service, Bot Service [10], and Web Apps. Cognitive services consist of Text Analytics, LUIS [11], and QnA Maker [12]. The bot service is used to create the bot application on Azure. In addition, Web Apps are used to host the application on Microsoft Azure. System uses Mongo DB to store the conversations history.

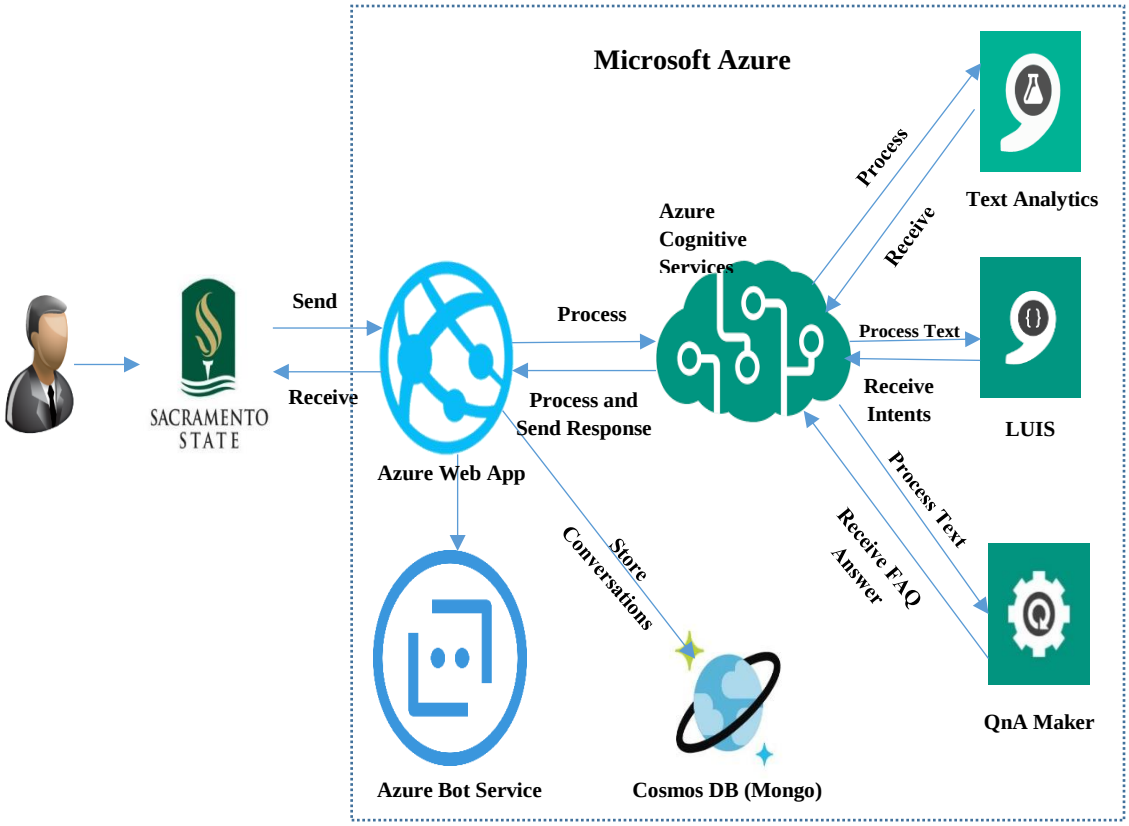


Figure 2: System Design

2.1 Microsoft Azure

Microsoft Azure provides cloud services to build, manage, and deploy applications on a cloud network which helps organization to meet their business needs using their favorite tools and frameworks. College Enquiry Chatbot uses all the services shown in Figure 2 which are provided by Microsoft Azure.

2.1.1 Azure Bot Service

Azure bot service is a service provided by Microsoft Azure which builds and artificial intelligence (AI) chatbot. It offers the ability to add intelligent agents that can do conversations with users without having to commit the resources to develop one's own AI [13].

2.1.2 Azure Web App

I have used Azure web app to host my bot application build by Azure bot service. Azure Web App are the web applications which are hosted on Microsoft Azure cloud without any programming language barrier. Since it is hosted on the cloud, infrastructure maintenance is not needed to host the applications. It also provides various features like auto scaling, automated deployment and also supports both Windows and Linux environments [14].

2.1.3 Azure Cognitive Services

Azure Cognitive services are used to add intelligence to the bots by adding features such as sentiment analysis and language understanding which help in analyzing user's queries [15]. These services can be added to an existing bot by adding service calls to the

Microsoft's SDK to get the desired results. College Enquiry Chatbot utilizes Text Analytics, LUIS, and QnA Maker services which are part of cognitive services and use natural language processing (NLP) for different purposes.

2.1.3.1 Text Analytics

Text Analytics is used to perform sentiment analysis on a user's queries. As shown in Figure 2, a text is sent to text analytics and it returns the sentiment of that text.

2.1.3.2 LUIS

"LUIS stands for Language Understanding Intelligent Services which aims at creating cloud-based machine learning language understanding (LU) models specific to an application and without machine learning expertise" [16]. To implement a College Enquiry Chatbot, I have first created all the possible intents and entities using LUIS tool. Based on these intents and entities, LUIS have built and train a LU deep learning model. Then, the created model needs to be pushed to the endpoint on the cloud. The queries from the user are passed to the endpoint to get the recognized intent and entities in JSON format. Based on various flows, response will be sent back to the user.

Active learning is also implemented using LUIS as shown in Figure 3. LUIS detects the user's query (utterances) in terms of intents and entities. It sends back the response to the service code where those utterances are examined based on the confidence score. Then, College Enquiry Chatbot labels these utterances, re-trains, and publishes the LU model [17]. Another method of active learning is also implemented which involves using user's response to re-train the model. The endpoint provided by LUIS responds with intents,

entities, and a corresponding confidence score. A threshold is maintained based on the confidence score and correspondingly prompts are provided to the user. When the users respond to it, the system keeps track of the responses and uses it to re-train the model.

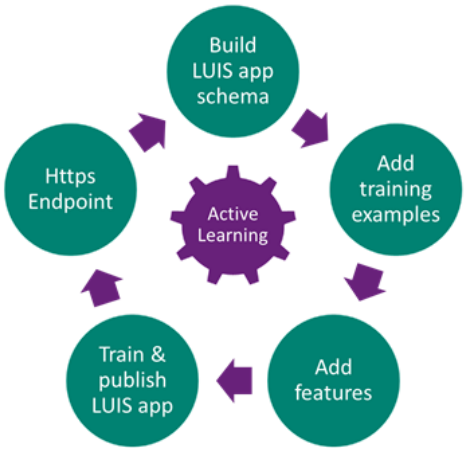


Figure 3: Active Learning Process [16]

2.1.3.3 QnA Maker

For answering simpler queries, instead of detecting intents and entities, College Enquiry Chatbot uses QnA Maker for structuring answers from a semi-structured document like FAQs. This web-based service is useful in incorporating multiple FAQs from an URL, structured documents, product manuals, or editorial contents; and building the LU model for natural language processing.

2.1.4 Cosmos DB (Mongo)

Cosmos DB is a database service provided by Microsoft Azure. College Enquiry Chatbot uses this database service to store my conversational history.

3 IMPLEMENTATION DETAILS

In this section of the report, step by step demonstration of how to setup the bot, LUIS (for NLP), and QnA Maker as well as explanation of service code which includes the implementation of the Active Learning are provided. In addition, setting up databases to store the conversation history is explained. All these steps serve as a template to get a basic bot deployed and published on Azure cloud.

The followings are couple of the prerequisites that are needed in order to get started:

- Microsoft Azure Student Account
- Installation of Git (https://git-scm.com/download/win) and NodeJS (https://nodejs.org/en/download/) on Windows.

3.1 Azure Bot Setup

Open https://portal.azure.com as shown in Figure 4 and follow the steps explained in the following subsections.

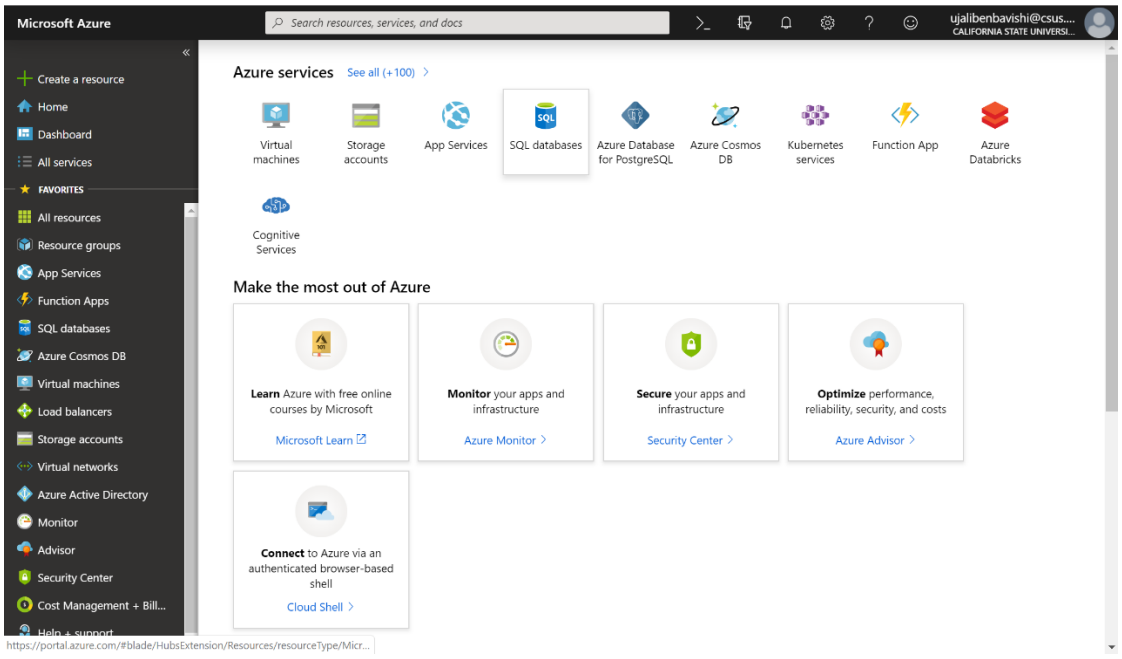


Figure 4: Azure Portal Home Page

3.1.1 Bot Creation

In the left side pane, click on “Create a Resource” and search for “Web App Bot”. As a next step click on “Create” to start creating a bot. Fill up all the required fields as shown in Figure 5.

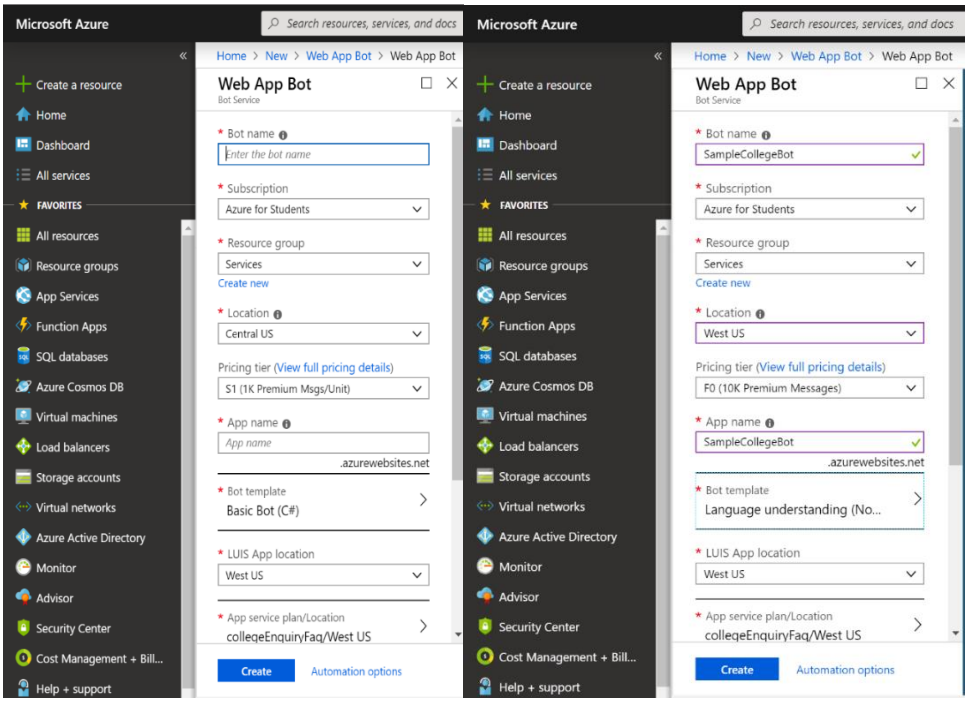


Figure 5: Web App Bot Creation

3.1.2 Adding the DirectLine Channel

After the bot has been created, several channels can be configured to access the bot such as Skype, Webchat, Slack, Facebook, etc. In this project, DirectLine channel is used to communicate with the bot. Figures 6 and 7 show how to add a channel to a bot. After the channel is added, copy the secret key to be used in the service and click on “Done”.

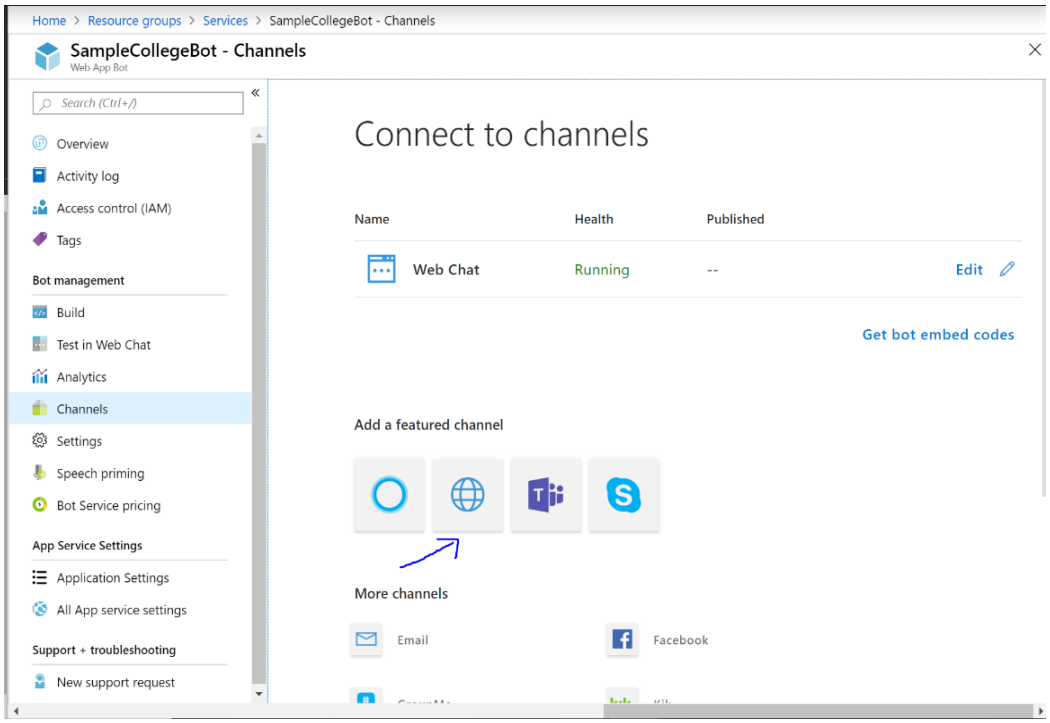


Figure 6: Channel Configuration Page of the Bot

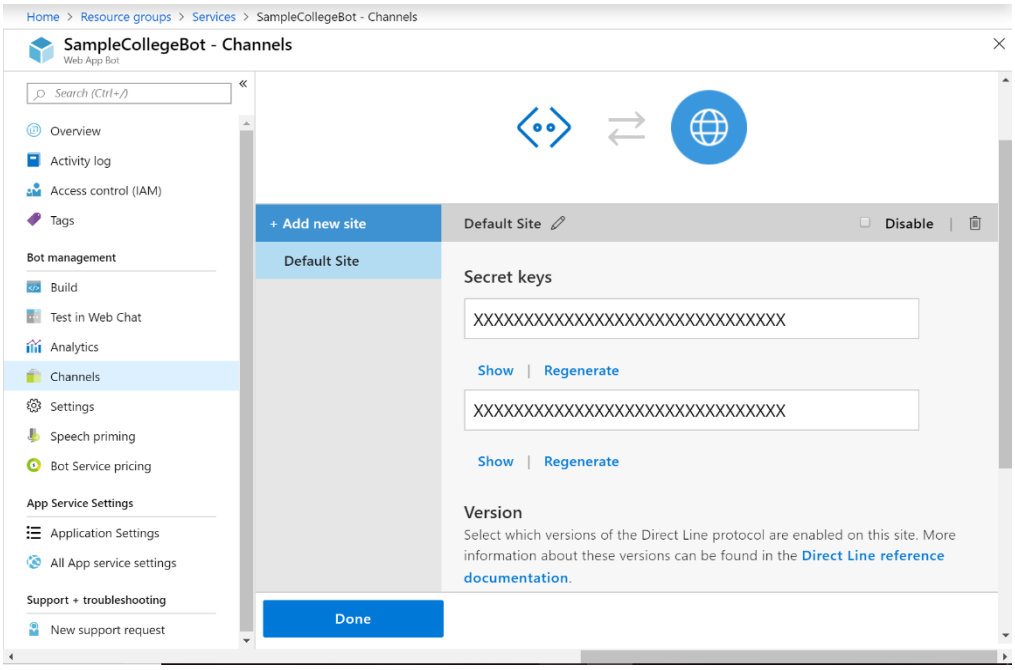


Figure 7: Configure DirectLine Channel for the Bot

3.1.3 Testing the Echo Bot

After the channel is configured, we can test the new bot with some preconfigured bot template where we can echo back whatever the user queries as shown in Figure 8.

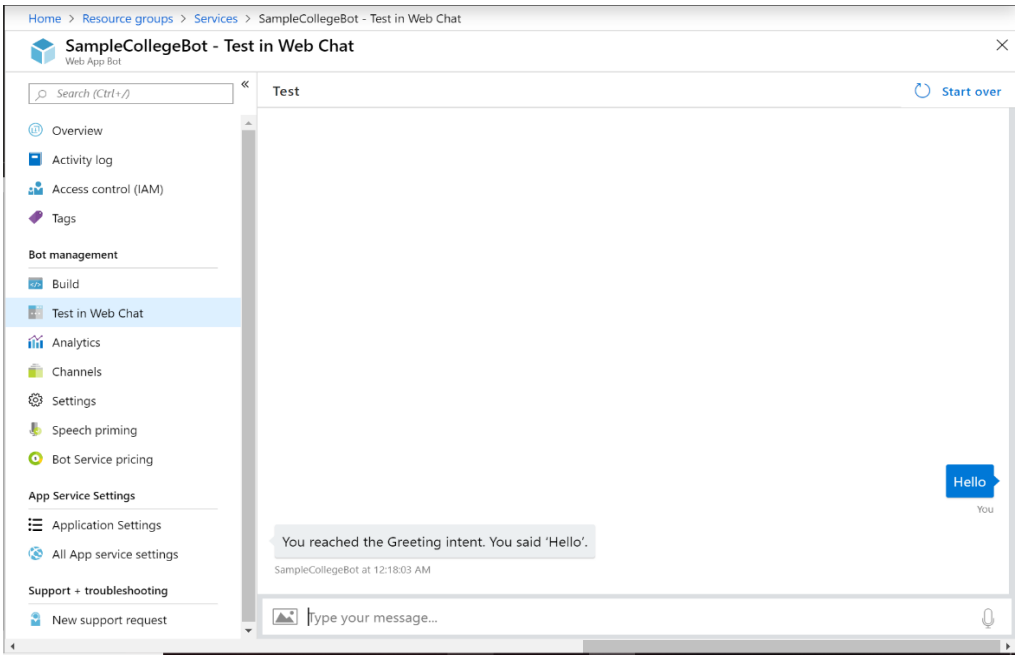


Figure 8: Web Chat Testing of the Created Bot

3.2 LUIS Setup

Go to https://www.luis.ai to setup the intents and entities to create a model and train the natural language processor.

3.2.1 LUIS App Creation

After visiting the website, sign in with the same Azure credentials, scroll down and click on the button “Create a LUIS app now” as shown in Figure 9. Please note that if a Web

App Bot is created with LUIS bot template, then a LUIS App will be created automatically with preconfigured intents and entities to work with.

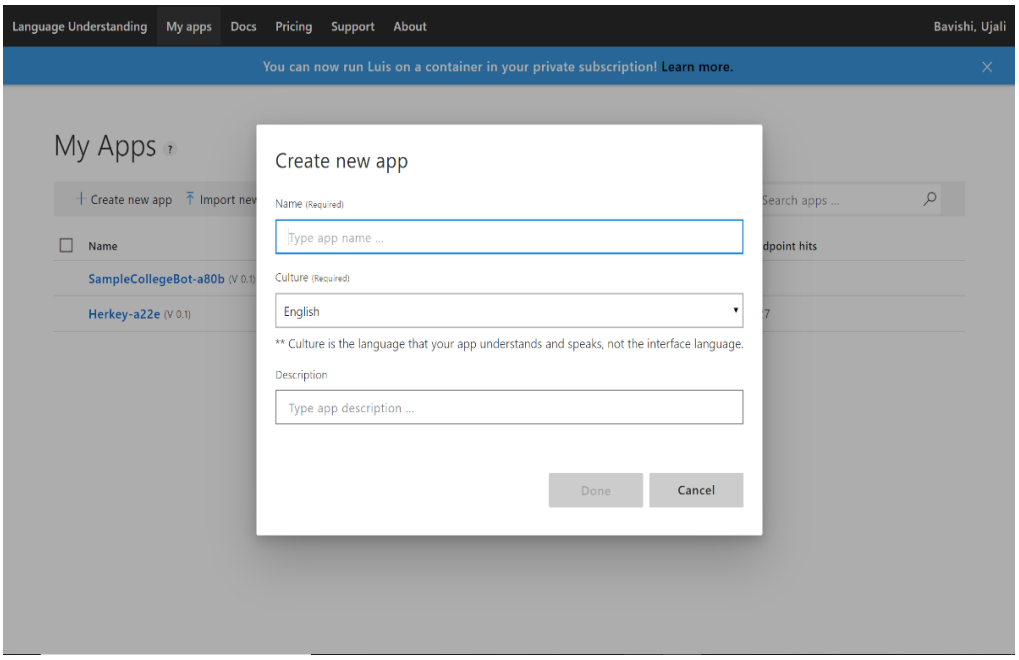


Figure 9: LUIS App Creation

3.2.2 Intents Creation

Go to created LUIS app and click on “Create new intent” and provide a specific intent name as shown in Figure 10. The next step would be to add training data to train the intent with all different types of utterances as shown in Figure 11.

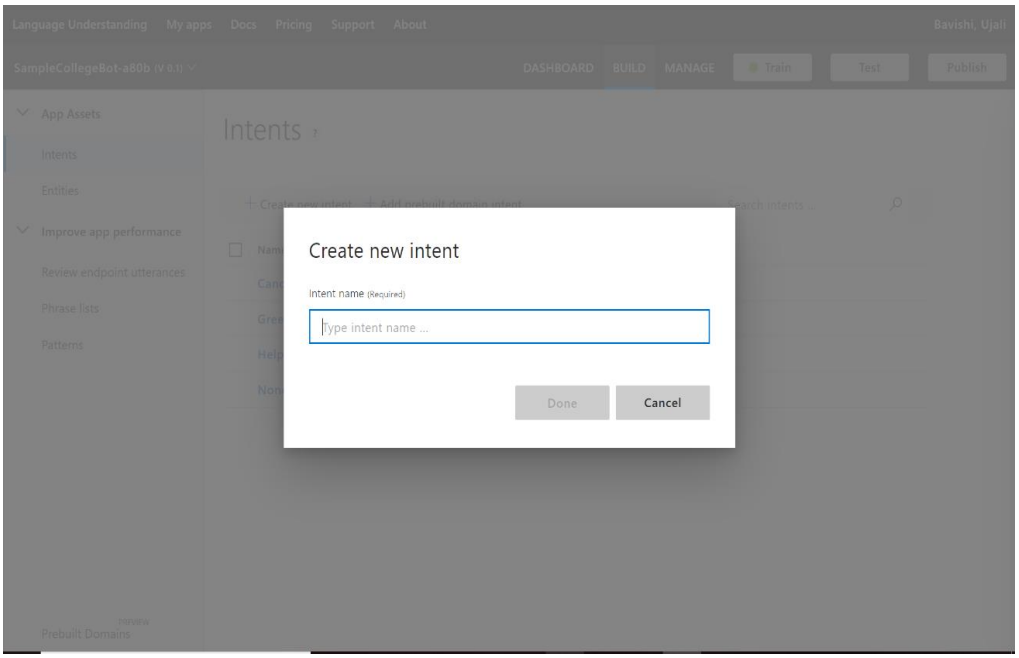


Figure 10: Intent Creation in LUIS

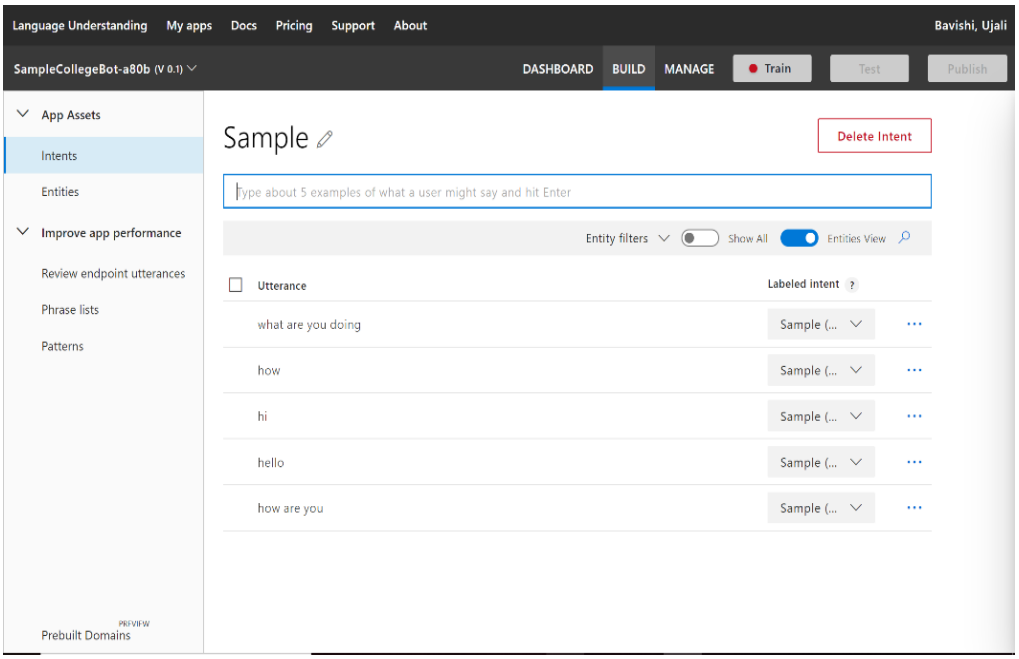


Figure 11: Adding Training Data to Created Intent

3.2.3 Entity Creation

In the left side pain, click on “entities” and then select “Create an Entity” and provide a name for the entity. In this project, a list type of entity is used since the professor and course values are stored in the entity sub list as shown in figures 12 and 13.

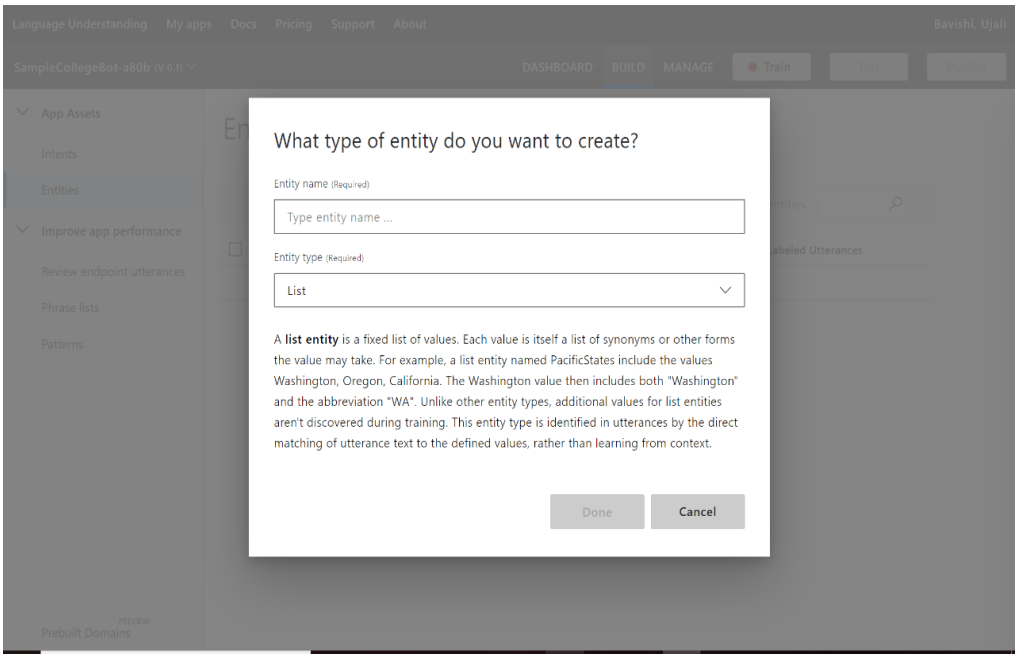


Figure 12: Entity Creation in LUIS - 1

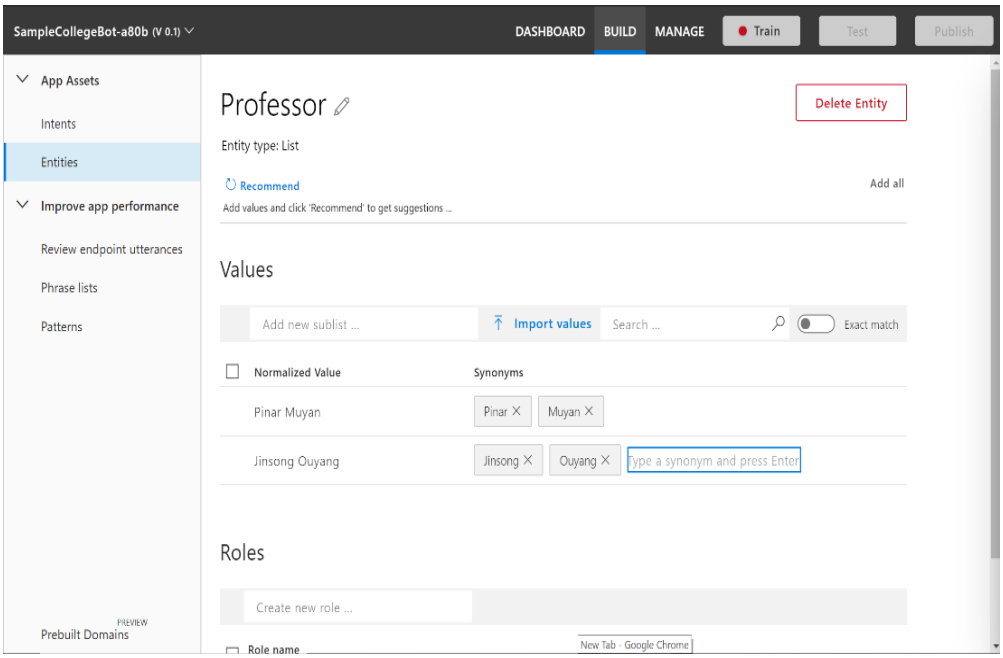


Figure 13: Entity Creation in LUIS - 2

3.2.4 Train and Publish the Model

After adding the intents and entities, the model is trained and published. After the model is published, REST API can be accessed from the service to access the LUIS endpoint to get the intent and entity from the user's query.

3.3 QnA Maker Setup

Go to https://www.qnamaker.ai to setup the questions and answers from the FAQs listed in any website and also to include some of the responses to be displayed depending on user's emotions based on some metadata.

3.3.1 QnA Maker App Creation

After visiting the website, sign in with the same Azure credentials, click on “Create a knowledge base” from the top navigation bar as shown in Figure 14. Then, follow the steps as shown in figures 15 and 16.

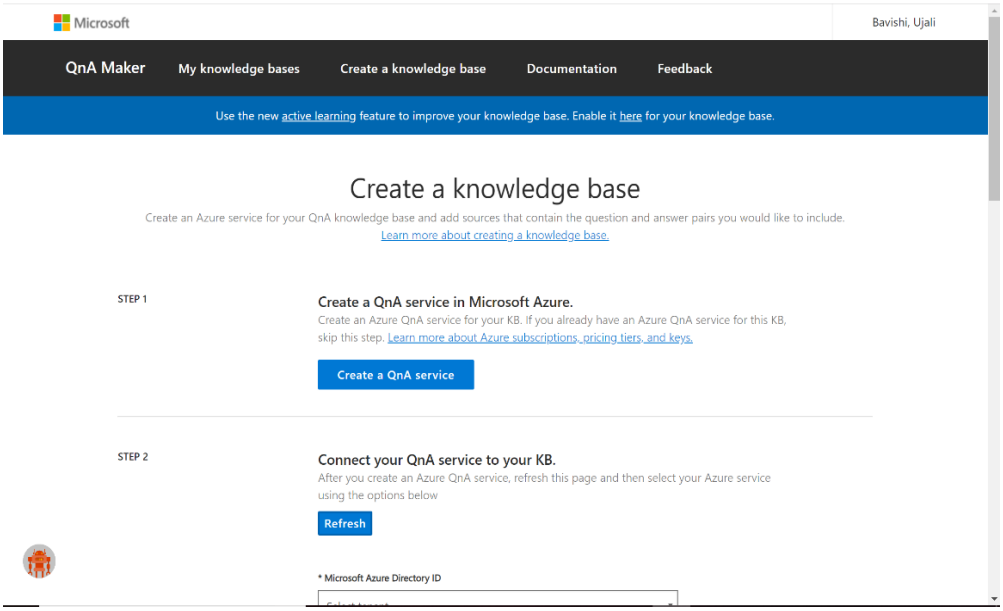


Figure 14: QnA Maker App Creation - 1

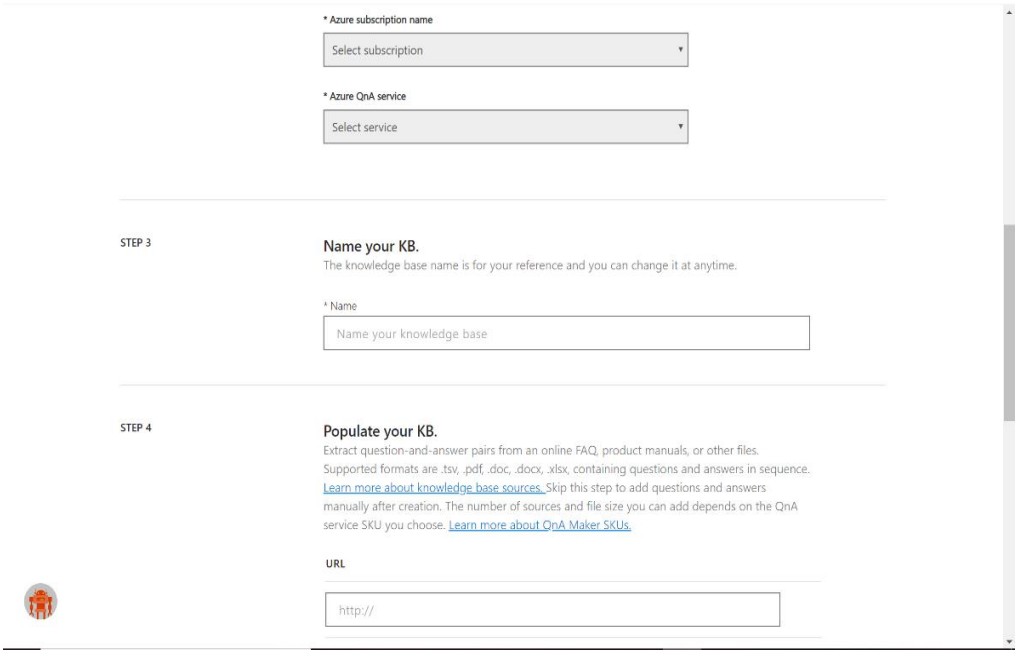


Figure 15: QnA Maker App Creation - 2

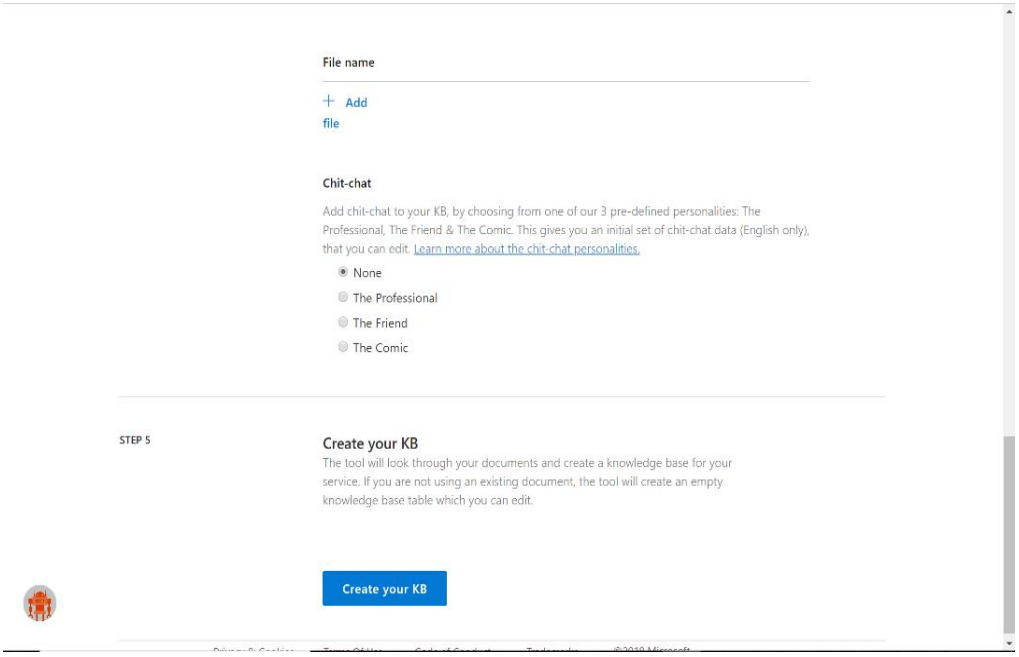


Figure 16: QnA Maker App Creation – 3

3.3.2 Add/Manage Knowledge base

Click on “Settings” from the top navigation and add FAQs URL from the CSUS website which are needed to be included in the knowledge base as shown in Figure 17

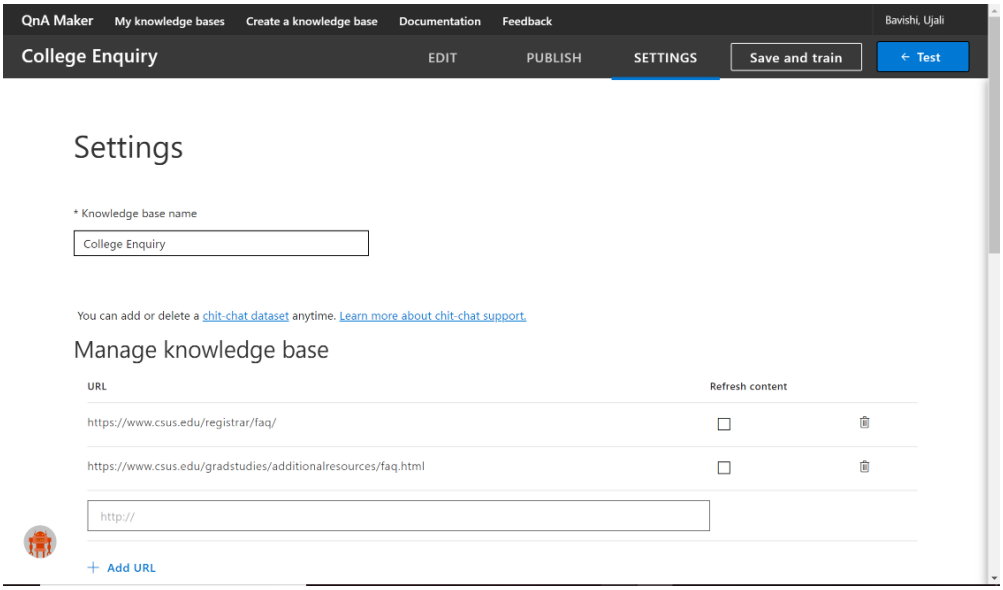


Figure 17: Knowledge Base Configuration Page

3.3.3 Train and Publish the Knowledge Base

After the knowledge bases are added, the next step is to train the app and publish to get a published endpoint to use the QnA Maker service.

3.4 Service Code Setup

I am using Azure DevOps to setup continuous deployment with a source control repository where the code will reside.

3.4.1 Create Project, Repository, and Branches

Sign in to Azure DevOps using the Azure account, create a new project and setup a repository based on the needs as shown in figures 18-20.

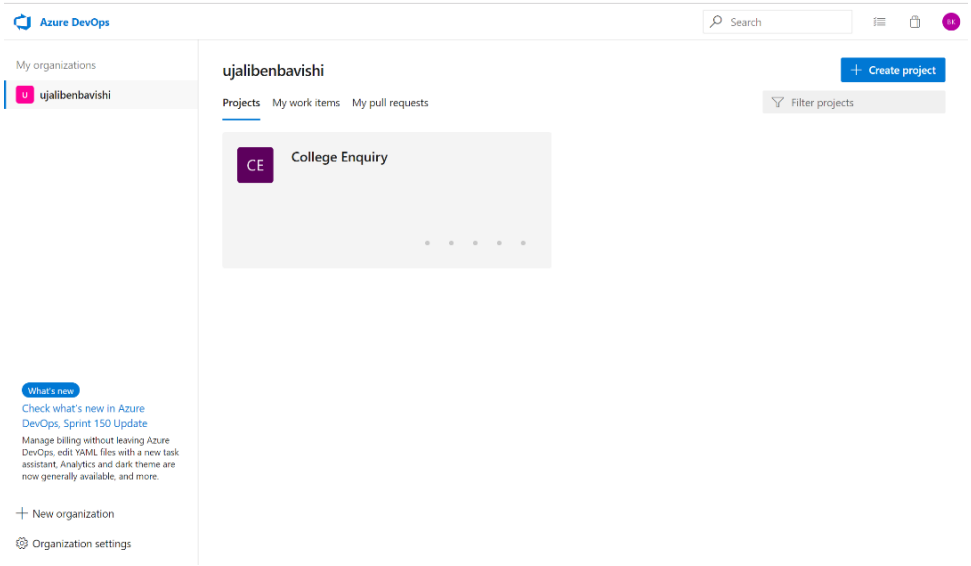


Figure 18: Azure DevOps Source Control Repo

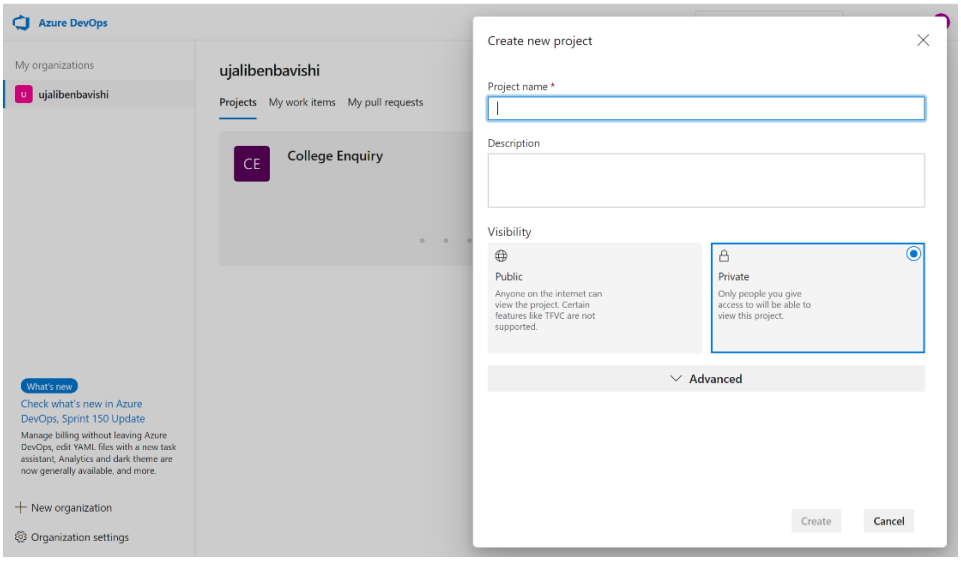


Figure 19: Project Creation on Azure DevOps

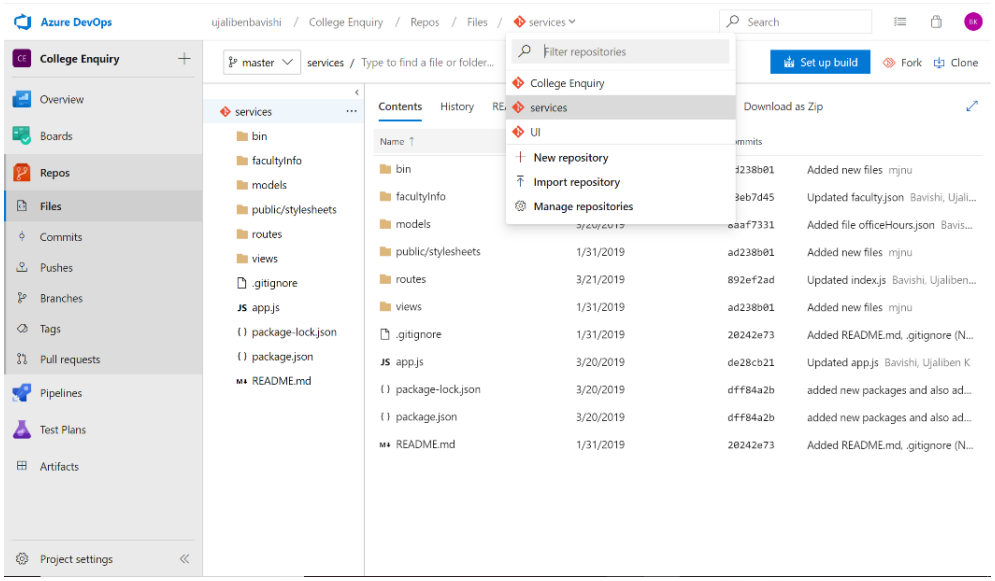


Figure 20: Repository and branch configuration in Azure DevOps Project

3.4.2 Sync Service Code with Azure DevOps

After the repository is setup, use Git clone functionality to clone the repo onto the local system and add all the files related to the service into the project. Finally, when a Git push is made from the same folder, all the files will be copied over to Azure DevOps.

3.5 Setup Continuous Deployment

As a last step, we need to configure the project created on Azure DevOps with the application created on Azure portal as shown in figures 21-24.

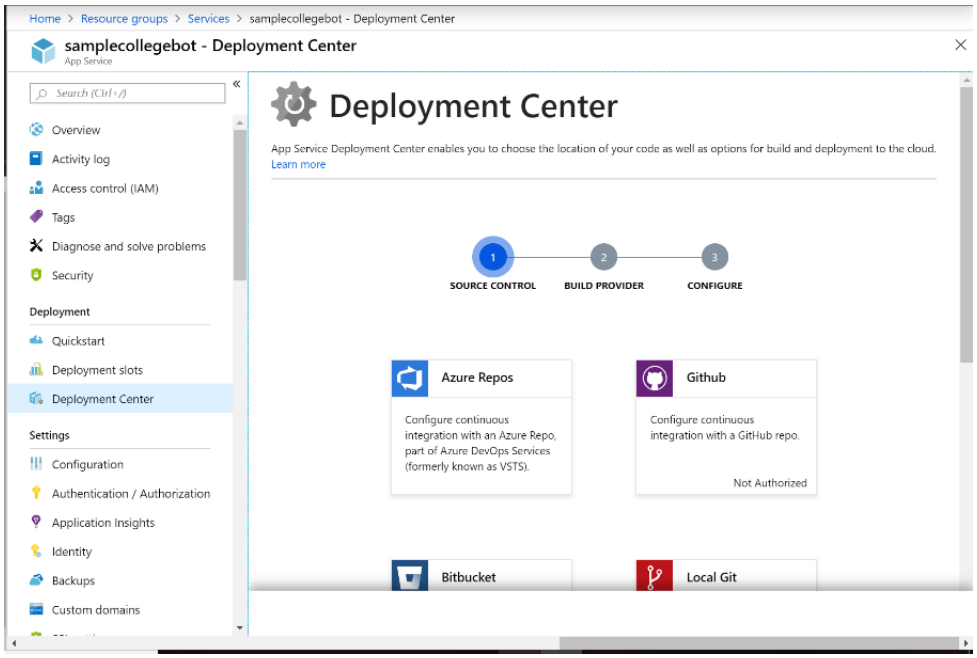


Figure 21: Continuous Deployment Configuration - 1

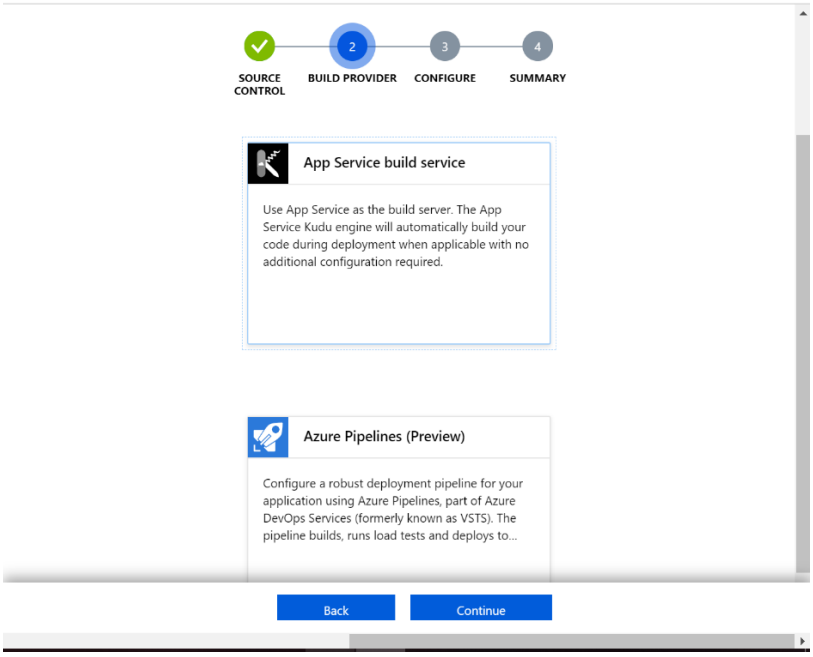


Figure 22: Continuous Deployment Configuration - 2

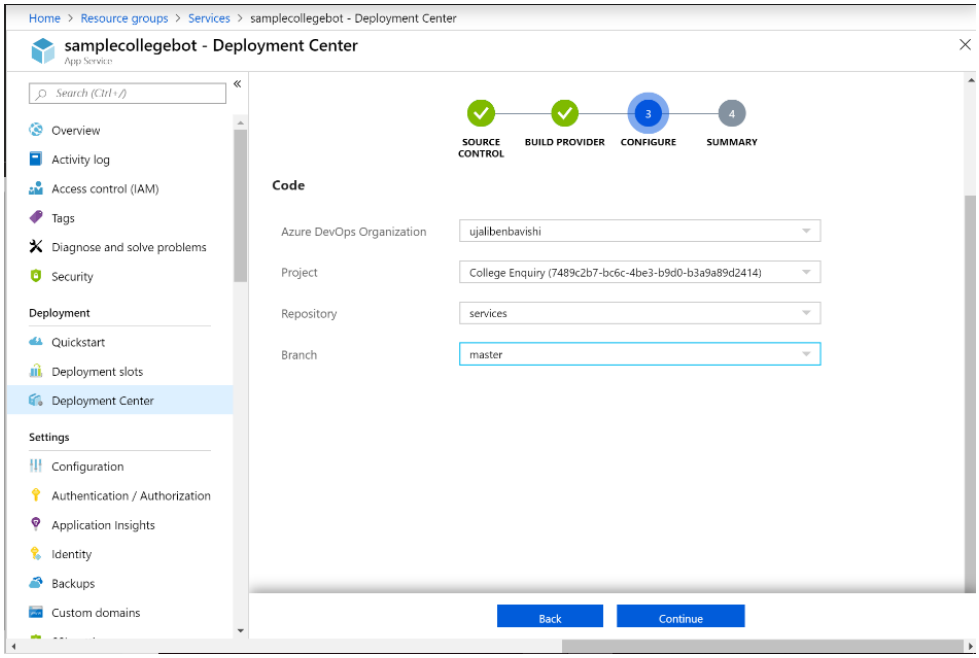


Figure 23: Continuous Deployment Configuration - 3

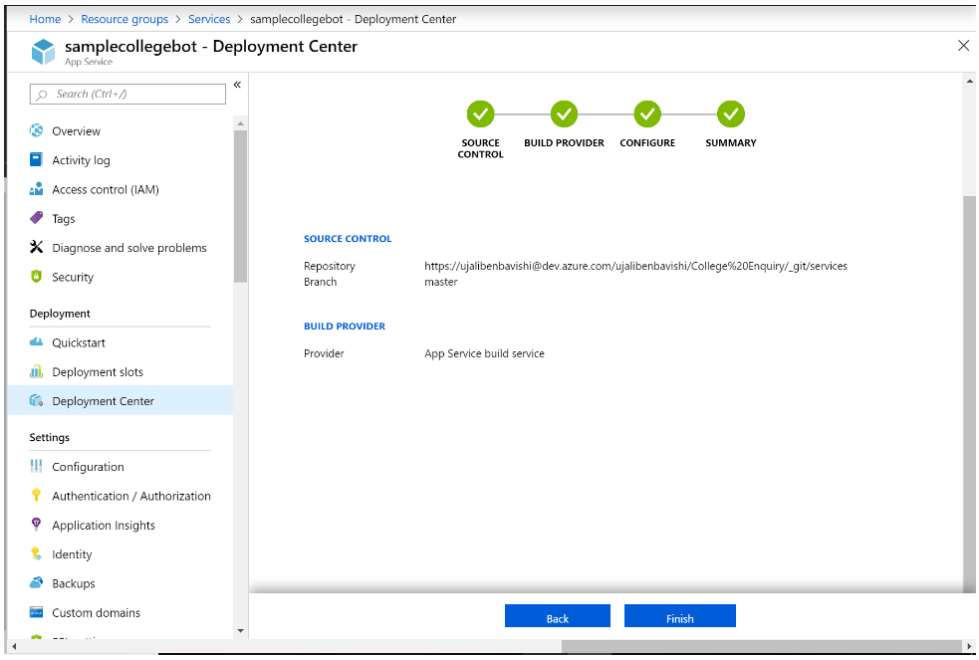


Figure 24: Continuous Deployment Configuration – 4

3.6 Service Code Snippets

In order to provide overview of the service code and some of the utility functions that are used by the bot, this section provides some screenshots. Figure 25 shows the overall structure of the code which utilizes NodeJS and ExpressJS frameworks.

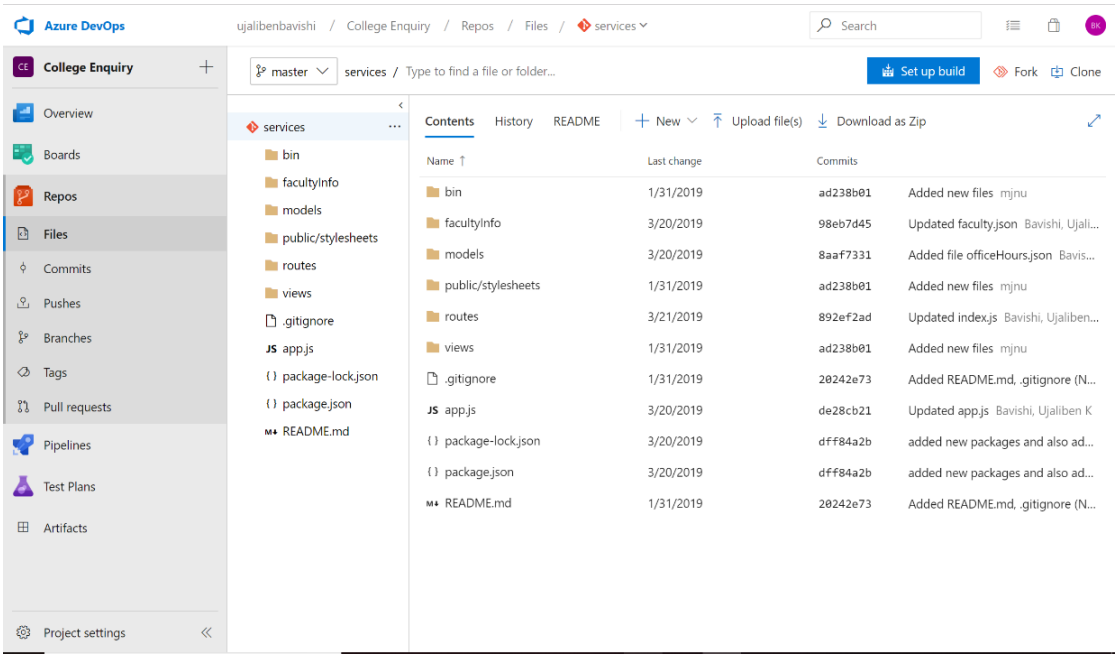


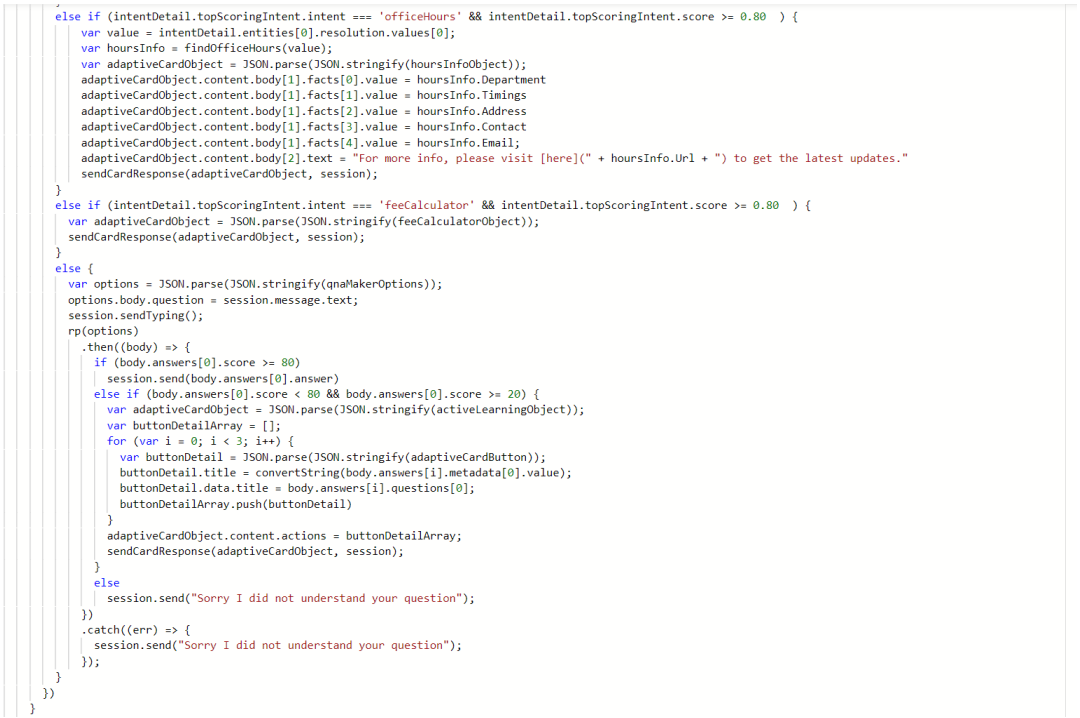
Figure 25: Code Structure Overview

Figures 26 and 27 show various functionalities including calling LUIS REST API, intercepting bot messages to save the chat history to the database and presenting the logic to show feedback card used in active learning.

```
bot.use({
  botbuilder: function (session, next) {
    if (session.message && session.message.value) {
      var studentType = session.message.value.studentType;
      var credits = session.message.value.credits;
      var registrationFee = 0;
      var totalFee = 0;
      if (studentType === "UnderGraduate") {
        if (parseInt(credits) > 6)
          totalFee = 3655 + parseInt(credits) * 396;
        else
          totalFee = 2449 + parseInt(credits) * 396;
      }
      else if (studentType === "Graduate") {
        if (parseInt(credits) > 6)
          totalFee = 4372 + parseInt(credits) * 396;
        else
          totalFee = 2866 + parseInt(credits) * 396;
      }
      var resp = "Based on your input, the total fees would be approximately $" + totalFee + ".00";
      session.send(resp);
    }
    else if (session.message && session.message.text !== "") {
      getIntentOptions.url = LuisModelUrl.concat(session.message.text);
      rp(getIntentOptions).then((result) => {
        var intentDetail = JSON.parse(result);
        console.log(result);
        var timeStamp = moment(new Date()).tz("America/Los_Angeles").format("MM/DD/YYYY hh:mm:ss a");
        var updates = {};
        if (intentDetail.sentimentAnalysis) {
          if (Math.round(intentDetail.sentimentAnalysis.score) === 1) {
            updates = { $setOnInsert: { startTimeStamp: timeStamp }, $set: { endTimeStamp: timeStamp }, $inc: { positive: 1 }, $push: { conversations: { $each: [{ "use
            }
            else {
              updates = { $setOnInsert: { startTimeStamp: timeStamp }, $set: { endTimeStamp: timeStamp }, $inc: { negative: 1 }, $push: { conversations: { $each: [{ "use
            }
          }
          else {
            updates = { $setOnInsert: { startTimeStamp: timeStamp }, $set: { endTimeStamp: timeStamp }, $push: { conversations: { $each: [{ "user": session.message.text,
          }
          insertIntoDb(session.message.address.conversation.id, updates)

          if (intentDetail.topScoringIntent.intent === 'courseInfo' && intentDetail.topScoringIntent.score >= 0.80  ) {
```

Figure 26: LUIS and Active Learning Logic - 1



```
    else if (intentDetail.topScoringIntent.intent === 'officeHours' && intentDetail.topScoringIntent.score >= 0.80  ) {
      var value = intentDetail.entities[0].resolution.values[0];
      var hoursInfo = findOfficeHours(value);
      var adaptiveCardObject = JSON.parse(JSON.stringify(hoursInfoObject));
      adaptiveCardObject.content.body[1].facts[0].value = hoursInfo.Department
      adaptiveCardObject.content.body[1].facts[1].value = hoursInfo.Timings
      adaptiveCardObject.content.body[1].facts[2].value = hoursInfo.Address
      adaptiveCardObject.content.body[1].facts[3].value = hoursInfo.Contact
      adaptiveCardObject.content.body[1].facts[4].value = hoursInfo.Email;
      adaptiveCardObject.content.body[2].text = "For more info, please visit [here](" + hoursInfo.Url + ") to get the latest updates."
      sendCardResponse(adaptiveCardObject, session);
    }
    else if (intentDetail.topScoringIntent.intent === 'feeCalculator' && intentDetail.topScoringIntent.score >= 0.80  ) {
      var adaptiveCardObject = JSON.parse(JSON.stringify(feeCalculatorObject));
      sendCardResponse(adaptiveCardObject, session);
    }
    else {
      var options = JSON.parse(JSON.stringify(qnaMakerOptions));
      options.body.question = session.message.text;
      session.sendTyping();
      rp(options)
        .then((body) => {
          if (body.answers[0].score >= 80)
            session.send(body.answers[0].answer)
          else if (body.answers[0].score < 80 && body.answers[0].score >= 20) {
            var adaptiveCardObject = JSON.parse(JSON.stringify(activeLearningObject));
            var buttonDetailArray = [];
            for (var i = 0; i < 3; i++) {
              var buttonDetail = JSON.parse(JSON.stringify(adaptiveCardButton));
              buttonDetail.title = convertString(body.answers[i].metadata[0].value);
              buttonDetail.data.title = body.answers[i].questions[0];
              buttonDetailArray.push(buttonDetail)
            }
            adaptiveCardObject.content.actions = buttonDetailArray;
            sendCardResponse(adaptiveCardObject, session);
          }
          else
            session.send("Sorry I did not understand your question");
        })
        .catch((err) => {
          session.send("Sorry I did not understand your question");
        });
    }
  })
}
```

Figure 27: LUIS and Active Learning Logic - 2

Figure 28 shows a sample file which contains basic information related to the course like course id, name, information, prerequisites, professor's name and URL of the course.

```
[
    {
        "Course Id": "CSC201",
        "Course Name": "Programming Language Principles",
        "Course Information": "Notations for the specification of programming language syntax and semantics; attribute, translational, operational, axiomatic, algebra
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Dr. Cui Zhang",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc201.pdf"
    },
    {
        "Course Id": "CSC204",
        "Course Name": "Data Models for Database Management Systems",
        "Course Information": "Database management system (DBMS) architecture. Database file organizations and access methods. The relational model and relational alg
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Bill Mitchell",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc204.pdf"
    },
    {
        "Course Id": "CSC205",
        "Course Name": "Computer Systems Structure",
        "Course Information": "Overview of computer systems structure, covering hierarchical structure from software and hardware points of view. Concepts of relocati
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Dr. Weide Chang",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc205.pdf"
    },
    {
        "Course Id": "CSC206",
        "Course Name": "Algorithms and Paradigms",
        "Course Information": "Design and analysis of algorithms. Classical design paradigms including greedy, divide-and-conquer, dynamic programming, and backtracki
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Dr. Chung-E Wang",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc206.pdf"
    },
```


Figure 28: Sample Course Details

Figure 29 shows a sample file which contains basic information related to the professors like name, office hours, location, and email.

```
[
{
    "Name":"Dr. Nik Faroughi, Department Chair (CSC)",
    "Location":"RVR 3018G",
    "Email":"faroughi@ecs.csus.edu",
    "Phone":"916-278-7628 ",
    "Office Hours": "M W F 11:00am-12:00pm",
    "Webpage":"https://athena.ecs.csus.edu/~faroughi/"
},
{
    "Name":"Dr. Scott Gordon, Assoc. Chair (CSC)",
    "Location":"RVR 3018F",
    "Email":"gordonvs@ecs.csus.edu",
    "Phone":"Use Email",
    "Office Hours": "W 2:00pm - 4:00pm",
    "Webpage":"https://athena.ecs.csus.edu/~gordonvs/"
},
{
    "Name":"Dr. Jinsong Ouyang, Graduate Coordinator (CSC)",
    "Location":"RVR 3018I",
    "Email":"jouyang@csus.edu",
    "Phone":"916-278-5769",
    "Office Hours": "Tu R 1:30pm - 3:00pm",
    "Webpage":"https://www.csus.edu/faculty/o/jouyang/"
},
{
    "Name":"Dr. Pinar Muyan-Ozcelik",
    "Location":"RVR 5008",
    "Email":"pmuyan@ecs.csus.edu",
    "Phone":"916-278-6713",
    "Office Hours": "Tu 3:00pm - 3:50pm, R 1:40pm - 3:50pm",
    "Webpage":"https://athena.ecs.csus.edu/~pmuyan/"
},
{
    "Name":"Dr. Haiquan Chen",
    "Location":"RVR 5018",
    "Email":"chenh@ecs.csus.edu",
    "Phone":"916-278-6087",
    "Office Hours": "M W 3:00pm - 4:00pm",
    "Webpage":"https://athena.ecs.csus.edu/~chenh/"
},
```


Figure 29: Sample Faculty Details

4 EXECUTION RESULTS

In this section, execution results of College Enquiry Chatbots are provided by listing several functionalities included in this project and explaining these functionalities with the help of the screenshots.

4.1 How to chat

To start chat with the chatbot, a student will have to go to the university website www.csus.edu and click on the question mark icon as shown in Figure 30.

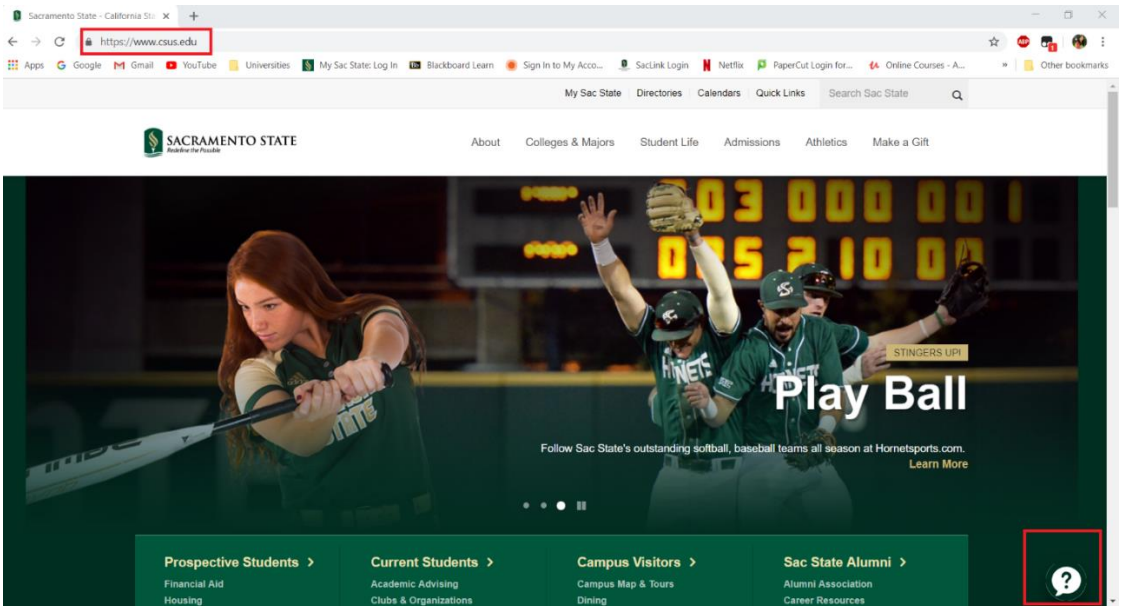


Figure 30: How to Chat

To have the chatbot on a live website, access to the codebase of a website is required. However, for now a software called Tampermonkey is used to inject the Java script into the browser.

4.2 Sentiment Analysis

Figures 31 and 32 show how a bot is answering the irrelevant questions of a user for which normal bots are not showing any kind of empathy. To make the bot to be able to respond these kinds of responses, the bot is trained with the chitchat integration which is provided by QnA Maker in which there are lots of questions and answers pairs are available.

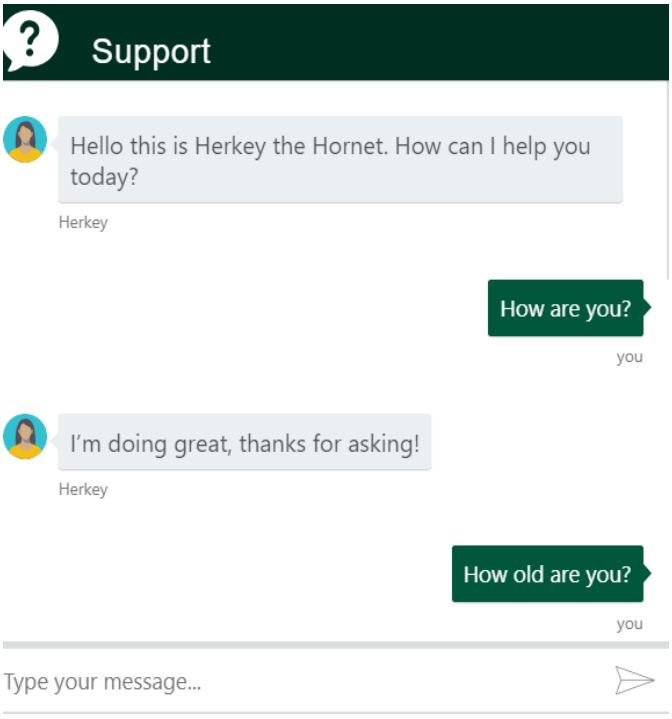


Figure 31: Friendly Conversations - 1

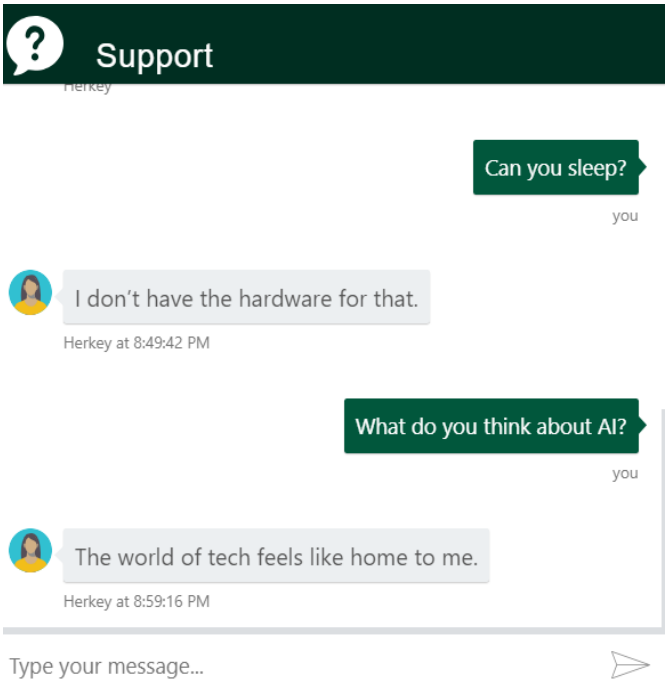
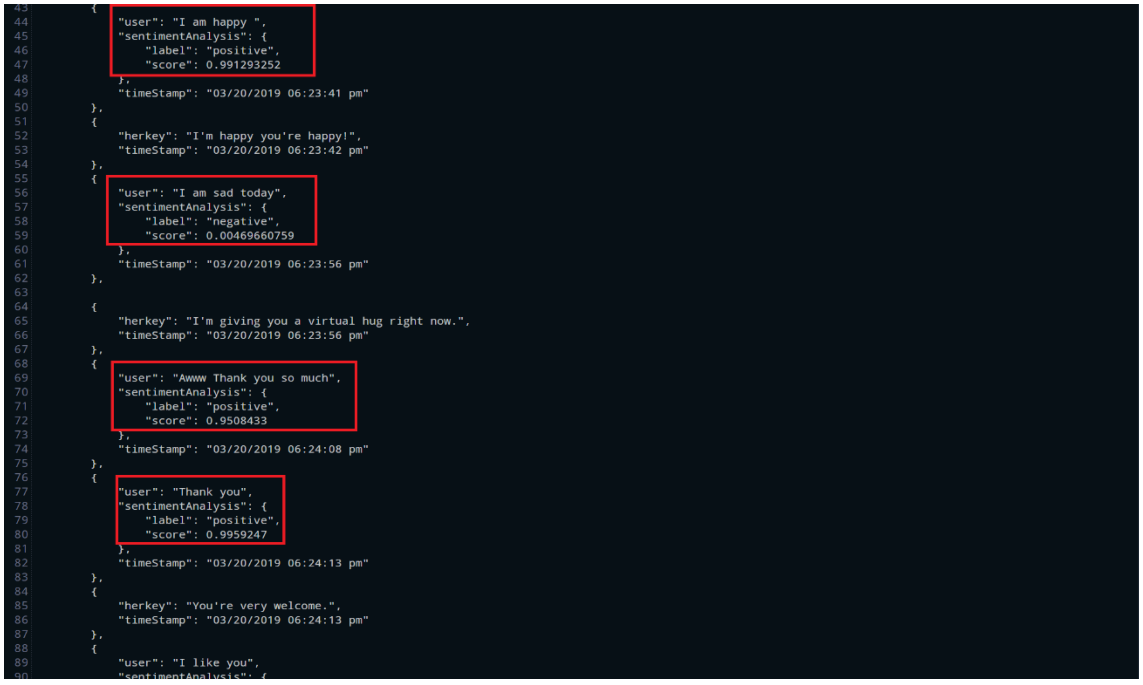


Figure 32: Friendly Conversations – 2

Figures 33 and 34 shows how conversations are being stored in the database and how LUIS performs sentiment analysis on user queries based on which it gives the response back to the user. A bot interceptor is used in the service where conversations are tracked and user's query is passed onto the LUIS endpoint which has an in-built sentiment analyzer to track whether the query is positive, negative or neutral. These results are then stored into the database for any further analysis.

```
{
    "_id": {
        "$oid": "5c92e666fca6e5e29a2628fd"
    },
    "sessionId": "GUOv9o6K91K6B03TidJJtH-g",
    "conversations": [
        {
            "herkey": "Hello this is Herkey the Hornet. How can I help you today?",
            "timeStamp": "03/20/2019 06:18:30 pm"
        },
        {
            "user": "What can you do?",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.843127966
            },
            "timeStamp": "03/20/2019 06:20:17 pm"
        },
        {
            "herkey": "I'm here to chat and to try to help out.",
            "timeStamp": "03/20/2019 06:20:18 pm"
        },
        {
            "user": "professor info",
            "sentimentAnalysis": {
                "label": "neutral",
                "score": 0.5
            },
            "timeStamp": "03/20/2019 06:22:47 pm"
        },
        {
            "herkey": "I can help you with that. Please provide the name of the Professor",
            "timeStamp": "03/20/2019 06:22:47 pm"
        },
        {
            "user": "Pinar Muyan",
            "sentimentAnalysis": {
                "label": "neutral",
                "score": 0.5
            },
            "timeStamp": "03/20/2019 06:23:00 pm"
        },
```


Figure 33: Sentiment Analysis on User Queries - 1



```
        {
            "user": "I am happy ",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.991293252
            },
            "timeStamp": "03/20/2019 06:23:41 pm"
        },
        {
            "herkey": "I'm happy you're happy!",
            "timeStamp": "03/20/2019 06:23:42 pm"
        },
        {
            "user": "I am sad today",
            "sentimentAnalysis": {
                "label": "negative",
                "score": 0.00469660759
            },
            "timeStamp": "03/20/2019 06:23:56 pm"
        },

        {
            "herkey": "I'm giving you a virtual hug right now.",
            "timeStamp": "03/20/2019 06:23:56 pm"
        },
        {
            "user": "Awww Thank you so much",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.9508433
            },
            "timeStamp": "03/20/2019 06:24:08 pm"
        },
        {
            "user": "Thank you",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.9959247
            },
            "timeStamp": "03/20/2019 06:24:13 pm"
        },
        {
            "herkey": "You're very welcome.",
            "timeStamp": "03/20/2019 06:24:13 pm"
        },
        {
            "user": "I like you",
```


Figure 34: Sentiment Analysis on User Queries – 2

4.3 Active Learning

Whenever a user asks anything which is outside of the script, the bot asks questions back to the user to understand what exactly user wants to ask and gives the responses accordingly. Figures 35 and 36 shows how a student has asked “on campus” randomly and then bot has asked question in return with three different options to understand what the user means. Once user has selected one of the options it did frame a question based on that option and gave the response to the user.

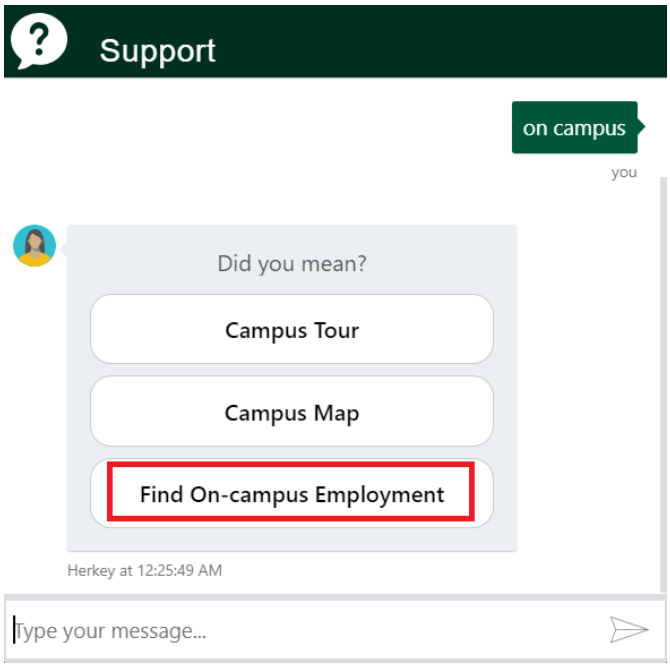


Figure 35: Active Learning - 1

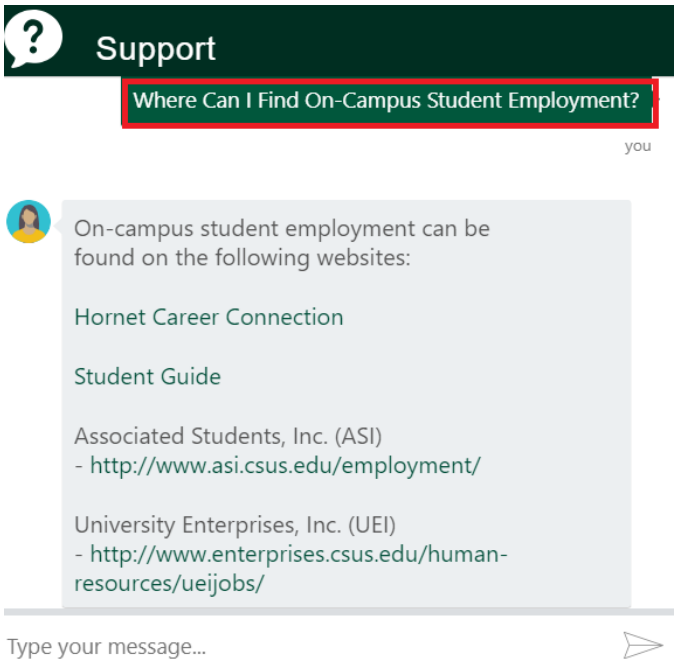


Figure 36: Active Learning – 2

4.4 Frequently Asked Questions

The system inserts FAQs related to academics, registration, records, evaluations/graduation, applications, current students, and campus information. Figures 37 and 38 show two different highlighted questions and answers from two different FAQ URLs which are added to QnA Maker.

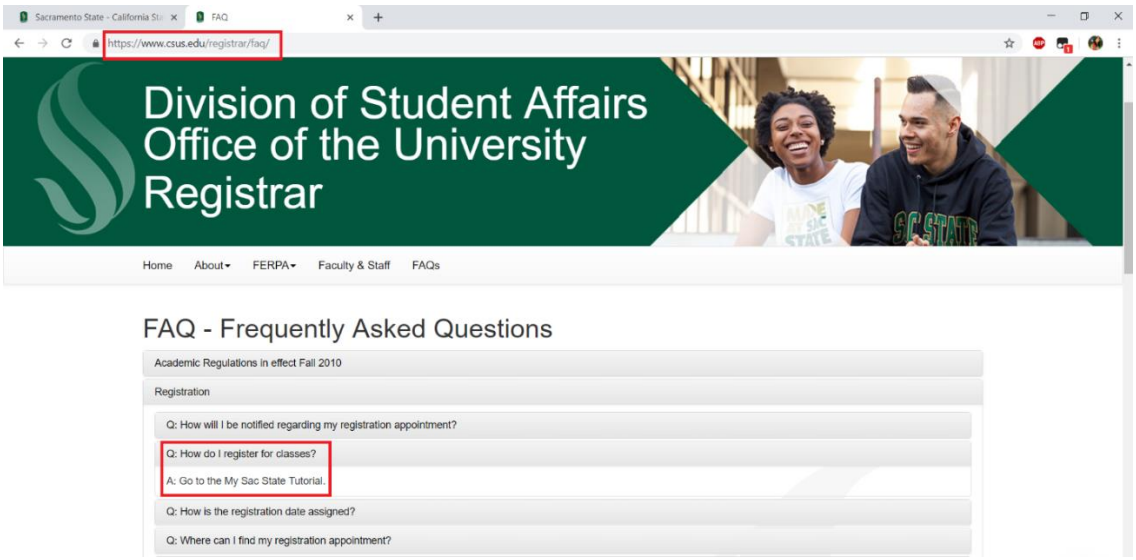


Figure 37: FAQs from Registrar

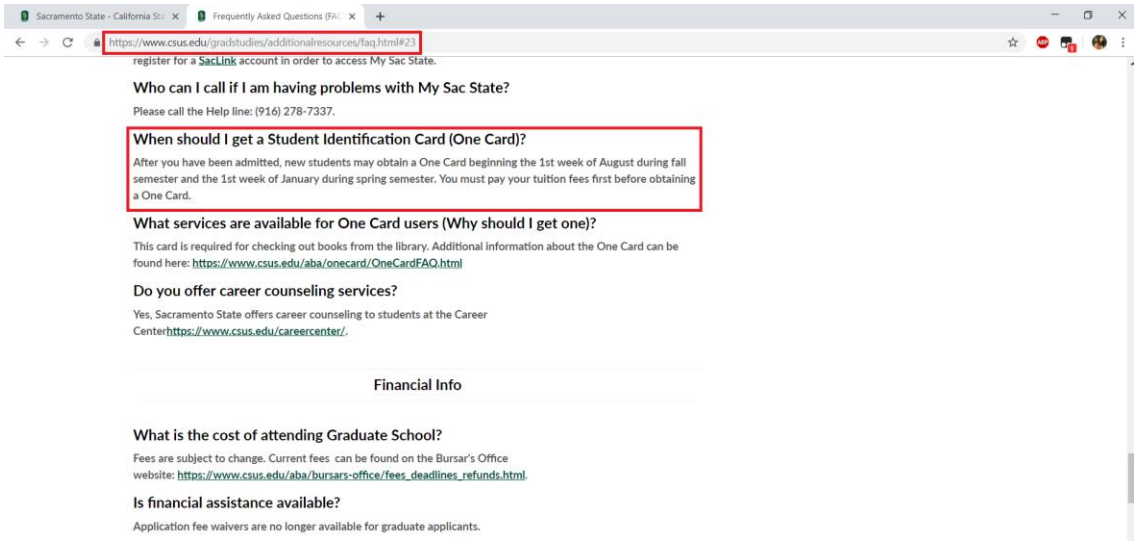


Figure 38: FAQ from Graduate Studies

Figure 39 shows how questions from FAQs are asked and responded in an exact same way. In this case, notice that a student does not have to ask an exact same question included in FAQs. This is the main advantage of an AI-powered chatbot.

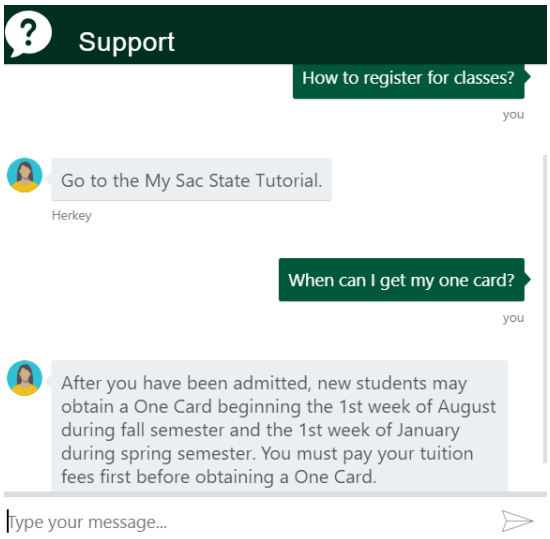


Figure 39: FAQs Asked to Chatbot

4.5 Course and Faculty Details

Figure 40 shows how chatbot is giving the information about course when asked. It shows name, overview, prerequisites, number of units, and professor of the subject. It also gives a course link to the student for more information.

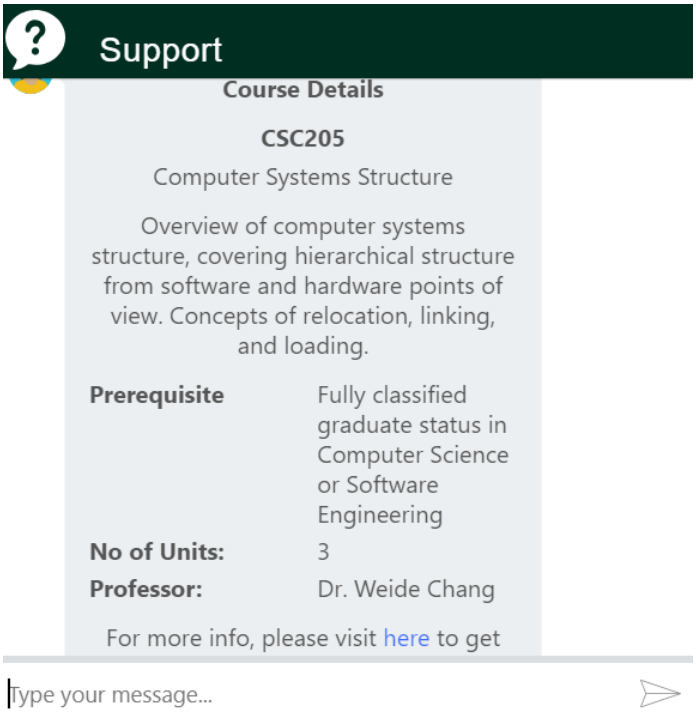


Figure 40: Course Information

Figure 41 shows the chatbot's response about office hours of a faculty. It gives all the necessary details about the faculty such as name, location of the office, email, phone, and office hours of the faculty. It also gives a link to the faculty's website for more information.

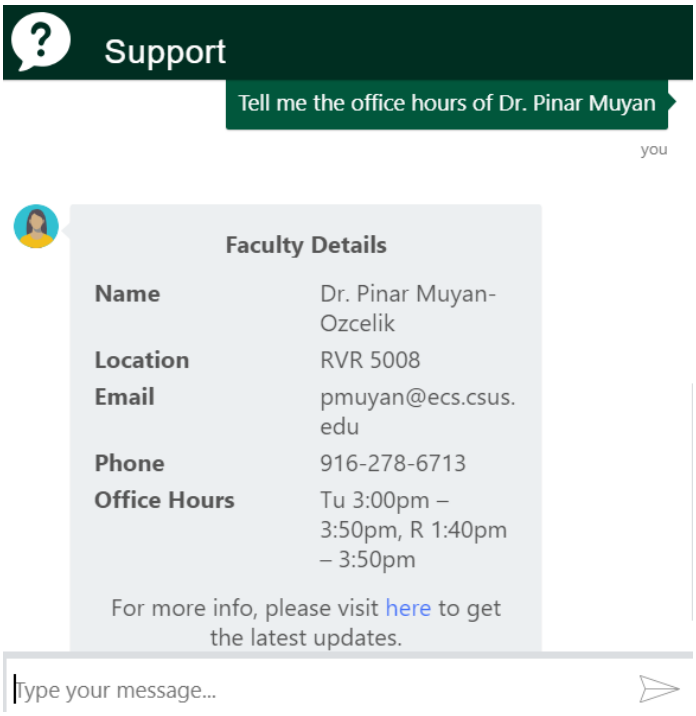


Figure 41: Faculty Information

4.6 Academic Calendar

Figure 42 shows how the bot gives a link to an academic calendar if a student is asking about all the holidays of the semester.

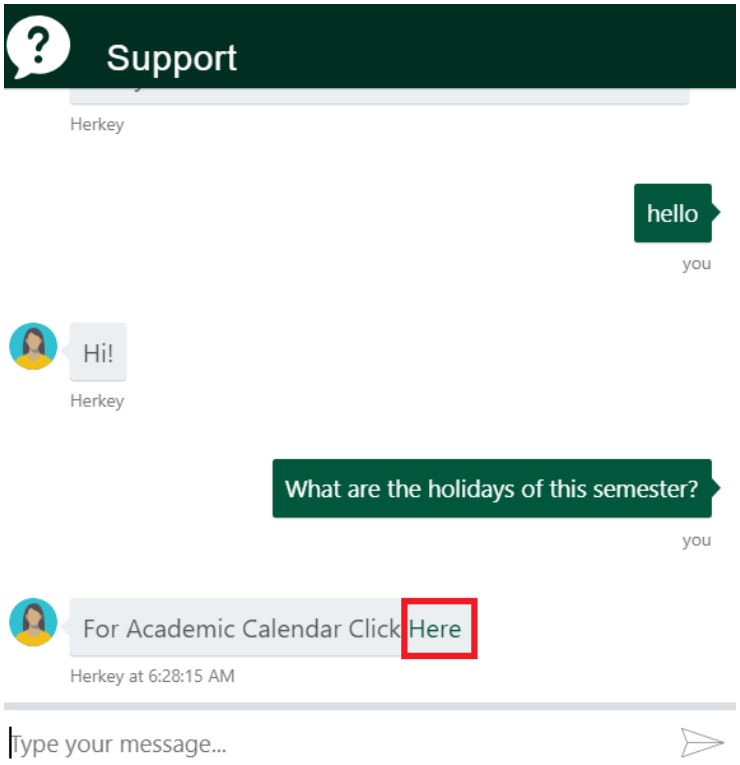


Figure 42: Academic Calendar

4.7 Fee Calculator

Figures 43 and 44 shows about the chatbot providing facility of calculating the fees by just selecting undergraduate or graduate and inserting number of units.

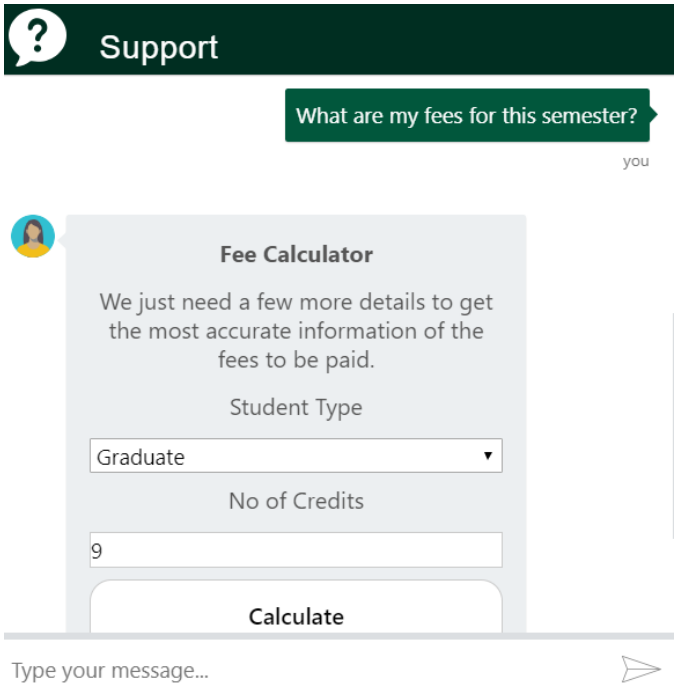


Figure 43: Fee Calculator – 1

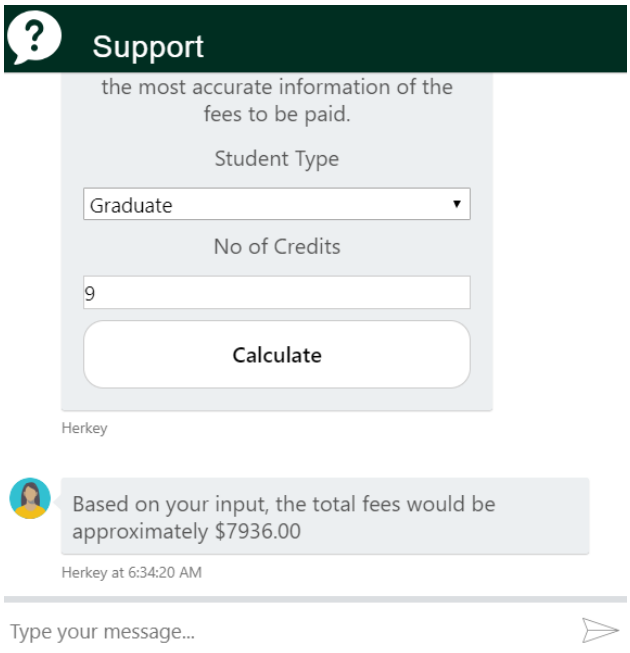


Figure 44: Fee Calculator - 2

4.8 Other Departmental Information

Figures 45 and 46 shows how the chatbot gives information about IPGE and Union office hours, address, contact info, and email. It also gives a link to the respected department for more information.

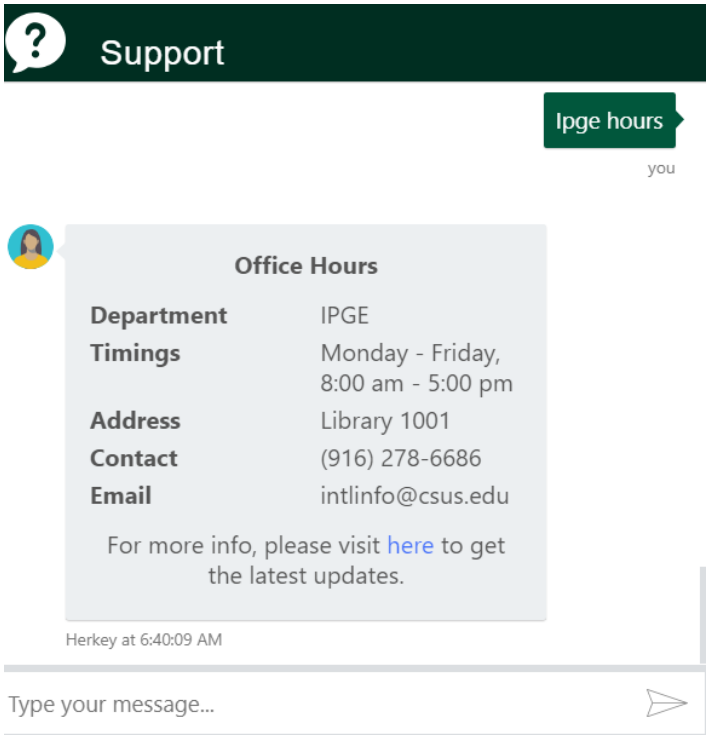


Figure 45: IPGE Hours Information

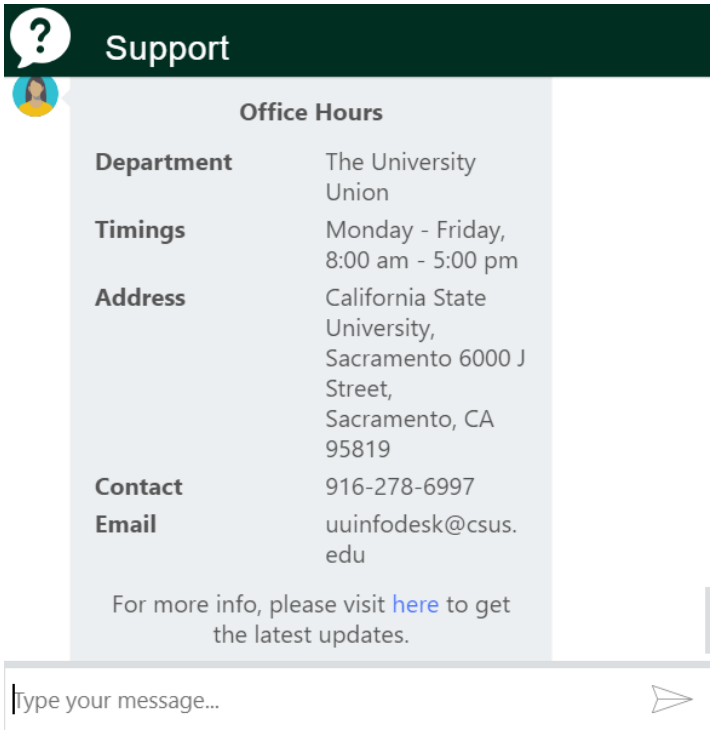


Figure 46: Union Hours Information

4.9 Results

The results of this project are measured in whether sentiment analysis and active learning is correctly implemented or not. Sentiment analysis correctly recognizes the user's query such as positive, negative, and neutral by storing all the conversations in the database (as shown in Figures 33 and 34). These results are used to add empathy to the bot. However, the system was partially successful in adding empathy to the bot. It is because, although large amount of data was added to include some common answers to the queries which are off scripts and to add empathy to the bot (so that it understands what is the current mood of the user and responds accordingly), since scope of these queries is vast, the system

requires more rigorous data to handle all the questions which are out of script. This can be illustrated in the Figure 47 where the bot understood that I am in a negative sentiment, so it answered with a proper response. But, it did not understand the meaning of 'I am excited' since bot did not have any training data related to the typed query as shown in Figure 48.

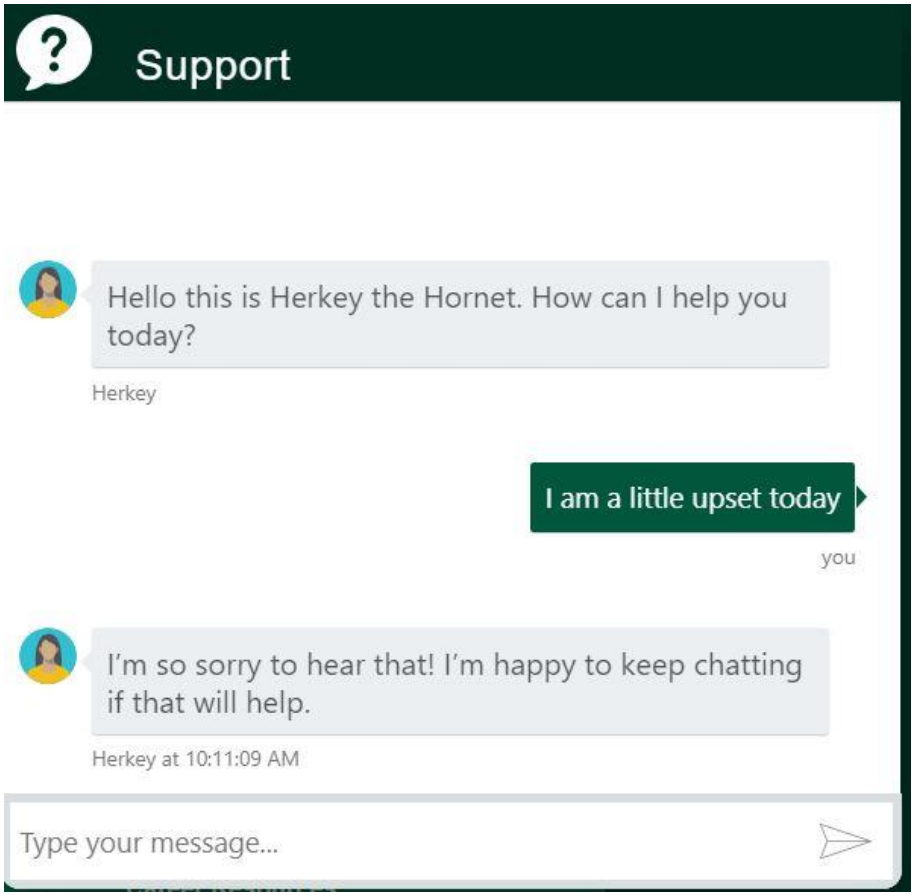


Figure 47: Bot successfully detecting the sentiment of the query

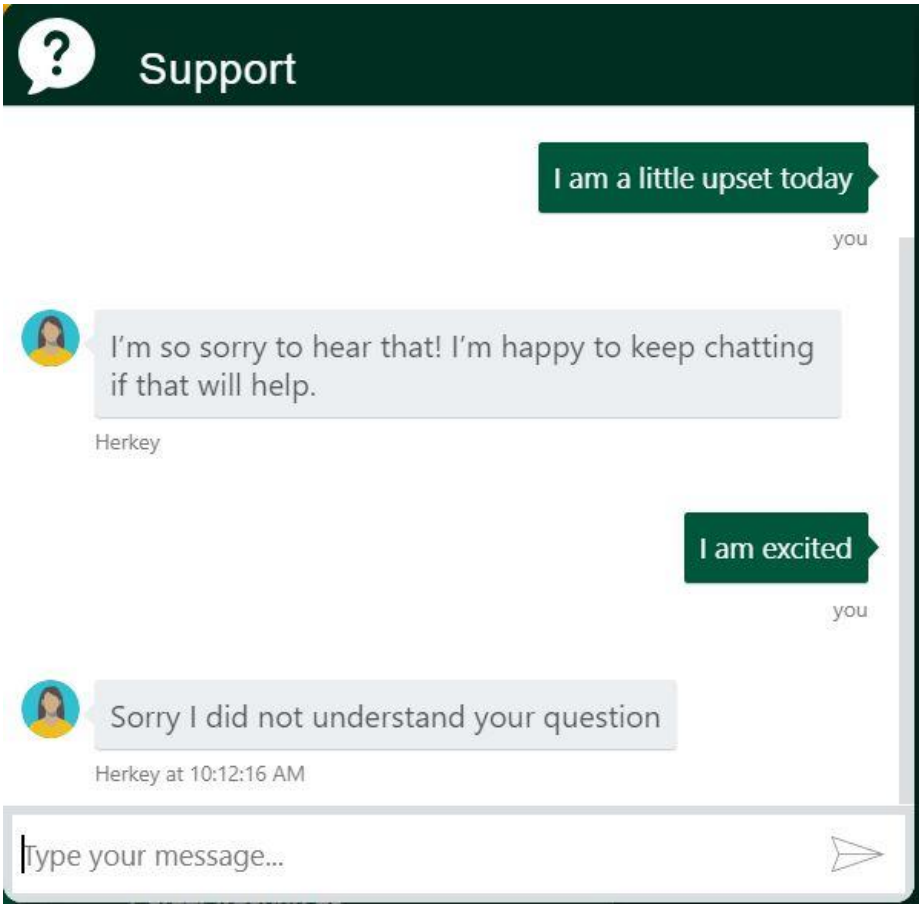


Figure 48: Bot failed to detect the sentiment of the query

On the other hand, active learning helps to improve the bot performance for handling off-script queries. It correctly understands the user's questions, asks clarifying question, and then re-trains the NLP to give response what the user is intended to get.

5 CONCLUSION AND FUTURE WORK

To conclude, College Enquiry Chatbot is helpful in guiding students with correct and most up to date sources of information. It is advantageous for international applicants for queries such as fee payment and academic matters. Students can get the information at their fingertips rather than visiting college office. It improves efficiency by taking over tasks for which humans are not essential.

Sentiment analysis implemented in College Enquiry Chatbot correctly recognizes the user's query such as positive, negative, and neutral by storing all the conversations in the database. However, the system was partially successful in adding empathy since scope of these queries is vast and the system requires more rigorous data to handle all the questions which are out of script. Nevertheless, active learning helps to improve the bot performance for handling off-script queries.

To improve the current functionalities of College Enquiry Chatbot, in the future, the scope of the chatbot can be increased by inserting data for all the departments, training the bot with varied data, testing it on live website, and based on that feedback inserting more training data to the bot. Some of the new features which can be added to the bot are 1) speech recognition feature through which students can ask their queries verbally and get the answers from the bot, 2) integration with multiple channels such as phone call, SMS, and various social media platforms like Skype, Facebook and Twitter, 3) handling context aware and interactive queries in which bot will be aware of the context of an ongoing conversation with a student, 4) integration with services such as password reset and course

enrollment, and 5) adding a capability for the bot to perform analytics based on user's sentiment based on which the bot can be re-trained on human emotions so that more empathy can be added to the bot.

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College Enquiry Chat-Bot System

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***Abstract*—Nowadays, many people are using smartphone with many new applications i.e. technology is growing day by day. Today Artificial Intelligence is playing a major role in a variety of fields ranging from industries in product manufacturing, to customer care in public relations. As there are many online Artificial Intelligence (AI) systems or chat bots which are in existence that help people solve their problems. So, we are going to implement a virtual assistant based on AI that can solve any college related query. This will work as a College Oriented Intelligence machine. This virtual machine will respond the queries of students on college related issues. A chat bot has information stored in its database to identify the sentences and making a decision itself as response to answer a given question. The college enquiry chat bot will be built using algorithm that analyses queries and understand user's message.**

Keywords— Artificial Intelligence, Database, Intelligence Machine.

I. INTRODUCTION

A chatbot is a software application used to conduct an on-line chat conversation via text or text-to-speech, in lieu of providing direct contact with a live human agent. Designed to convincingly simulate the way a human would behave as a conversational partner [14]. Bots can be created by using language like Artificial Intelligence Mark-up Language(AIML), a language based on XML that allow developer's write rules for the bot to follow. Another drawback is writing rules for different scenarios is very time consuming and it is impossible to write rules for every possible scenario. So these bots can handle simple queries but fail to manage complex queries is stated in paper [7]. In paper [2] the chat-bot system is been proposed and designed using chat fuel platform and integrated in Facebook page. The chatbot has been designed to provide students feel like talking to the staff from college and their queries are addressed through the conversational text. Responses can be provided to the user in text format, pictures and with many more features provided by the chat fuel. The setup AI feature makes the bot smart and answers the queries of user [2].

The purpose of developing this project is based on an intellectual chat-bot system which will deal with the academic activities like admission enquiry, fees structure, scholarship details, time-table of every department, details of the documents required to attach etc. With this chat-bot system it will be easy for the student to directly clear their queries in lesser time.

II. LITERATURE SURVEY

A literature survey is a comprehensive summary of previous research on a topic. The literature review surveys scholarly articles, books, and other sources relevant to a particular area of research. It should give a theoretical base for the research and help you (the author) determine the nature of your research. [14]

Prof. Ram Manoj Sharma [2] proposed a college enquiry chatbot system which has been built by using Artificial Intelligence algorithms. The bot analyses user's query and understands user messages. The system has modules like Online chatbot, Online Noticeboards etc[2].

P.Nikhila, G.Jyothi, K.Mounika, Mr. C Kishor Kumar Reddy and Dr. B V Ramana Murthy [3], they have designed using AIML (Artificial Intelligence Mark-up Language) to make response to queries. AIML is employed to make or customize alicebot that could be a chat-bot application supported ALICE free code [3].

Harsh Pawar , Pranav Prabhu, Ajay Yadav, Vincent Mendonca , Joyce Lemos [6], a chatbot is designed by them using knowledge in database. The proposed system has Online Enquiry and Online Chatbot System. The development is done using various programming languages by creating a user friendly graphical interface to send and receive response. The main purpose is it uses SQL (Structured Query Language) for pattern matching which is been stored in program [6].

Nitesh Thakur, Akshay Hiwrale, Sourabh Selote, Abhijeet Shinde and Prof. Namrata Mahakalkar [10], proposed an artificial chatbot using NLP (Natural Language Processing) which can be done in two ways the first via written text and the second is via verbal or voice communication. Written communication is much easier than the verbal communication. This paper introduces an interest in some emerging capabilities for evolving speed understanding and processing in virtual human dialogue system [10].

III. PROPOSED METHODOLOGY

The proposed methodology makes use of both qualitative and quantitative perspectives, and includes a broad array of approaches such as literature reviews, expert opinions, focus groups, and content validation [14].

The proposed system will have the following modules:

A] Online Enquiry:

Students can enquire about facilities and query related to exams, academics, fee structure, etc.

Students can also ask questions related to placement activities.

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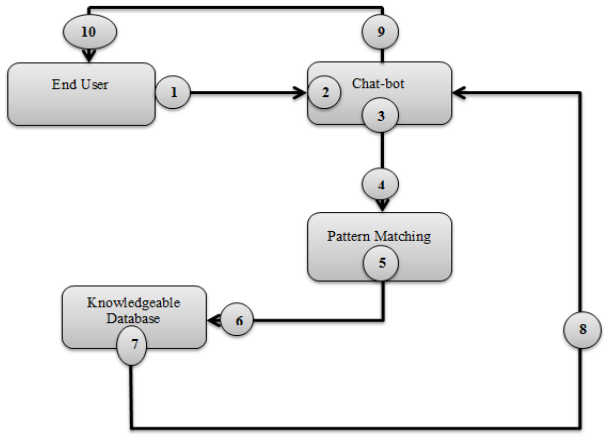
B] Online Chatbot:

The result can be showed in the form of images and card format or in text format. The query will be answered on the basis of questions asked and the language model built and also the response media created.

Users that want to enquire about the college at the time of admission or any competition held in the college can query to the chat-bot.

Given below is the system architecture of this chat-bot:



The basic algorithm that will be implemented for working of this proposed system is as follows:

Step 1: Start.

Step 2: Get the input query from the user.

Step 3: The query is pre-processed. E.g. suppose there is this query “what are the project domains for CSE fourth year major projects.” So, we are going to remove these stop words like “are”, “the” using pre-processing technique.

Step 4: Fetch the remaining keywords from the query.

Step 5: Match the fetched keywords with the keywords in Knowledge base, and provide an appropriate response.

Step 6: Further the Database module is used to call proper services using entity information to find proper data.

Step 7: The keywords will be matched with the help of keyword matching algorithm.

Step 8: It returns the query response to the bot.

Step 9: Chat-bot packages the data into proper response for display by the client.

Step 10: Exit

IV. CONCLUSION

The goal of the system is to help the students to stay updated with their college activities. Artificial Intelligent is the fastest growing technology everywhere in the world, with the help of Artificial Intelligent and Knowledgeable database. We can make the transformation in the pattern matching and virtual assistance. This system is developing chat bot based on android system so with the combination of Artificial Intelligent Knowledgeable database and virtual assistance. We can develop such chat bot which will make a conversion between human and machine and will satisfy the question raised by user. The main motive of the project is to reduce the work load on the college's office staff and reduce the response time to a user's query.

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ARTIFICIAL INTELLIGENCE BASED COLLEGE ENQUIRY CHATBOT

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ABSTRACT

A chat bot is a computer program that may initiate conversations between people and other computers. With chatbot technology, it is text-based and may be utilized securely by a bigger audience. Chatbots for university research are developed using synthetic algorithms that interpret user messages and assess user demands. The goal of the chatbot's responses is to match the user's input while avoiding making oneself physically available to the institution in response to queries. The system uses its intelligence to answer to the pupils' questions.

Keywords: Artificial Intelligence, College Enquiry, Deep Learning, Cloud Computing, Machine Learning.

I. INTRODUCTION

The objective of AI (Artificial Intelligence) is to establish natural communication between humans and robots. The fastest-growing field of AI today is dialogue systems, sometimes known as interactive conversation systems. A chatbot is a programmer that uses artificial intelligence techniques like Natural Language Processing (NLP), video and image processing, and audio analysis to simulate human conversations in their natural format, including text. The artificial intelligence algorithms that will be used to create this project will study user demands. The system assists with university-related tasks including anniversary, sports day, admission, and other cultural events activities by responding to the user through an efficient graphical user interface (GUI). It will make it easier for users and students to stay informed about university events.

II. LITERATURE SURVEY

A chatbot system for college inquiries that has been created using artificial intelligence algorithms was developed by Prof. Ram Manoj Sharma [2]. The bot interprets user communications and analyses user queries. The system includes modules such as online chatbots and noticeboards, among others [2].

AIML (Artificial Intelligence Mark-up Language) has been created by P. Nikhila, G. Jyothi, K. Mounika, Mr. C. Kishor Kumar Reddy, and Dr. B. V. Ramana Murthy [3] to make responses to enquiries. To create or modify Alice Bot, which might be a chat-bot program supported by ALICE free code, AIML is used [3].

The suggested system by Payal Jain will be built on the Alice and AIML algorithm and be used to find solutions to user-submitted queries. It is necessary to create a database where all relevant data will be kept, as well as a user interface. One section of the Android interface will be designed for basic users, while the other will be for the administrator. A background investigation was conducted, which covered an overview of the conversation process and any existing chatbots that were pertinent. We'll create a database to house data about queries, responses, keywords, logs, and feedback messages [4].

A chatbot was created by Harsh Pawar, Pranav Prabhu, Ajay Yadav, Vincent Mendonca, and Joyce Lemos [6] utilizing knowledge from a database. The suggested solution includes an online inquiry and chatbot technology. A user-friendly graphical interface is developed utilizing a variety of computer languages to transmit and receive responses. The primary objective is to match patterns contained in the application using SQL (Structured Query Language) [6].

Using NLP (Natural Language Processing), which may be done in two ways—the first via written text, and the second by verbal or vocal communication—Nitesh Thakur, Akshay Hiwrale, Sourabh Selote, Abhijeet Shinde, and Prof. Namrata Mahakalkar presented an artificial chatbot. Verbal communication is far more difficult than

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written communication. The interest in certain newly developed understanding and processing speed capabilities for growing speed in virtual human dialogue systems is introduced in this research [10].

III. METHODOLOGY

This system is an online program that responds to user questions. It uses a chatbot with artificial intelligence that acts as a substitute for awareness to respond to inquiries about colleges. Technologies for natural language processing are used to filter, stem, and tokenize the content of complaints. The system analyses the question and, following the client's responses, provides an answer that appears to have been provided by a real person. The system can also respond to the student's general questions. The following flow chart can be used to understand the algorithm of the entire system.

IV. MODELING AND ANALYSIS

Login Module

In this portal, student will able to login into system by providing its username and password.

Sign Up Module

The sing up module in this block student can able to register a new account into system by entering details like Name, Branch Semester, Year, Photo, Roll No., etc.

Chat Bot Interface Module

It is providing an effective Graphical user interface which implies that as if a real person is talking to the user and this module can be accessible through anywhere the student just has to enter the query in chat section which the user can chat by ask queries related to college and department related activities.

Chat Bot Engine Module

This section is responsible to answer the student query in this module we are going to use machine learning power and will create one ML model which will responsible to answer the student query and it uses the Artificial Intelligence and NLP to understand the user intention and answers their query.

Google web scrapper

We will create our own scrapper which will responsible to fetch result of subject related query from google.

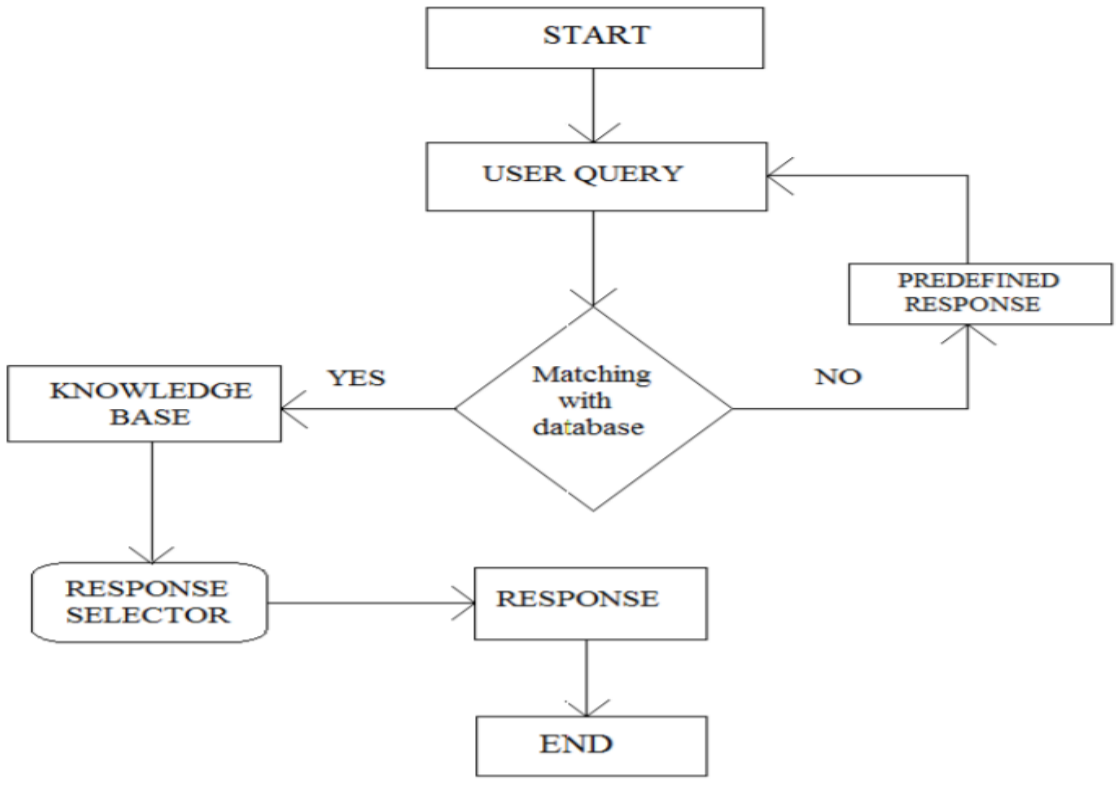

Figure 1: DFD

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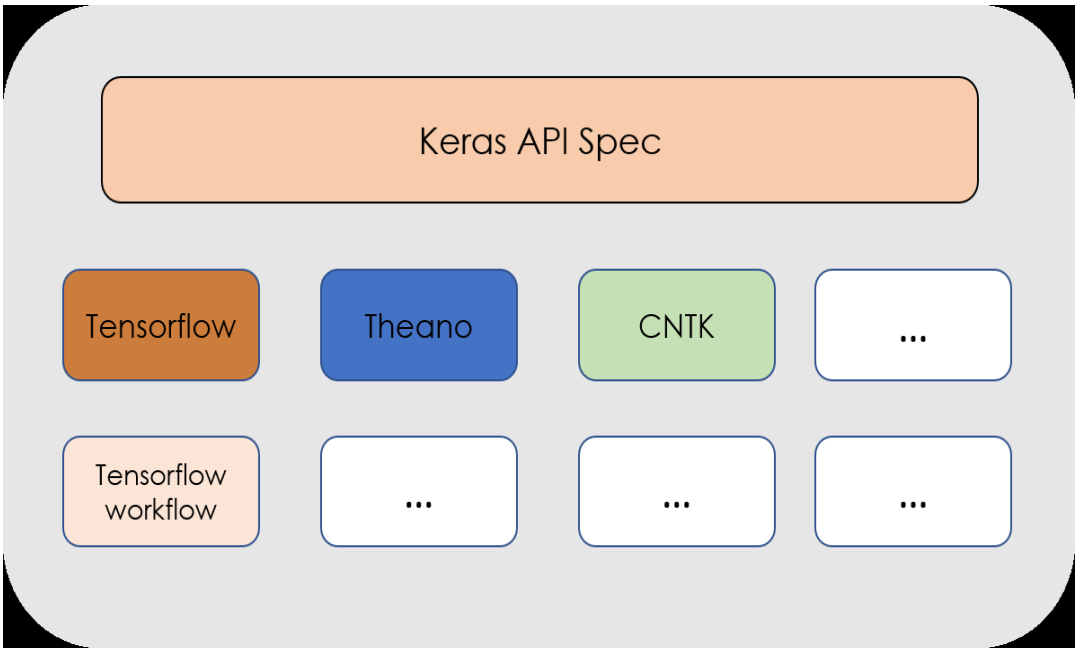

Figure 2: Algorithm architecture

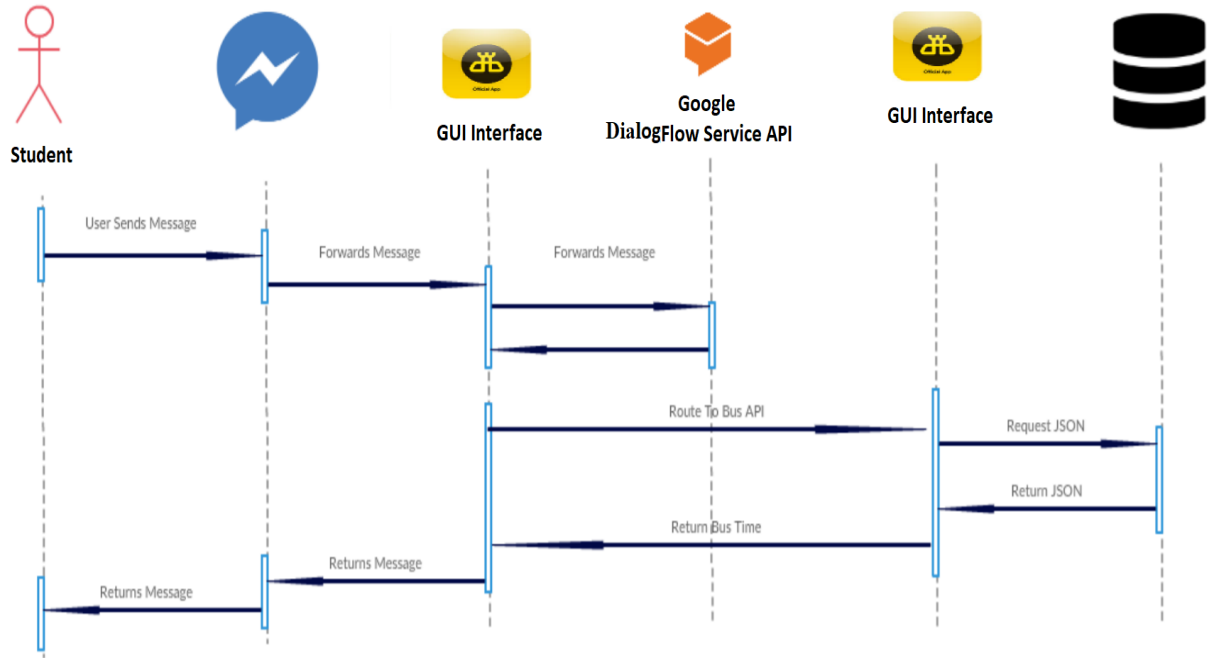

Figure 3: Architecture of System

An open source, high level library for creating neural network models is called Keras. It was created by Google Deep Learning researcher François Chollet. Its fundamental idea is to simplify the creation of neural networks, their training, and use in prediction while still enabling developers to completely customise the ANN's settings. In essence, Keras is essentially an interface that may be used with a variety of Deep Learning frameworks, such as CNTK, Tensorflow, or Theano. Regardless of the back-end that is employed, it functions the same. The Keras API's layered architecture.

In a Neural Network, each node in a specific layer takes the weighted sum of the outputs from the previous layer, applies a mathematical function to them, and then passes that result to the next layer. With Keras, we can create a block representing each layer, where these mathematical operations and the number of nodes in the layer can be easily defined. As can be seen, it can run on top of different frameworks without any issues. One logical line of code may be used to build these several levels.

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V. PROPOSED SYSTEM ARCHITECTURE

- Using NLP techniques, the data is preprocessed, and the user's input sentence is divided into a number of questions and answers using information from the conversation file.
- The words are then lowered, stemmed back to their original form, and the contractions are eliminated.
- It incorporates the words into a vocabulary dictionary that contains certain integers, converting the input text into an array of integers that the encoder can comprehend.
- Also, we'll develop an inverted vocabulary that will translate the numbers back into the words that a given key is associated with.
- The creation of a set of tokens, including padding, start of token (SOS), end of token (EOS), and so on, will come next.
- By adding the tokens and padding the sentence's length to a predetermined length, the encoder and decoder inputs will then be formed.
- Due to the encoder outputs already including the start of the string token, we will raise the decoder input by one time step.
- The encoder and decoder LSTM layers will be present. The word embedding will then be produced using this LSTM recurrent neural network.
- The decoder receives the states of the encoder and passes them on, using the decoder's output to anticipate the next word and send back to the encoder.
- This decoder layer will continue to loop until it anticipates the end of the statement token or reaches the response's maximum size.

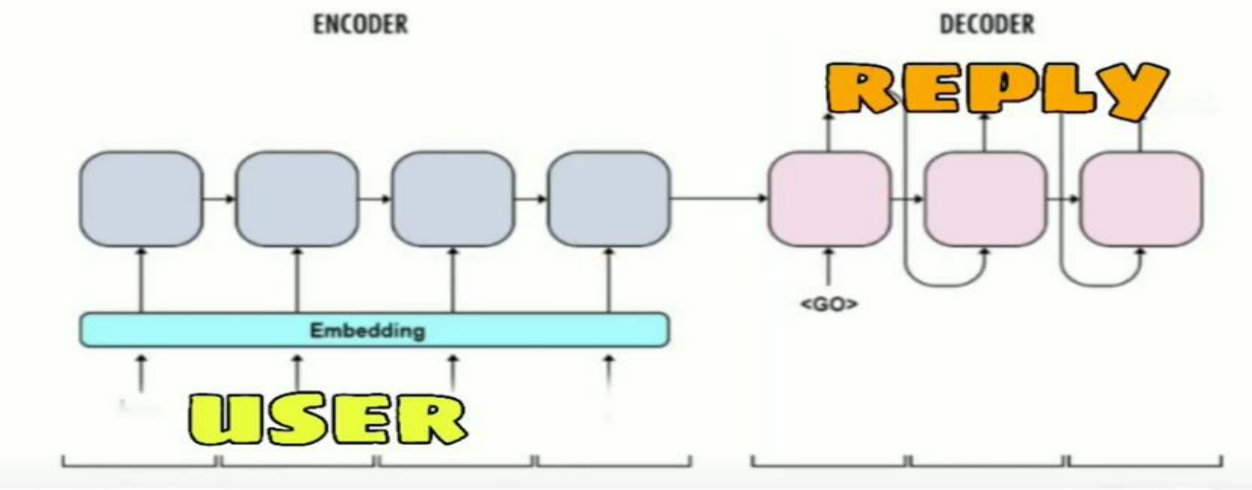

Figure 4: Communication Encoder & Decoder

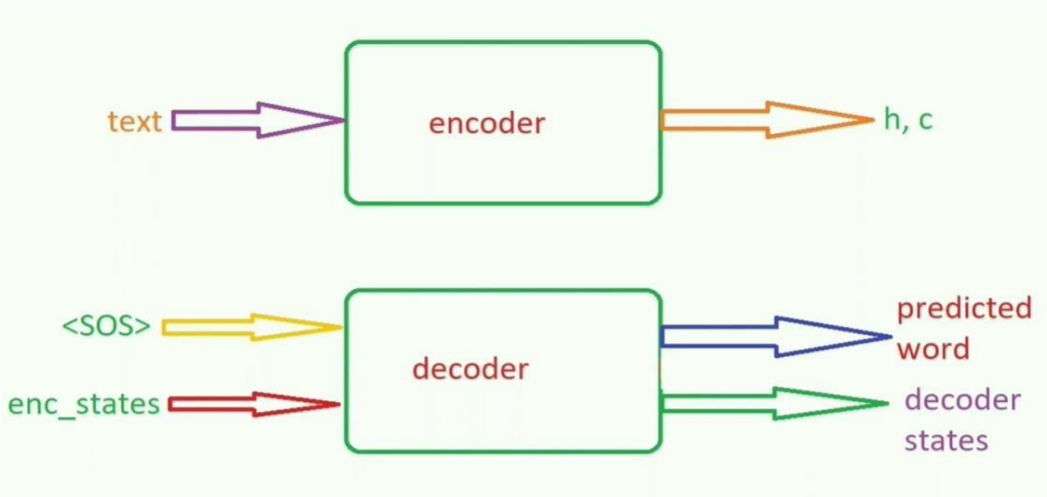

Figure 5: Communication Encoder & Decoder

VI. RESULTS AND DISCUSSION

It should be easy to interact with and use the chatbot. Maintaining the conversation's flow while taking into account the context from earlier exchanges is the chatbot industry's most common problem. The poor processing of natural language and the lack of data provide additional challenges. The accuracy of the model is inversely correlated with the level of granularity of the dataset. The most common issue in the realm of chatbots is maintaining the flow of conversation while taking the context from multiple conversations in the past. The model could have trouble comprehending or transmitting sarcasm and other figures of speech. The poor processing of natural language and the lack of data provide another difficulty. The accuracy of the chatbot's model depends on the level of granularity of the dataset. Sarcasm and other figures of speech could be difficult for the model to understand or express.

VII. CONCLUSION

Each college will utilize this software technology to enable students to freely post their questions. The complaint's content is parsed, tokenized, stemmed, and filtered using natural language processing tools. The chatbot receives the output and calculates the sentence's strength using it. Calculating the strength of denial aids in automatically prioritizing the issue for the service provider to address. The suggested approach will enable numerous enterprises, including any college, to guarantee customer satisfaction and high-quality service with less resources.

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CHATBOT FOR COLLEGE ENQUIRY

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Abstract: Frequently we tend to tend to pay our time interrelate with numerous chatterboxes on the net, mostly targeted at such functions or just amusement. The chatbots have embedded information that helps them acknowledge the user's question and provide an answer to it. The college enquiry chatbot project is meant exploitation algorithms that interpret user queries and understand user's message. The college enquiry chatbot project is developed exploitation algorithms that analyze user queries and understand user message. This method is a web application that provides answers to the student's question. Students would really like simply question through the bot. The program analyzes the user's query and answers. Then the bot responds to the query, as if the real person were asking it. The program responds to the students' question with the help of algorithms. The system can have an internet board which can browse any text through the links, this will ease the user get the relevant notifications changed. The user won't waste heaps of your time checking out the suitable notices.

Key Words **- Chatbot, Database, Python, MySQL.**

I. INTRODUCTION

Chatbot was a computer application which can speak to kinsmen naturally, the manner we interact with one anothe . It can put back a person's for multiple tasks of answering queries. A chatbot is a proxy that interacts with users using painless language. It had been built as an endeavor to hoax humans. Various appeal of chatbots like Customer Service, call centers etc. uses AI terminology to talk with user. One among the prime goals of chatbots is to favor an intelligent human and make it difficult for the receiver of the conversation to know the important working alongside various architectonics and capabilities for his or her usage has widely fill out. The chatbots can prove decent to fool the user into basic cognitive process they're "talking" to a person's being, but are very limited in improving their cognitive content at runtime, and normally have a very little to no means of keeping track of all the colloquial data. Chatbots makes use of machine learning to triumph in AI helping them to know the user query and supply proper response. The chatbots are flourished using the synthetic Intelligence parlance for interacting with the user. This consist a software which can be made up using Python, PHP framework and can help user to talk with machine.

II. MOTIVATION

As students, we have a tendency to gain more of knowledge concerning our school, college and university throughout our course. Generally obtaining this details is very cumbersome and drawn-out. Like obtaining facts concerning our fees structure or the due fees remaining may be a terribly drawn-out method that we have to travel to administration building and notice the right window so explore for a no dues form then fill it with correct information so submit it to the acceptable person so that person can tell us our due fees. So why have this long and worthless process to get this minor information. We as a computer science student are always looking forward to solving the problems around us using the technology that we learn and how to implement them to achieve ease of usage in real life. This is where we thought of using an intelligent bot delivering this information. Think about an application, where all you have to do is just ask. You would like to grasp the fee structure of a student, then ask the bot about is it clear or not it will tell you. There is no need of doing a prolonged and feverish procedure. There is no need of doing a prolonged and feverish procedure. If you want to know how to fill the exam form, no problem our bot will help you about the process and the steps. It can also solve the perplexity once a student is about to join the college. He/she might want to enquire about the fee structure of various colleges and understand their admission procedure. Currently within the current system, it will be a protracted method. You would have to go to various college websites and then look over it. Then our bot can do it for you in seconds all you may have to do is to ask it. Isn't it simple and convenient?

III. EXISTING SYSTEM

In the earlier days students had to visit the college to enquire about details like courses ,fee structure ,admission process and other information's about the college ,which is a tiresome process as well as long process for both parents as well as students. Now a days there are many changes occurred in the Education system with help of advanced technolog. Everything is happening over the internet without any trouble. In those days for enquiring about courses we have to visit the college, but as the days are passing away its completing changing. Collecting the course details, fee structure manually will be hectic procedure and it also needs a manpower. For reducing that manpower and avoid such difficulties and time consuming many devices or systems were emerged day by day.

IV. PROPOSED SYSTEM

A Student Chabot project could be a retrieval-based chatbot that uses AI concepts to possess conversations with humans. Once ever a user asks any question, the bot can first analyze the request, builds a response and send it back to the utilization. The chatbot can break down the user sentence into 2 things: intent and an entity. A retrieval-based chatbot is one that functions are predefined input patterns and set responses. Once the question is entered, the chatbot use a heuristic approach to deliver the suitable response. The retrieval-based model is extensively used to design goal destined chatbots with bespoken options just like the flow and tone of the bot to reinforce the client expertise. ChatBots use pattern matching to classify the text and produce a suitable or best response for the clients. A customary structure of those patterns is "Artificial Intelligence Markup Language" (AIML). The planned System could be a net application that has answers to the queries provided by the scholar or the user. Users can just question through the chatbot that is used for chatting. Students can chat by any format there isn't any specific format the user must follow. The answers are applicable what the user queries. If the answers are found to be invalid or not accessible, then those queries are hold on into the unanswered table that's basically created by the admin. Later those queries will updated by the admin, simply just in case of urgency we are provides a message that "our representatives can get to bear with you shortly". This could be displayed once aggregation the desired data from the user. Admin can browse invalid answer through portal via login System, it's going to permits the admin to get rid of the invalid answer conjointly as in updating the acceptable answer for the question raised by the user. The User can raise any college connected activities through the system. The user does not have to be compelled to personally move to the college for enquiry. The System analyzes the question then answers to the user. The system answers to the query as if it's answered by the real person. The system replies with the assistance of a decent Graphical interface that suggests that as if a real person is rebuke the user. The user can question concerning the college connected activities through on-line with the help of this net application. This technique helps the scholar to be updated concerning the faculty related information.

4.1Proces Flow Chart

This section shows the basic steps that how the chatbot provide answers for the users query will be shown in the following Fow Chart:-

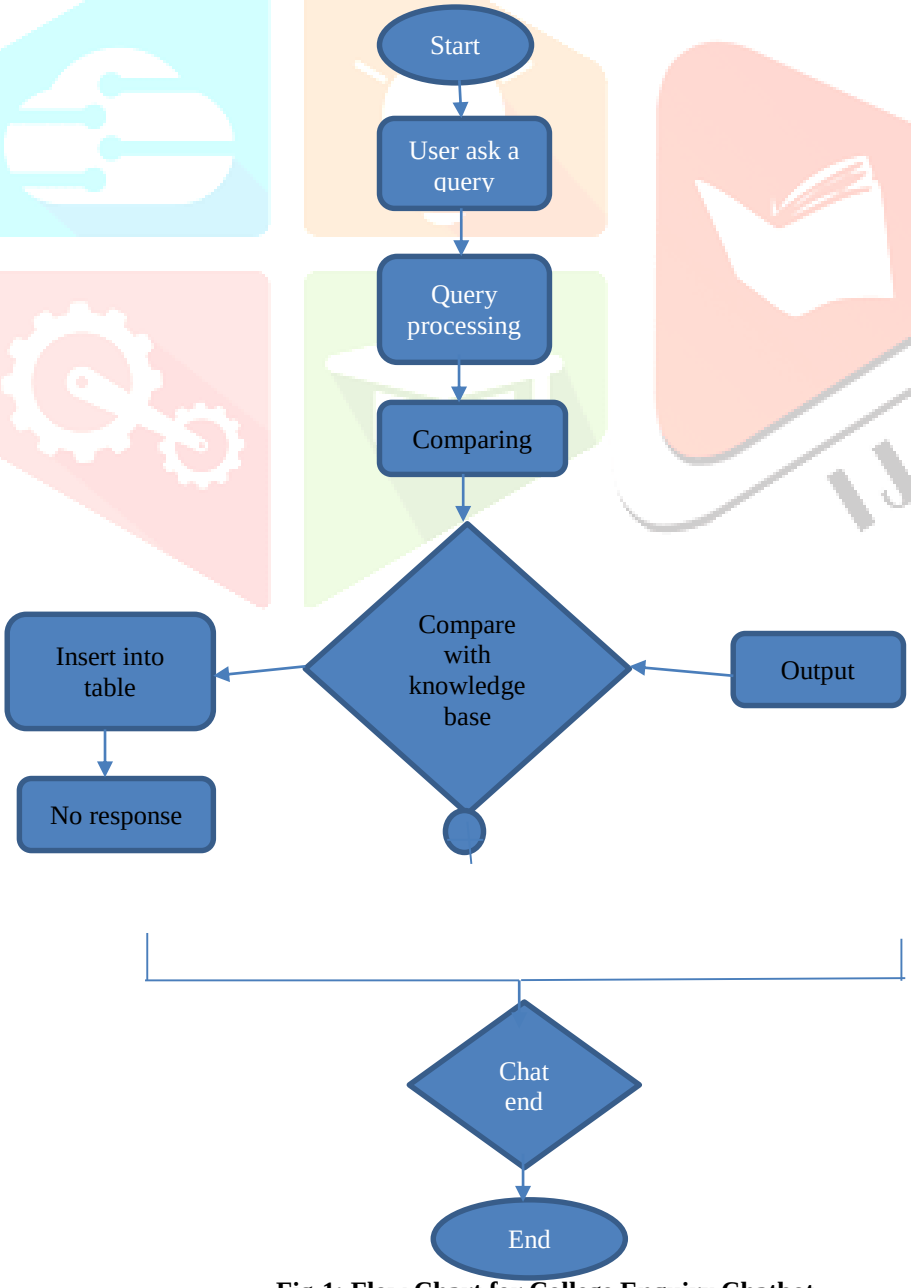

Fig-1: Flow Chart for College Enquiry Chatbot

The Flow Chart describes the entire process of the system or working of chatbot ,if the user cannot find the answer for a query then the bot will answer "sorry I can't understand", in such condition user can send feedback to the admin by using feedback form in the home page. Admin can view the feedback and the corresponding query and answer will be stored and update the data in the database.

4.2 ER Diagram

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Fig- 2: ER Diagram of ChatBot For College enquiry

IV. IMPLEMENTATION

Block Diagram for proposed system:-

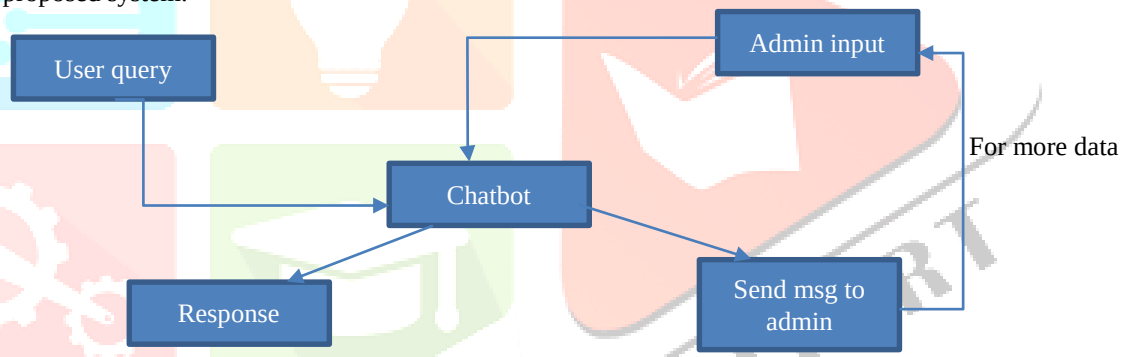


Fig:-3: Block Diagram of ChatBot For College enquiry

From the block diagram it is clearly shows that, the student or any other user ask query to the Chatbot , that query will be stored in the database ,and the answer related to the query will be displayed to the user. If that query is not in the database then the user can ask the admin to add more data to the bot. The entire background process will be done by the admin.

4.1 Creation of Table in Database

A database consisting of different tables. These different tables will store key-words, answer- sentences, mutual weight of each key-word corresponding to each answer-sentence and the lists of words to be filtered out. We are having programs or code for searching through these tables and come up with the most suitable replies or response corresponding to the user's query.

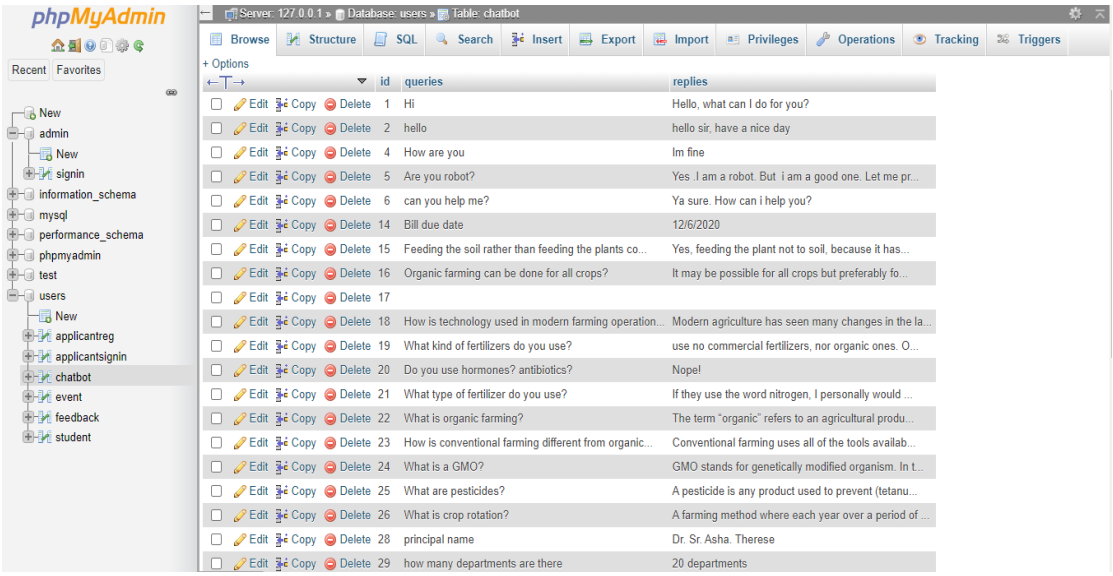


Fig:-4: Tables in Database

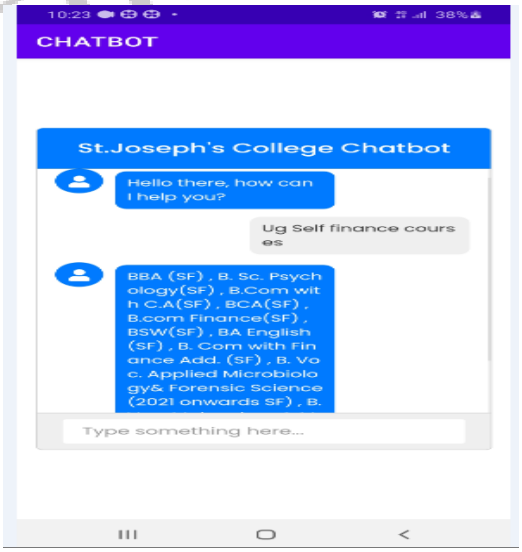
V. APPLCATIONS

- College enquiry chatbots helps the students to get the right sources of information.
- Not Only the college enquiry chatbot any bot that will provide them an instant as well as accurate response or answer.
- Enhance Artificial Intelligence Based ChatBot System,it will be used in most of the colleges and also it can be used in various firms and business-related industries.

VI. RESULTS AND DISCUSSIONS

The proposed system was successfully tested to check its effectiveness and achievability. Chatbot reduces the paperwork, manpower and time for any individual. In this paper we had developed an application which will interact with users by means of reducing the time for visiting the college to enquire about the details/information regarding admissions, college activities etc. The user can chat with the chatbot by format. The user or the student and the Administrator are interacted through a chatbot. The questions which are not answered by the chatbot will be added and updated by the Admin.

6.1 List of output Screens



VII. ACKNOWLEDGEMENT

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VIII. CONCLUSION

The main objectives of the project were to develop an algorithm that will be identify the answers associated with user submitted queries. A database is developed to store all related data's and to develop an internet interface. The web interface developed had one parts, and that is for the administrator. A background research happened, including a summary of the conversation procedure and any relevant chat bots available. A database system was designed, that stores information regarding questions, answers, keywords, logs and feedback message.

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AI College Enquiry Chatbot System

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Abstract-- In this paper, we present a college enquiry chatbot system designed to provide quick and efficient responses to student queries. The chatbot was built using natural language processing techniques and machine learning algorithms. We evaluated the performance of the system by testing it with a dataset of commonly asked student queries. The results showed that the chatbot was able to provide accurate responses in a timely manner. The system has the potential to save time for both students and staff by providing instant answers to commonly asked questions. Our study highlights the effectiveness of chatbot systems in educational environments and suggests the potential for future research in this area..I conversational assistant is a computer program that can be used for online interaction through text or voice messages. They can make human interaction contextual which leads to actual engaging interaction. Python's Rasa X is a framework that is a powerful tool in the creation of chatbots that can serve as a college enquiry system. This research study is focused on identifying the requirements for the development of a dynamic chatbot that supports text as well as voice-based interaction with the users.

Key Words: Artificial Intelligence, Rasa X, Machine learning, College enquiry chatbot, Human-computer interaction, Natural language processing, Speech-to-text.

1. INTRODUCTION

College students often need information regarding college such as timetable, upcoming events of college, about faculties, exam timetables, new assignments and projects with their deadline many more. The traditional way such as making phone calls, browsing the school website, or sending emails is inconvenient and time-consuming since you have to wait for a long time before you get an answer from the other side. If physical support is not available then calling doesn't help in some cases. Chatbots are changing the way of communication over the past few years it has been observed that most of the websites refer to chatbot interaction over actual physical calling support. So, a solution such as a VoiceChatbot is the easiest system to access for any user and is available 24 x 7. Anyone, Anywhere, Anytime without any problem can make use of internet connection and mobile device or other laptop devices to solve doubts. The objective of this research study is to identify the appropriate software components needed for developing a chatbot support system using Machine Learning and Natural Language Processing which can take input through voice as well as text and can easily extract intent and entity of user's message as it can be easily integrated with college website to provide precise and accurate answers to college-related queries by students or parents. To minimize the load of offices of universities and increase interaction between student and college without actually involving any physical human entity that can promote student engaging system with great user interface and quick response.

2. LITERATURE SURVEY

Authors Siti Nazurah Mohd Sau Pi, Mazlina Abdul Majid [1] identified six components of the Smart Chatbot Academic Model through an extensive literature survey from the years 2017-2020. They compared existing chatbot applications for university websites and identified their purpose, type, character, and the programming languages behind them. However as this was a research work, they were unable to validate the identified components and hence could not proceed with the designing and development of the proposed product.

Authors Yurio Windiatmoo, Ridho Rahmadi, Ahmad Fathan Hidayatullah [2] implemented a chatbot based on deep learning which could be integrated with Facebook Messenger to answer university-related queries. The evaluation results of the model gave nearly perfect scores of precision, recall, and F1 with fast response time. However, the chatbot had not been used operationally on campus and thus its effectiveness and ease of use for users could not be measured yet.

Authors Olusegun Lala, Temilola Okedigba, Halleluyah Oluwatobi Aworinde [3] implemented an admission enquiry chatbot using IBM Watson for rapid response to admission related queries. When evaluated with Botium, the chatbot gave an accuracy of 95.9% with optimal and real-time feedback. While the model was successful in most aspects, it could only answer text-based queries with no support for voice input.

Authors S. Kumari, Z. Naikwadi, A. Akole, P. Darshankar [4] implemented a voice and text-based chatbot which could answer admission-related queries. In addition to the previously implemented works, this chatbot allowed the users to express their satisfaction with the provided answers by pressing the like or dislike buttons. This data was stored at the backend which served as a guideline for the Administrator to improve the answers framed. However, it could not understand the user's query if there were any glitches in input due to human spoken language, like a grammar error or a context error.

Authors Koundinya Hrushikesh, Ajay Krishna Palakurthi, Vaishnavi Putnala, Ashok Kumar [5] implemented an online chatbot system for visitors to the college website based on the AIML language which is a type of XML that enables the

user to get academic information. The chatbot utilized WordNet calculation and grammatical form labeling to distinguish the feeling of the words. The main limitation of WordNet is that it does not

provide a clear distinction criterion between atomic and non-atomic lexical units due towhich the chatbot is unable to recognize more words.

Authors Neelkumar P. Patel, Devangi R. Parikh, Darshan A. Patel, Ronak R. Patel [6] developed an interactive university chatbot with a GUI similar to a conventional messaging application that could answer text-based queries with minimal response time and very few database hits. On the downside the chatbot worked well only if the user framed the query using predefined keywords; it provided default answers when synonyms of keywords were used.

Authors Kulkarni, Pradnya, Ameya Mahabaleshwarkar, Mrunalini Kulkarni, Nachiket Sirsikar and Kunal Gadgil [7] threw light on the latest research in the field of Conversational AI along with the improvements achieved over the traditional counterparts. They explored the three main components of Conversational AI along with their accuracy, methodologies, and drawbacks.

Authors Ralston, Kennedy, Yuhao Chen, Haruna Isah and Farhana Zulkernine [8] developed a voice interactive and multilingual chatbot that could effectively respond to the users' mood, tone, and language using IBM Watson Assistant for responding to users' needs regarding exam stress. While it was a novel approach to the existing works, it could provideonly about 76.5% accuracy.

Authors Xiong, Wayne, Lingfeng Wu, Fil Alleva, Jasha Droppo, Xuedong Huang, and Andreas Stolcke [9] enhanced their conversational speech recognition system based on Microsoft for Switchboard and CallHome domains by adding the CNN-BLSTM system. The resulting system had reduced error rates than its previous iterations.

The following table contains the comparison of variousexisting chatbot frameworks that were considered while designing the proposed chatbot.

A survey conducted by Braun, Daniel, Adrian Hernandez Mendez, Florian Matthes, and Manfred Langen [10] comparesthe NLU capabilities of the above frameworks. As chart-1 shows, Rasa ranks second overall and outperforms Watson and DialogFlow. This supported our decision to use Rasa as the framework behind our proposed chatbot.

Table -1: Comparison of Existing Chatbot Frameworks

Framework	Hosting Model	Pricing	Languages Supported
DialogFlow	Cloud	Free with optional enterprise plan	Vary by channel
Amazon Lex	Cloud	Pay per use	English
IBM Watson	Cloud	Varies. 10000 free transactions per month	English, Japanese
Microsoft LUIS	Cloud	Basic: Up to 1000 transactions per second; $0.75 per 1000	Vary for prebuilt entities and prebuilt domains

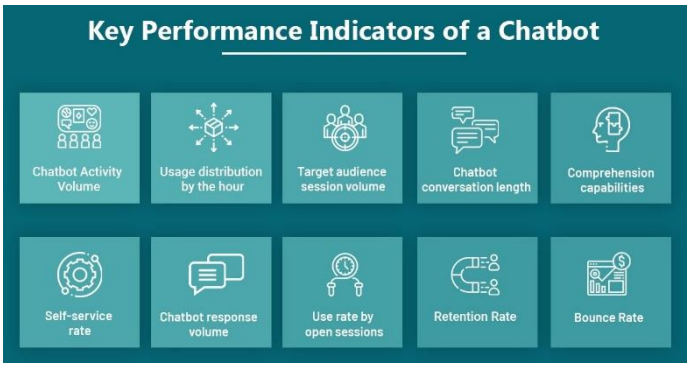

Chart -1: Performance Comparison of Chatbot

3. PROPOSED SYSTEM

The proposed methodology makes use of both qualitative and quantitative perspectives, and includes a broad array of approaches such as literature reviews, expert opinions, focus groups, and content validation. Students can enquire about facilities and query related to exams, academics, fee structure, etc.Students can also ask questions related to placement activities.

3.1 Project Scope

The chatbot is an AI-based chatbot that receives questions from users in audio or textual format, converts the audio intotext format, tries to understand the question by processingthe text using NLP, and finds an appropriate answer to the question. In natural language processing, human language isdivided into several pieces so that the grammatical structure of statements and the meaning of those pieces can be analyzed and understood in context to the whole conversation. This lets computers read and understand spoken or written text in the same way as humans. For example, when the chatbot receives the question "How manydepartments are there in the college?" it will answer "The college has 6 departments". The main objective is to reducethe burden on the college faculties by deferring the responsibility of answering the visitors' doubts regarding the college to the chatbot by creating a web-based chatbot that can be incorporated with the college website and can answer the users' text as well as audio-based queries. The goal is to provide visitors and faculty a quick and easy way tohave their doubts answered as well as offer the developers the means to incorporate new information in the chatbot's information repository.

3.2 User Classes and Characteristics

The two classes of users for this application based on the mode in which they query the chatbot are as follows:

1. Text- These users provide input in textual format by typing in the text box.
2. Audio- These users provide input in audio format which will first be converted into a textual format or the chatbot server to process.

3.3 System Architecture

Rasa is an open-source machine learning framework toautomate text-and voice-based conversations. It should provide us with all the functionality that we might need forimplementing the project. Rasa helps us build contextual assistants capable of having layered conversations with lotsof back-and-forths. Python's pyttsx3 library should be sufficient for converting audio into text.

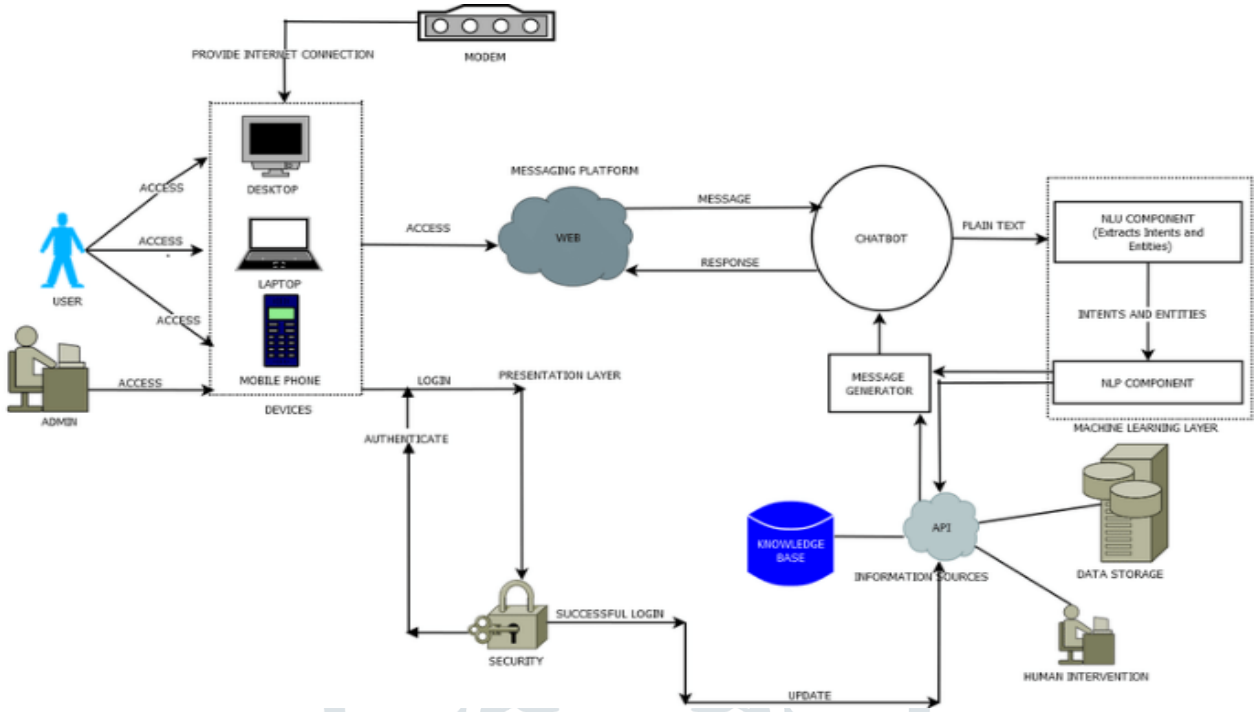

Fig -1: System Architecture

3.4 Functional Requirements

1. Users should be able to enter their query textually or inaudio format.
2. The chatbot should be able to process that query.
3. It should fetch an appropriate response.
4. It should be able to relay that response to the user.
5. In case the query is out of scope, provide a default answer.

3.4 Database Requirements

1. NLU Dataset with more than 100 examples for intent.
2. NLU Dataset with more than 100 examples for the entity.
3. Stories dataset with staring stories.
4. One dataset specifying Rules for the chatbot.

3.5 Software Requirements (Platform Choice)

1. Advanced Natural Language Processing. There are two options in the chatbot space: Click or AI.
2. Multilingual AI.
3. Easy Channel Integration.
4. Easy Backend Integration.
5. Enterprise-Grade Security.
6. Sentiment Analysis.
7. Hybrid Chat.

4. LIMITATIONS

The proposed chatbot does not support regional languages.It would be able to process and answer questions in Englishonly as it is the only language supported by Rasa NLU. spaCyis one of the default pipelines for processing user inputs in Rasa. While it works well when server capacity is low,demand for a higher configuration server to host the chatbotapplication might be a challenge.

5. CONCLUSION AND FUTURE WORKS

This research study proposes a college enquiry chatbot thatcan be integrated with a college website to interact with visitors and answer their questions about the college. The proposed chatbot will be able to accept both text-based as well as audio-based input from users. We have conducted acomprehensive literature survey to find the most appropriate chatbot framework and have referred to existingworks that could provide an insight into the domains of NLP and Conversational AI.

This research study is focused on identifying the requirements for the development of a dynamic chatbot thatsupports text as well as voice-based interaction with the users.

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Institute Enquiry using Chatbot

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Abstract

Students almost always need to visit colleges or universities to obtain various data, such as information about the college, tuition costs, term schedules, and so on, during their confirmation interactions or for their daily needs. This process is arduous and time-consuming, and it also needs people to provide required data to visitors that come to the college. As a result, a chatbot can be constructed to solve the problem. The project is about user participation with the chatbot, which can be accessed from anywhere and at any time. With only a few fundamental language modifications, the chatbot may be easily/conveniently integrated with any college or university website. Chatbot provides various statistics associated with college or university, as well as additional student-related data. Any individual who has access to the college's website can use the chatbot. Artificial Intelligence and Machine Learning are also used in the venture. The advancement of Chatbots is aided by Natural Language Processing. Users can also ask college-related questions, which are subsequently applied as a contribution to the calculation, which assesses the message and displays the users' comparing reaction.

Keywords: *Chatbot, NLTK, Artificial Intelligence, Natural Language Processing, Machine Learning, HTML, Json.*

1. Introduction

A chatbot likewise alluded to as bot is a pc framework which speak by means of hear-able or perhaps text based strategies. "ChatterBot" was at first instituted by Michael Mauldin (maker of the absolute first Verbot, Julia) in 1994 to clarify these conversational applications [nine]. Chatbots are not difficult to create just as advance users collaborations. Mobile applications need being downloaded just as utilize extra space yet chatbots aren't important to be downloaded. It's anything but a message in an informing application. Bots can discover from users conduct and furthermore give significantly more customized answers. It's assessed that approximately 80% of organizations are planning to fuse chatbots by the whole year 2020. Students incline toward their issues settled rapidly, obligations to be refined promptly and information to be found quickly. The chatbot can give them a human like discussion and address the issues of the users. A few instances of chatbots are GupShup, RechargeBot, IxiBaba, Lawbot and so forth.

2. System Architecture

In this project the architecture is about the chatbot working, how does it works which is shown in Figure 1. The web application uses the python flask with the chatbot engine, as the chatbot engine contains the NLTK packages and the string processing which helps chatbot to responds to the user.
The chatbot also contains training data which is stored in .Json where the admin inserts all the queries which needs to be answer by the chatbot according to users. And also the admin part contains the Log where if the queries are not inserted in the training data and it will be

taken as the feedback from the users if not been answered on time by chatbot and that to can respond to the user next time.

According to the architecture the chatbot responds to the user with the help of the training data which is present in .Json file and also the feedback file which Log file to help the users accordingly and easy to build the queries to the admin. Chatbot consist of training data as .Json, HTML, CSS, flask as web interface and NLTK package as string processing.

The architecture also shows the chatbot responds to user to which query should it respond to .Chatbot depends and works on the training data which has been given and done by the admin. Chatbot engine includes all the data and files which is relatable to the chatbot.

The log file also shows and record the positive response which is chatbot has been answered to the queries asked by the user which is named as ’positive’ and ’response’ that is chatbot responded accurately. And on other hand the feedback queries will be recorded and shown to admin to frame the queries for the next time as the user cannot miss that next time, so which is named as ’negative’ in the Log file.

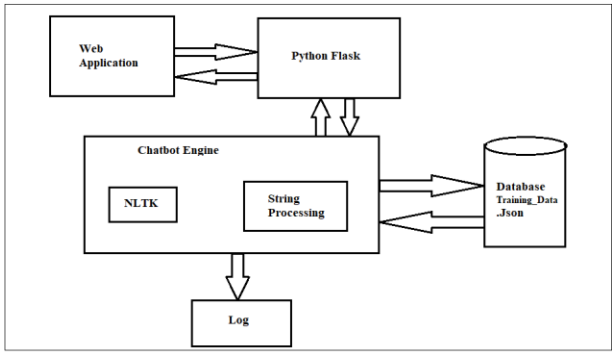

Figure 1: System Architecture

At last the chatbot answers all the queries which are present in the database which is present in .Json file and if not present taken as feedback and will answer it next time. There is no disadvantage that the chatbot do not respond and will not answer to the other question apart from the database. So this above architecture shows how each and every part works to complete this institute enquiry chatbot.

3. Methodology

The flowchart in Figure 2 shows that how the chatbot works.

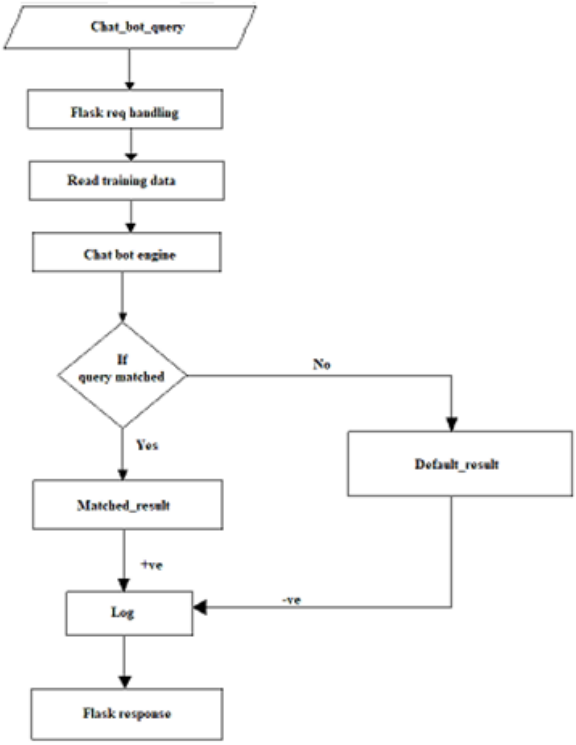

Figure 2: Flow Chart

The chatbot query will be taken as the input from the user to the chatbot, then the flask handling will taken place to the query according users after the flask request will be handled then the training data which is made up of .Json file will be read and the chatbot engine will be responded accordingly.

If yes then the query gets matched then matched result will be shown to the user by the chatbot and if not the query is matched to the user’s query then default result what has been given to the chatbot will be reflected at that time and the queries will be taken as the feedback which is stored in the Log file.

Then the Log file will have both the response which has been asked by the user and answered by the chatbot, and even the queries are not present in the training data can be taken

as the feedback so that the admin can insert those queries to be answered accordingly by the chatbot to the user. And finally, the python flask which acts as the web interface will reflect the answer by the chatbot which has been asked by the users.

In this Figure 3 is about log plotter where the graph shows that the positive response of the value 1 and the negative is of zero. The user asks the query and the chatbot responds to it correctly if the query is in the training database which has been stored in .Json file, so the response will be recorded in a log file as positive and the value shown in the graph is 1 like how many accurate answer has been responded by the chatbot to the user's query. If the training database doesn't contains the query which been asked by the user, then the chatbot responds the default answer that is "Sorry, i didn't get you" and these queries which has not been answered correctly will be taken as feedback and stored in a Log.txt file which will be shown as the Negative response. Hence it will help admin to add/insert the queries which has not been answered by the chatbot in the training data which is in .json File.

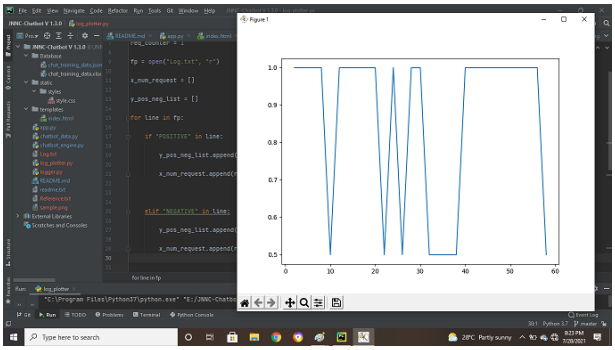

Figure 3: Log Plotter

The x and y axis are present in the graph, where the x-axis represent the num_request that is nothing but the number of request has been recorded in the Log.txt file where the chatbot has been responded to the user which correct or not correct that means positive response or negative response. In the other hand y-axis represent the pos_neg_list that is nothing but the positive negative list which has been shown in the graph that the list has like the negative is shown as 0 and the positive as 1.

4. Results and Discussion

The website snapshot is shown in Figure 4, where we can see a clear picture or snapshot of the website, as well as the blue chatbot icon on the website, which is located on the right bottom of the website page. The combination of website and chatbot is shown in this screenshot.

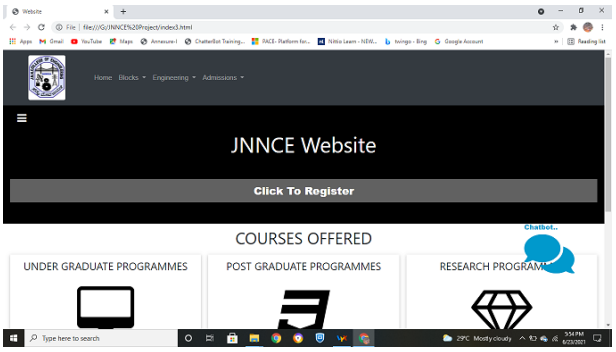

Figure 4: Website snapshot 1

In Figure 5, you can see how the chatbot actually looks. "Hello, welcome to JNNCE!" the chatbot will greet users at first. Send me a message." After that, the user can begin to ask questions about college to which the student or parent is interested.

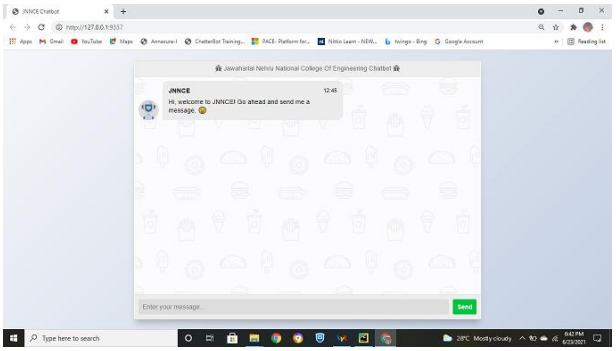

Figure 5: Chatbot Snapshot 1

Almost all users, such as students and parents, want to know where the college is located, what it looks like, and how far it is from the

users' location. The location in the snapshot is nothing more than the Url, which can be copied and entered into the user's map to locate the college. The user can access and take it from the chatbot part by using the location Urls in this chatbot. The screenshot above indicates that the chatbot can also function with Urls, as illustrated in Figure 6.

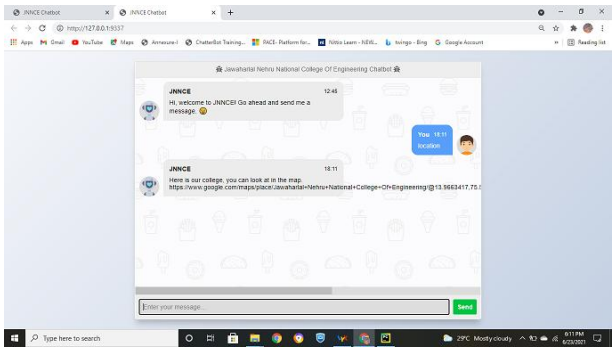

Figure 6: Chatbot Snapshot 2

The screenshot in Figure 7 shows how the chatbot responds to users for any query, with a focus on how string matching is accomplished. If a user types 'hi,' the chatbot will respond with 'Hello,' for example. ‘How may I assist you?' 'Hiiiiiiiiiiiiiiii’ many users will use and become addicted to the fact that they may use as many "i's" in the word "hi" in order for the chatbot to react by matching the string and responding with the same response as 'Hello, How may I assist you'.

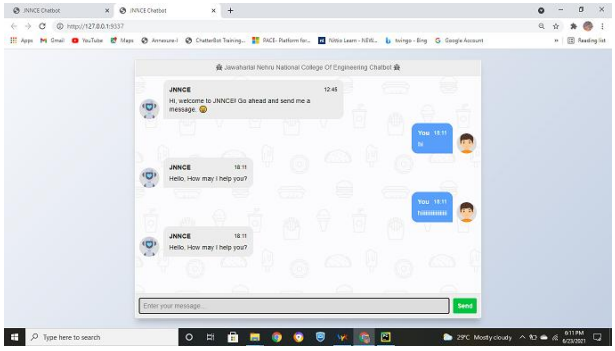

Figure 7: Chatbot Snapshot 3

The image in Figure 8 is of a log plotter, where the graph indicates a positive reaction of 1 and a negative response of 0. If the query is in the training database, which has been stored in, the user asks the question, and the chatbot responds appropriately. file json, As a result, the response will be logged as positive in a log file, and the value displayed in the graph will be 1, indicating how many accurate answers the chatbot has provided in response to the user's enquiry.

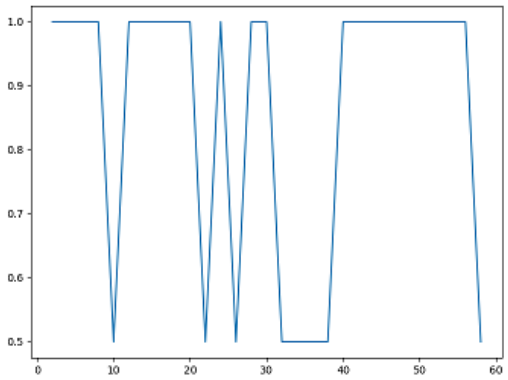

Figure 8: Snapshot Log Plotter

5. Conclusion

The users can collaborate with speedy approach by furnishing with the best instrument which is called as chatbot. Helpful to the users as it permits to enter enquires in normal language and wanted data is acquired effectively to the users. In this project, insights concerning plan, calculation utilized and execution of the chatbot is introduced. The users doesn’t have to assemble data by visiting college or universities, users can get to it straight forwardly from these chatbot anyplace or whenever that is 24×7.

6. Future Scope

The extent of the chatbot can be expanded by embeddings information for every one of the offices, preparing the bot with fluctuated information, testing it on live site and dependent on that input embeddings seriously preparing information to the bot.

A portion of the new highlights which can be added to the bot are:

1. Discourse acknowledgment include through which student can ask their

questions verbally and find the solutions from the bot.

2. Joining with numerous channels, for example, call, SMS, and different online media stages like Skype, Face book and Twitter.

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Design of Chatbot System for College Website

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Design of Chatbot System for College Website

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***Abstract*—** Most of the time, Students need to visit college administration office to collect various information regarding college such as Tuition fees, Term Schedule, etc. during admission process or as per their daily needs. Hence, to overcome this problem, a chatbot can be designed and developed which can be easily integrated with any college website to provide necessary information regarding college. The goal of AI based chatbot is to make an efficient conversation between human and machine via auditory or textual methods. This project uses Natural language processing to process the user's query and generate a meaningful response. Based on the information stored in the database, bot itself determines appropriate response of a particular query fired by user. The Chatbot is based on an Artificial Intelligence algorithm, which analyses user's question and responds with a Naive Bayes' algorithm. This system will be a Web Application and can reduces work of college administration providing information to students. It also reduces the workload on the staff to answer all the queries of the students.

***Keywords*—** Chatbot, Query, Graphical User Interface, Natural Language Processing, Artificial Intelligence.

I. INTRODUCTION

Chatbot is a computer application that mimics human conversations in its natural format along with textual or voice communication. In the utilization of AI techniques together with natural language processing (NLP) [1],[3] chatbot for college website can be designed. This system will be a web application, so it can give solutions to the analysed queries of the user. User simply need to raise the query to the chatbot and the system will reply to the users through the powerful Graphical User Interface (GUI) which is similar to messaging application interface, and provides a friendly environment to the user as they are much aware of operating messaging application[1],[2]. The user can submit the question about the college-related information or activities such as admission process, contact information, address, annual day, sports day, intake and other cultural activities of colleges. Developing a chatbot solves the problems that can arises in gathering required college information. This system can be accessible from anywhere and anytime. Chatbot will deliver efficient and relevant response to the user corresponding to their entered message. Chatbot system will be beneficial for students, parents, teaching and non-teaching staff as well. Presently, there are various chatbots available for the students like UNIBOT, ALICE etc. UNIBOT is designed for the students to ask university related question. For this system a new algorithm is developed to deliver an appropriate response to the user corresponding to their entered message[2]. ALICE is a rule-based chatbot based on the Artificial Intelligence Markup Language (AIML). This System uses NLP and Pattern Matching Algorithm [3],[6],[7] to process user's query[8].

This paper is divided into several sections, where Section I contains the introduction of chatbot system, Section II contains Related Work of chatbot system, Section III explains the Methodology with architecture diagram and flow chart, Section IV contains Results and Section V describes Conclusion and Future Work.

II. RELATED WORK

K. Bala, M. Kumar, S. Hulawale, and S. Pandit et al. [1] Project on Chatbot for college management is developed with the help of AI algorithms which can analyse user's queries. This is a web application that will give answers to the analysed queries of the user. Users will simply need to select the class for queries and ask the question to the bot. In this paper, they have used Porter Stemmer algorithm to answer the user' queries. The Users should register and login to the system. Once login, user can access the various helping pages through which the user can ask queries related to college activities.

P. Nikhila, G. Jyothi, K. Mounika, Mr.K. K. Reddy et al [2] The chatbot named UNIBOT is designed for the students to ask university related question. This system uses the concept of Artificial Intelligence and Machine Learning. The System uses PHP Language for the development of UNIBOT. The query is given as an input to the algorithm, which processes it and gives the corresponding response to the user. The GUI is similar to a Messaging Application. It delivers efficient and relevant response to the user corresponding to their entered query. New algorithm is developed for UNIBOT. It is very efficient, requires less memory and has minimal database hits.

B.Setiaji and F. W. Wibowo et al. [3] Chatterbot is designed with a powerful pattern matching algorithm. This project uses Indonesian conversational pattern and MySQL database. This application is based on a knowledge base which is maintained by admin. It can be miss in defining a sentence and how to response it while connecting chat application to the database. In the pattern-matching operation, knowledge representation and implementation of SQL are important. A data that has been created which is based on the pattern of the conversation must be tested by the help of a series of scenarios. The conversation should be crosschecked to the basic pattern so that it allows you to add some knowledge to the database which is not added before. If the input record in the database does not match, then it will be remodeled.

K. Shivam, K. Saud, M. Sharma, S. Vashishth, and S. Patil et al. [4] In this paper, for designing chatbot, Facebook Messenger is used which is source and uses artificial intelligence to communicate with the user and provide the required information. This Facebook API is integrated with Python backend, webhook is used to deliver the query of the user to the server. This system has used WIT and AI as a pre-trained artificial intelligence module so that one could use its pre-trained neural networks to answer the user's query with efficiency and accuracy.

E. Haller and T. Rebedea et al. [5] This paper describes the concept of identifying vital facts in texts describing the life of a historical figure for building a conversational agent that could be used in middle-school CSCL scenario. This paper presents a way for building a chat-bot that may simulate a historical figure. The system can receive "input" as an understandable text or a web page about the historical figure and has as "output" a trained conversational agent that is in a position to answer all reasonably questions about the life expertise of that user.

S. B. Sonawane, A. S.Badwar, R. H. Dalvi, G. N. More and S. A. Talekar et al. [6] This paper describes the concept of AI based chatbot which is designed for Student Counselling for career guidance. This system uses NLP and Keyword Matching Algorithm to process user's query. This System uses a modular architecture to respond to user input. Each module contains knowledge based initialization mechanism, and logic to handle user requests. The students are able to get proper guidance for career in the field of their choice, also the college list for the same is provided as per requirement.

III. METHODOLOGY

The proposed chatbot system is a web application which gives reply to the question of the user. This system is utilized for talking. A chatbot project is built using artificial algorithms i.e. Naive Bayes' algorithm that analyse user requests and understand the user's message[9]. The system uses Natural Language Processing (NLP) and built-in artificial intelligence to answer the queries asked by the user. For the chatbot development, we have used Python programming language using Django framework and Chatterbot library. It makes it easy to generate automated responses to a user's input with the help of a machine learning algorithm to produce different types of responses. Students just have to query through the bot which is used for chatting purpose. Chatbot will reply to the query with the help of artificial intelligence.

The proposed system will reduce the administration burden and will be able to provide necessary details to students and parents online. Students do not have to visit college administration for every inquiry. Students will get their queries resolved without any hassle to reach out the college administration office. The System will be available for 24/7 to all students and parents [4].

1. User Login:

User just needs to submit his/her queries regarding the college to the bot. User can be student, teacher as well as parents.

2. Chatbot Responding System:

2.1 NLP Processing for Query Analysis :

When a user submitted the query to the system, NLP is applied and sense of the query is detected. Natural Language Processing (NLP) allows chatbot to understand user's messages and respond appropriately.

2.2 Search Questions in database:

Once the query is submitted, furthermore, we have to search the exact answer of the query in our pre-trained database. As the query description can change from person to person. The same question can be asked in different ways from multiple users. One user asks a question so simply and clearly, while another user may ask the same question with different format. So it is necessary to find out what is the correct solution of a submitted query.

2.3 Answer the Queries:

As described above, whenever user submits a complaint, then it is checked that is there such question registered in database. If the answer is matched, then that is sent to that User. If the answer of submitted query is not found in the database, then such questions are answered by admin person. Once he answered the query, the answer is sent to that user. And also it is stored in database so that whenever such questions will be asked they get answer of that query directly from the database. So admin doesn't need to answer the same query again and again. For this we are using powerful Naive Bayes' Algorithm[9].

3. Architecture Diagram of Chabot System:

Figure 1: shows the architecture of the chatbot system for college website.

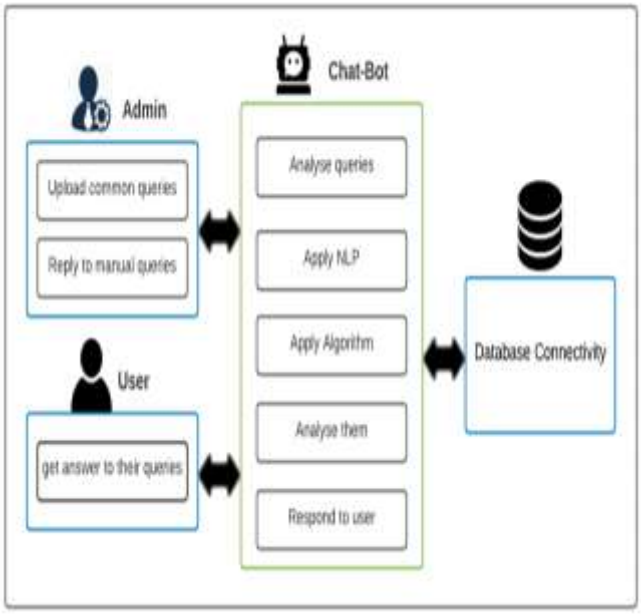

Figure 1: Architecture Diagram of Chatbot System

4. Flowchart of Chatbot System:

The flowchart of the system displays how the chatbot performs. Initially, the user message is pre-processed and connectivity to the database is obtained. Then, based upon conditions satisfied, the chatbot process flows and provide response to the user. If the user cannot find the answer for a query then in such condition chatbot will provide admin's contact details to the user. Admin can view and answer the corresponding query.

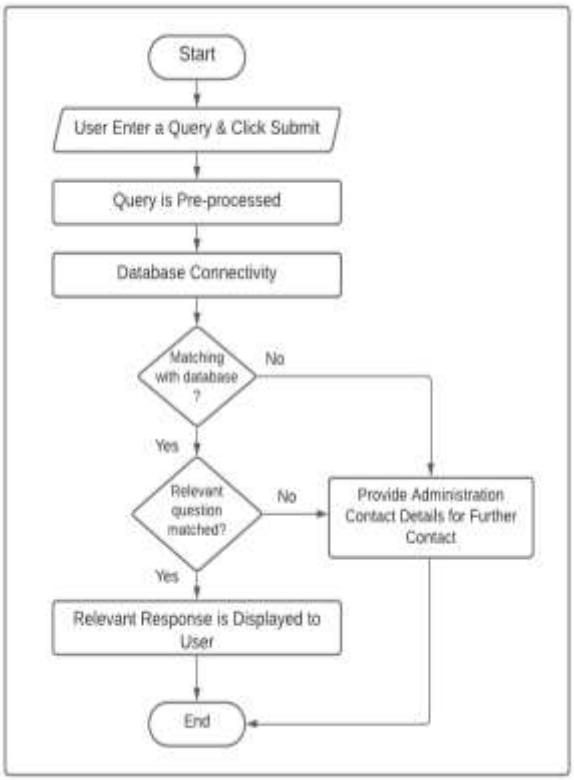

Figure 2: Flowchart of Chatbot System

5. Algorithm Implemented

Naive Bayes' is a powerful algorithm for text classification problems. It is a probabilistic machine learning algorithm which is based on Bayes' theorem[9]. This classifier assumes that the presence of a selected function in a category is unrelated to the presence of another function. In this algorithm a closed domain dataset containing questions/user-responses and corresponding answers is made, which every question is given a label, this will relate the question to its answer. Due to multiple questions could have the same response, there can be multiple questions having the same answer.

The Formula for Naive Bayes' Algorithm is as follows:

$$P(A \mid B) = \frac{(P(B \mid A) * P(A))}{P(B)} \quad (1)$$

Where,

P (A | B) = Probability of 'A' occurring given evidence of 'B' has already occurred.

P (B | A) = Probability of 'B' occurring given evidence of 'A' has already occurred.

P (A) = Probability of 'A' occurring.

P (B) = Probability of 'B' occurring.

6. Different Algorithms Used for Chatbot System:

Some of the most popular algorithms for chatbots are Porter Stemmer[1], Naive Bayes'[9], Support Vector Machines, K-means and atural language processing (NLP). Chatbots mainly use classification algorithms to recognize intent in phrases. Every algorithm has its own advantages and disadvantages according to its working method. Table 1 shows comparison of different algorithms WRT to Naive Bayes' algorithm.

Table 1: Comparison of Different Algorithms

Sr. No.	Porter-Stemmer Algorithm	K-Means Clustering Algorithm	Naive Bayes' Algorithm
1.	The stems generated are not always real words.	Different partitions can result into different final clusters.	Naive Bayes' classifier performs better than other models with less training data if the assumption of independence of features holds.
2.	It has five steps and sixty rules. And takes more time.	Difficult to predict K-Value, hence it is time-consuming.	The algorithm works very fast and can easily predict the class of a test dataset.

3.	This System is limited to English words only.	Doesn't support categorical data.	The algorithm performs well with categorical variables in comparison to numerical variables.

IV. RESULTS AND DISCUSSION

The Chatbot is to carry out a conversation between both human and machine. Figure 3: shows the simple and attractive pop-up Interface for College Chatbot System. Firstly, chatbot will print a welcome message then a user can type and submit the query and bot will provide an appropriate answer to the user's query. In figure 4 'What is college full name?' this question is asked by the user and correct answer is given by the chatbot. The User can query any college related activities through the chatbot system.

Figure 3: Chatbot Interface-1

Figure 4: Chatbot Interface-2

V. CONCLUSION AND FUTURE SCOPE

The aim of the system is to provide a user-friendly and efficient chatbot system for College. The chatbot will be very useful in guiding students to get correct and up-to-date information source. This system will be fruitful for students, teachers as well as parents. They can get information at any time without having to visit the college administration office every time. In the future scope of this project, the system will include voice-based requests and responses. Users are required to provide voice input and the system will output in the form of text. Chatbot will be able to provide a voice output as well, with the help of text to speech or speech to text conversion.

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IMPLEMENTING A COLLEGE ENQUIRY CHATBOT

A Project

Presented to the faculty of the Department of Computer Science

California State University, Sacramento

Submitted in partial satisfaction of
the requirements for the degree of

MASTER OF SCIENCE

in

Computer Science

by

Ujaliben Kalpesh Bavishi

SPRING
2019

IMPLEMENTING A COLLEGE ENQUIRY CHATBOT

A Project

by

Ujaliben Kalpesh Bavishi

Approved by:

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Dr. Pinar Muyan-Ozcelik

_____, Second Reader
Dr. V. Scott Gordon

_____
Date

Student: Ujaliben Kalpesh Bavishi

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Dr. Jinsong Ouyang Date

Department of Computer Science

Abstract
of
IMPLEMENTING A COLLEGE ENQUIRY CHATBOT
by
Ujaliben Kalpesh Bavishi

This project is focusing on creating a chatbot to be used by students to get their queries responded easily from the college website. The College Enquiry Chatbot has the capacity to make friendly conversations; respond the course and faculty details; give the link for the academic calendar; answer the frequently asked questions; calculate the fees based on the student's input; and give the timings, address, contacts, and events information of the departments like Union, Library, IPGE, and AIRC. To build the chatbot, Microsoft Azure bot service as well as Microsoft cognitive services, namely, Text Analytics, LUIS, and QnA Maker are used.

Most of the existing chatbots lack empathy and fail to accommodate anything outside of the script. In order to address these problems, the College Enquiry Chatbot extends the implementation of the current chatbots by adding sentiment analysis and active learning. Although, sentimental analysis correctly recognizes the user's query as positive, negative and neutral, the system was partially successful in adding empathy to the chatbot. It is because the system requires more rigorous training data to handle all queries which are off-script. However, for such queries, active learning helps to improve the chatbot

performance since it correctly understands the user's questions, asks clarifying question, and then retrains the system to give the response what the user intends to get.

The future work include training the chatbot with more varied data; increasing the scope of the chatbot by adding a speech recognition feature so that users can speak to get responses; and including integration with multiple channels such as phone call, SMS, and various social media platforms.

_____ Committee Chair
Dr. Pinar Muyan-Ozcelik

_____
Date

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1 INTRODUCTION AND MOTIVATION

This project is focusing on creating a chatbot to be used by students to get their queries responded easily from the college website. A chatbot is a program which can do real conversations with textual and/or auditory methods [1]. Using Artificial Intelligence (AI), chatbots can simulate human conversations. There are two categories of chatbots. One category is command based chatbots where chatbots rely on a databank of replies and heuristics. The user must be very specific while asking the questions so that the bot can answer. Hence, these bots can answer limited set of questions and cannot perform function outside of the code. The other category is chatbots based on AI or machine learning algorithms, these bots can answer ambiguous questions which means the user do not have to be specific while asking questions. Thus, these bots create replies for the user's queries using Natural Language Processing (NLP).

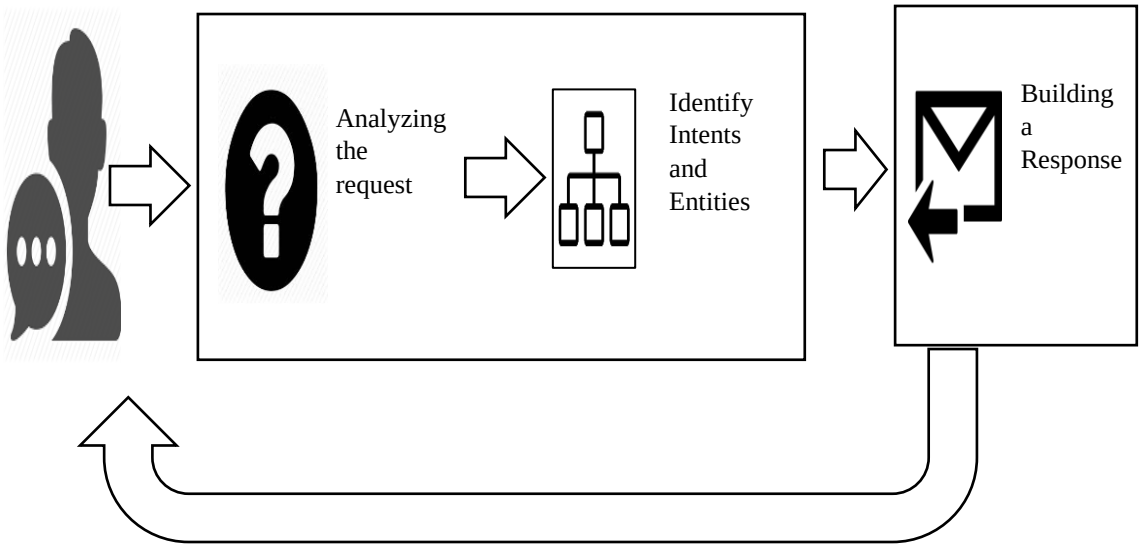


Figure 1: How a Chatbot Works [2]

Figure 1 shows how a chatbot works. Whenever a user asks any query, the bot will first analyze the request, then identifies intents and entities, builds a response and sends it back to the user. Now, intents mean intention of the query and entity means details of that query. For example, if a student wants to know the office hours of a faculty then the intent will be office hours and entity will be name of the faculty in this case.

AI-powered chatbots are motivated by the need of traditional websites to provide a chat facility where a bot is required to be able to chat with user and solve queries. When live agent can handle only two to three operations at a time, chatbots can operate without an upper limit which really scales up the operations. Also, if any school or business is receiving lots of queries, having a chatbot on a website takes off the load from support team. Having a chatbot clearly improves the response rate compared to human support team. In addition, since millennials prefer live chats over a phone call, they find a chatbot, which provide a highly interactive marketing platform, very attractive. Furthermore, a chatbot can automate the repetitive tasks. There can be some scenarios where a business or school receives same queries in a day for many times and support team must respond to each query repetitively. Lastly, the most important advantage of having a chatbot is that it is available 24/7. No matter what time it is, a user can get a query solved. All these advantages of a chatbot constitute the motivation to implement a College Enquiry Chatbot.

Before implementing College Enquiry Chatbot, various existing chatbots were reviewed such as Amazon Shopping App [3], Alexa [4], Bank of America (Erica bot) [5]

and CNN news bot [6]. In order to understand the requirement of a chatbot, consider an example of Amazon Shopping App. In this app, when a customer buys an item, he/she does not have any information about how to return the item. To get this information, the customer must call and wait to talk to customer representative for a long time. However, this whole process is tedious for a customer. Hence, Amazon created a chatbot to answer simple queries of customers.

Similarly, the College Enquiry Chatbot is designed to help students to get their queries solved on a fingertip. The most essential downside I found while utilizing the previously mentioned chatbots is absence of personality and conversational flow. As Storman [7] suggests, the CNN chatbot neglects to give sympathy and effortlessness. To be efficient, the chatbot must have the capacity to relate and associate itself with the user. For example, a discussion with the CNN chatbot is depicted in the article where at whatever point a user says anything aside from news or any current alternatives, it answers with the news comprising of those words and toward the end it says "Not sure I understand what you're looking for. Try again or pick one of the options below." and afterward it gives the choices as programmed. This implies, although it conveys the news proficiently, the CNN bot needs compassion.

Solution to this problem is described by Rahman et al. [8]. This study proposes that “there is a need to understand and consider the stability, scalability, and flexibility issues along with high level of intention of a human language”. Hence, for implementing a chatbot that handles complicated queries, the sentiment analysis is incorporated into College

Enquiry Chatbot. Sentiment analysis aims to obtain writer's feelings expressed in positive, negative or neutral comments. Based on sentiment analysis, the bot is trained to have empathy while answering to the user. For example, if a user says "I am sad today." then bot should reply to it with some empathy like "I'm sorry to hear that, how can I help you today?" and not just reply the standard message like "Sorry did not understand your question."

Another downside which was found during a research on chatbot is that bots are created in such way that they follow a specific route and mostly all of them fails to satisfy anything outside of the previously defined scripts. This means that if they are not part of a predefined scripts, a significant number of the bots will fail in understanding even the most fundamental kind of queries, which results in a repeating and horrendous experience. To resolve this issue, active learning can be introduced to the system to make probabilistic assessments and provide autonomous responses to the users [9]. Active learning is an algorithm which interactively queries user to obtain the desired output. Whenever a user asks anything which is outside of the script the chatbot will ask questions to the user by giving two to three options and based on the user's input, the bot returns the answer to that query. This whole learning process is called as active learning.

2 SYSTEM DESIGN

System design of College Enquiry Chatbot consists of integration of multiple technologies. This system makes use of NodeJS for backend and ReactJS for frontend. Microsoft Azure provides services like Cognitive Service, Bot Service [10], and Web Apps. Cognitive services consist of Text Analytics, LUIS [11], and QnA Maker [12]. The bot service is used to create the bot application on Azure. In addition, Web Apps are used to host the application on Microsoft Azure. System uses Mongo DB to store the conversations history.

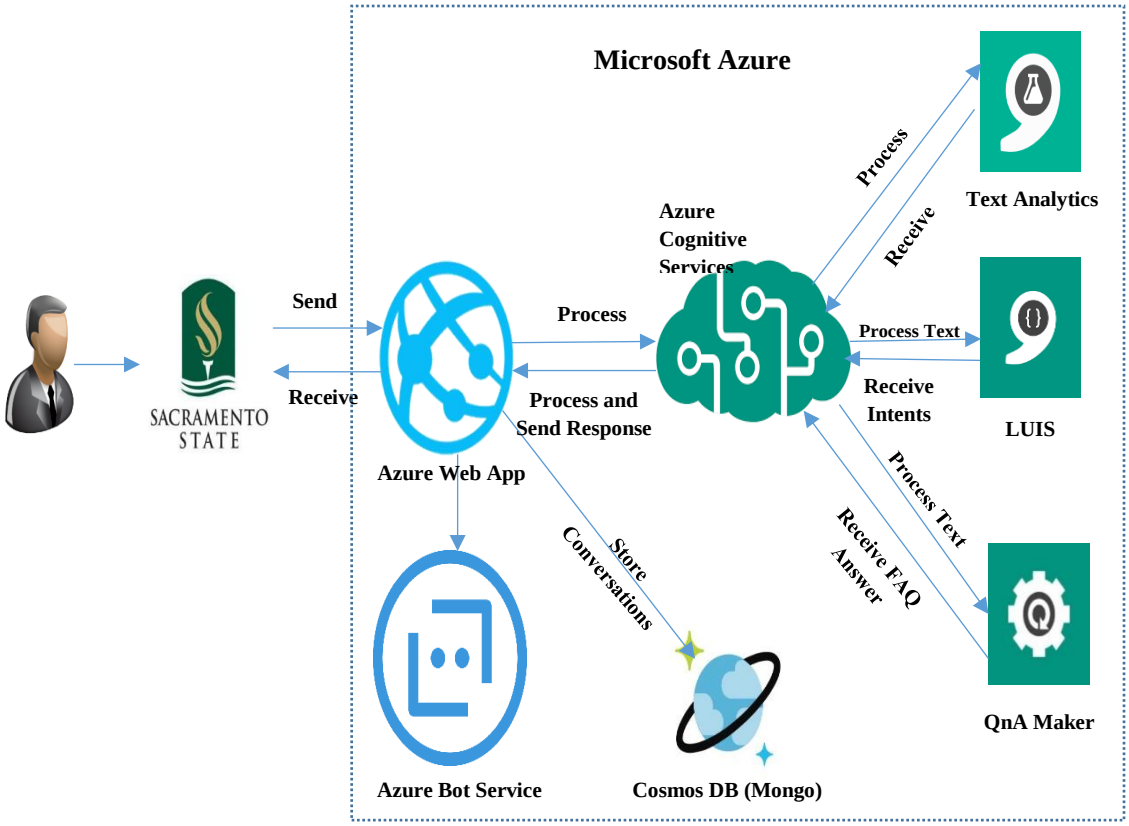


Figure 2: System Design

2.1 Microsoft Azure

Microsoft Azure provides cloud services to build, manage, and deploy applications on a cloud network which helps organization to meet their business needs using their favorite tools and frameworks. College Enquiry Chatbot uses all the services shown in Figure 2 which are provided by Microsoft Azure.

2.1.1 Azure Bot Service

Azure bot service is a service provided by Microsoft Azure which builds and artificial intelligence (AI) chatbot. It offers the ability to add intelligent agents that can do conversations with users without having to commit the resources to develop one's own AI [13].

2.1.2 Azure Web App

I have used Azure web app to host my bot application build by Azure bot service. Azure Web App are the web applications which are hosted on Microsoft Azure cloud without any programming language barrier. Since it is hosted on the cloud, infrastructure maintenance is not needed to host the applications. It also provides various features like auto scaling, automated deployment and also supports both Windows and Linux environments [14].

2.1.3 Azure Cognitive Services

Azure Cognitive services are used to add intelligence to the bots by adding features such as sentiment analysis and language understanding which help in analyzing user's queries [15]. These services can be added to an existing bot by adding service calls to the

Microsoft's SDK to get the desired results. College Enquiry Chatbot utilizes Text Analytics, LUIS, and QnA Maker services which are part of cognitive services and use natural language processing (NLP) for different purposes.

2.1.3.1 Text Analytics

Text Analytics is used to perform sentiment analysis on a user's queries. As shown in Figure 2, a text is sent to text analytics and it returns the sentiment of that text.

2.1.3.2 LUIS

"LUIS stands for Language Understanding Intelligent Services which aims at creating cloud-based machine learning language understanding (LU) models specific to an application and without machine learning expertise" [16]. To implement a College Enquiry Chatbot, I have first created all the possible intents and entities using LUIS tool. Based on these intents and entities, LUIS have built and train a LU deep learning model. Then, the created model needs to be pushed to the endpoint on the cloud. The queries from the user are passed to the endpoint to get the recognized intent and entities in JSON format. Based on various flows, response will be sent back to the user.

Active learning is also implemented using LUIS as shown in Figure 3. LUIS detects the user's query (utterances) in terms of intents and entities. It sends back the response to the service code where those utterances are examined based on the confidence score. Then, College Enquiry Chatbot labels these utterances, re-trains, and publishes the LU model [17]. Another method of active learning is also implemented which involves using user's response to re-train the model. The endpoint provided by LUIS responds with intents,

entities, and a corresponding confidence score. A threshold is maintained based on the confidence score and correspondingly prompts are provided to the user. When the users respond to it, the system keeps track of the responses and uses it to re-train the model.

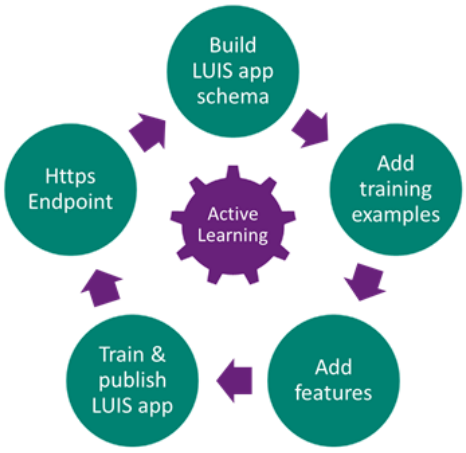


Figure 3: Active Learning Process [16]

2.1.3.3 QnA Maker

For answering simpler queries, instead of detecting intents and entities, College Enquiry Chatbot uses QnA Maker for structuring answers from a semi-structured document like FAQs. This web-based service is useful in incorporating multiple FAQs from an URL, structured documents, product manuals, or editorial contents; and building the LU model for natural language processing.

2.1.4 Cosmos DB (Mongo)

Cosmos DB is a database service provided by Microsoft Azure. College Enquiry Chatbot uses this database service to store my conversational history.

3 IMPLEMENTATION DETAILS

In this section of the report, step by step demonstration of how to setup the bot, LUIS (for NLP), and QnA Maker as well as explanation of service code which includes the implementation of the Active Learning are provided. In addition, setting up databases to store the conversation history is explained. All these steps serve as a template to get a basic bot deployed and published on Azure cloud.

The followings are couple of the prerequisites that are needed in order to get started:

- Microsoft Azure Student Account
- Installation of Git (https://git-scm.com/download/win) and NodeJS (https://nodejs.org/en/download/) on Windows.

3.1 Azure Bot Setup

Open https://portal.azure.com as shown in Figure 4 and follow the steps explained in the following subsections.

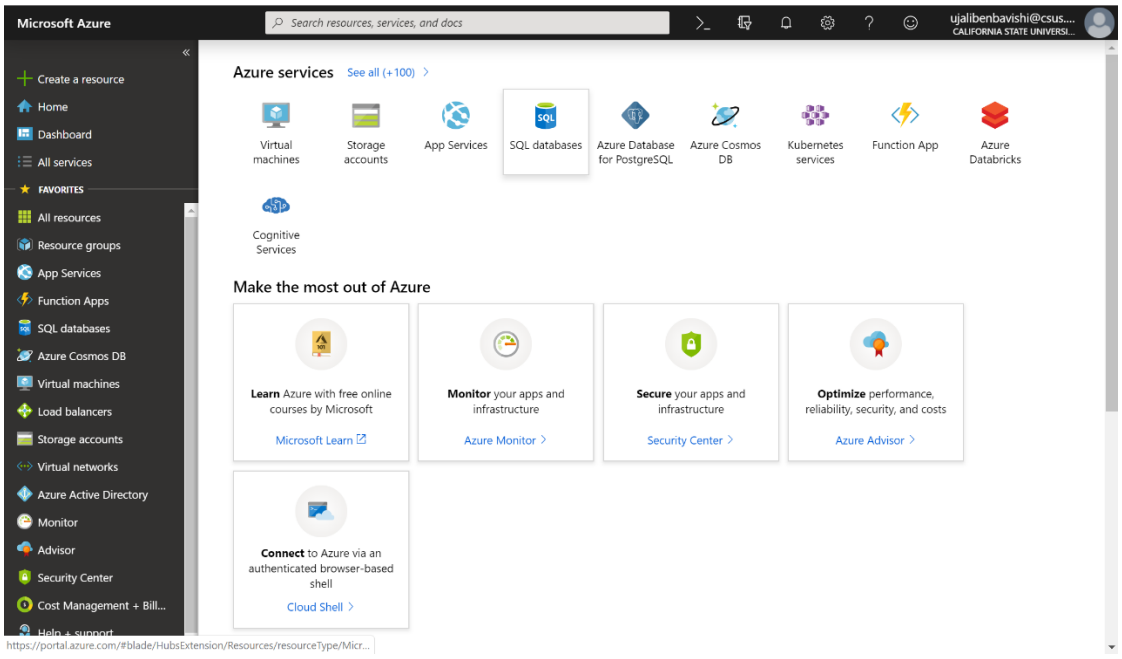


Figure 4: Azure Portal Home Page

3.1.1 Bot Creation

In the left side pane, click on “Create a Resource” and search for “Web App Bot”. As a next step click on “Create” to start creating a bot. Fill up all the required fields as shown in Figure 5.

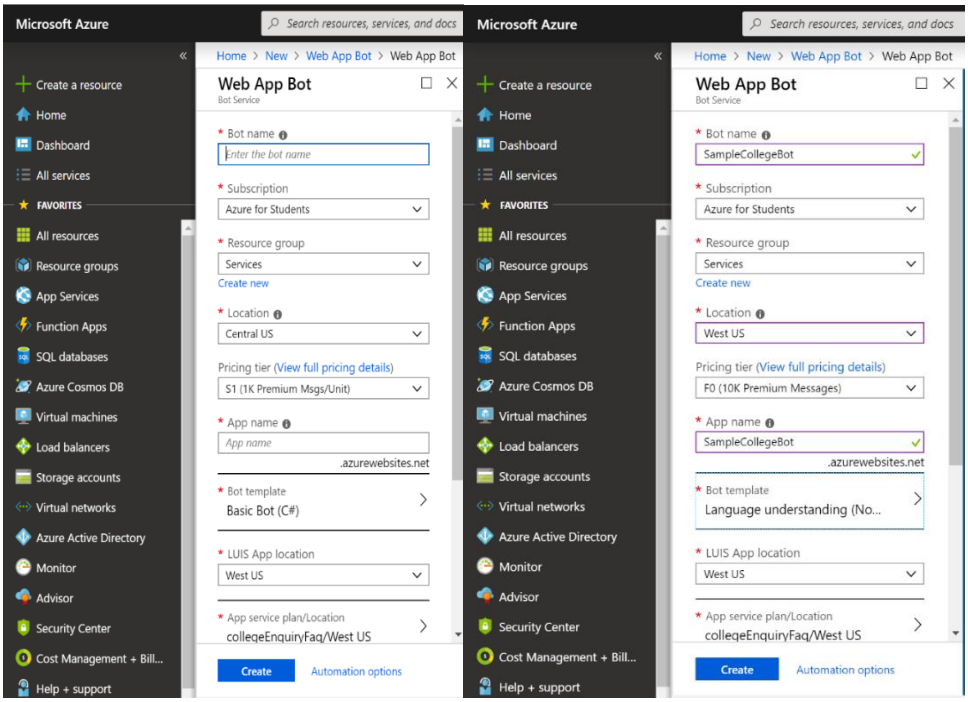


Figure 5: Web App Bot Creation

3.1.2 Adding the DirectLine Channel

After the bot has been created, several channels can be configured to access the bot such as Skype, Webchat, Slack, Facebook, etc. In this project, DirectLine channel is used to communicate with the bot. Figures 6 and 7 show how to add a channel to a bot. After the channel is added, copy the secret key to be used in the service and click on “Done”.

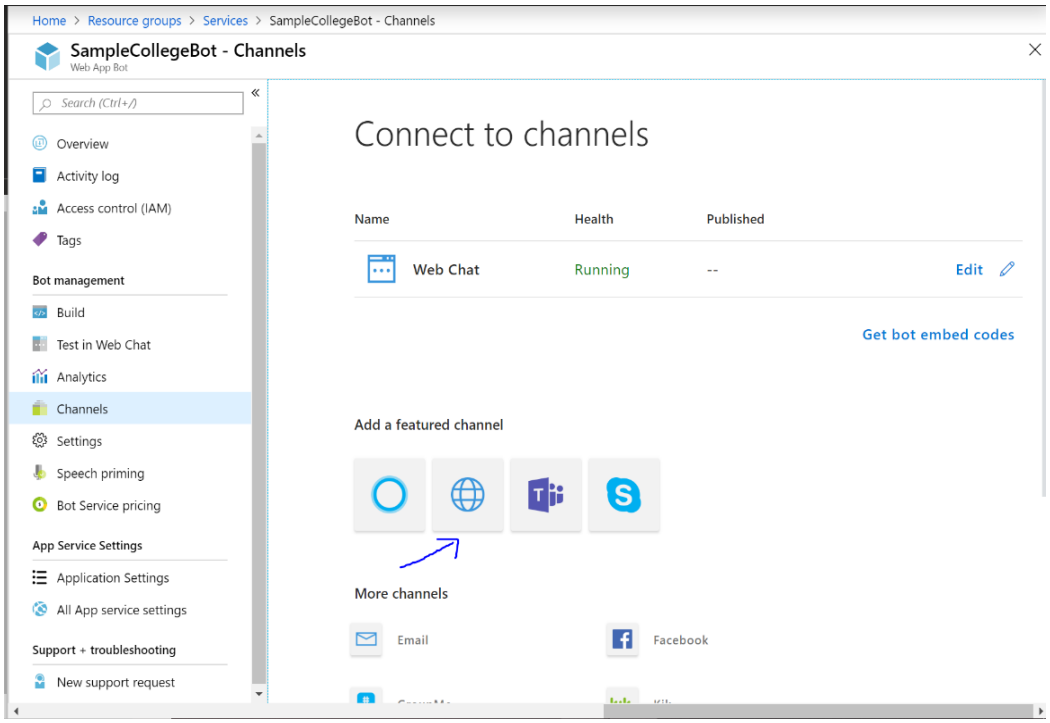


Figure 6: Channel Configuration Page of the Bot

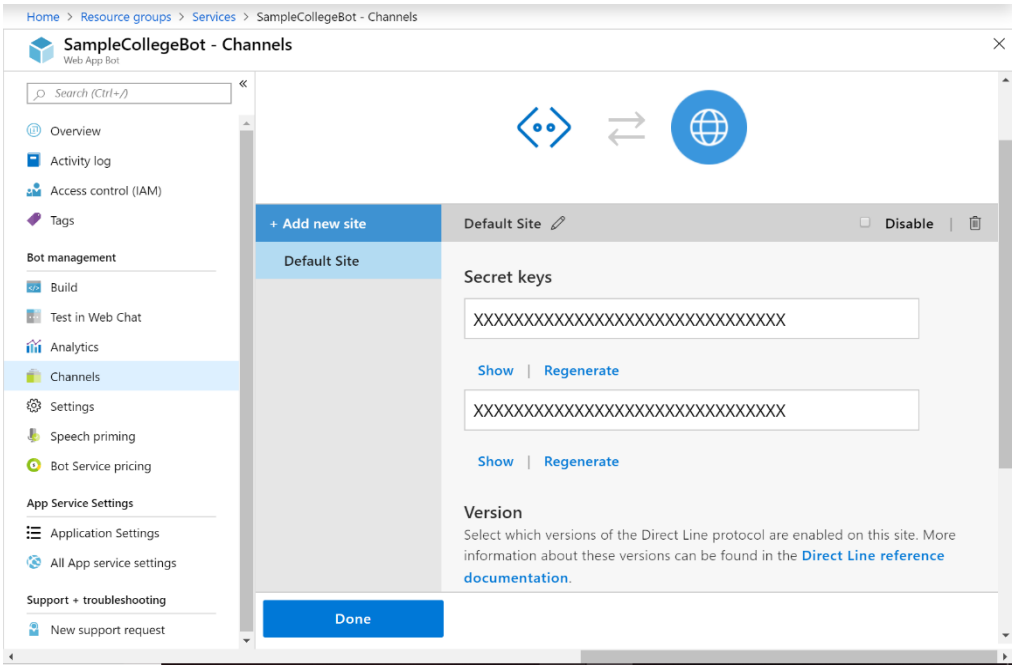


Figure 7: Configure DirectLine Channel for the Bot

3.1.3 Testing the Echo Bot

After the channel is configured, we can test the new bot with some preconfigured bot template where we can echo back whatever the user queries as shown in Figure 8.

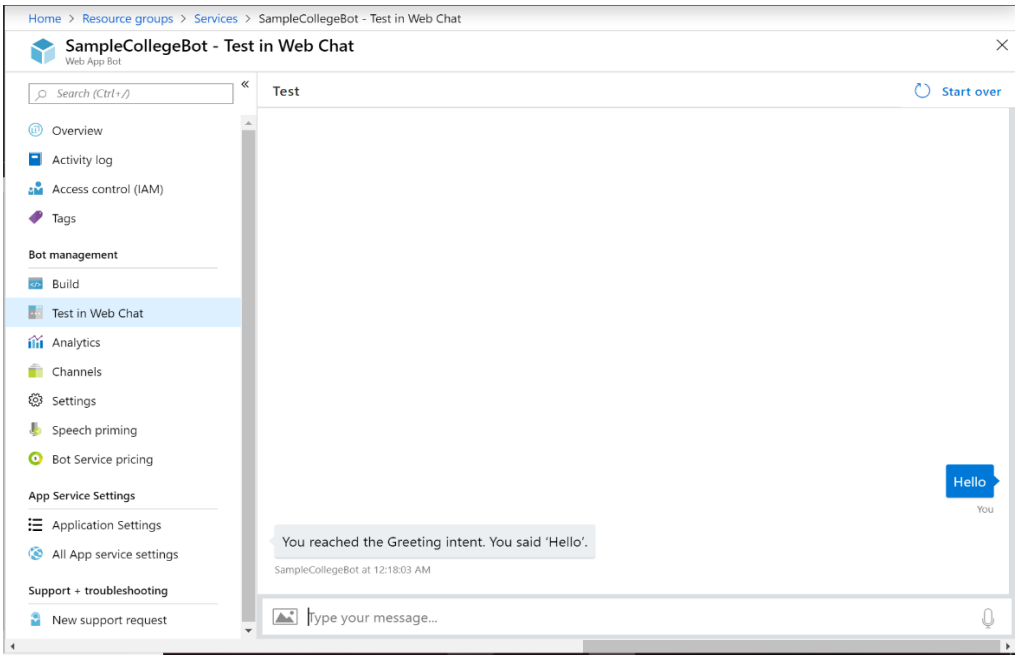


Figure 8: Web Chat Testing of the Created Bot

3.2 LUIS Setup

Go to https://www.luis.ai to setup the intents and entities to create a model and train the natural language processor.

3.2.1 LUIS App Creation

After visiting the website, sign in with the same Azure credentials, scroll down and click on the button “Create a LUIS app now” as shown in Figure 9. Please note that if a Web

App Bot is created with LUIS bot template, then a LUIS App will be created automatically with preconfigured intents and entities to work with.

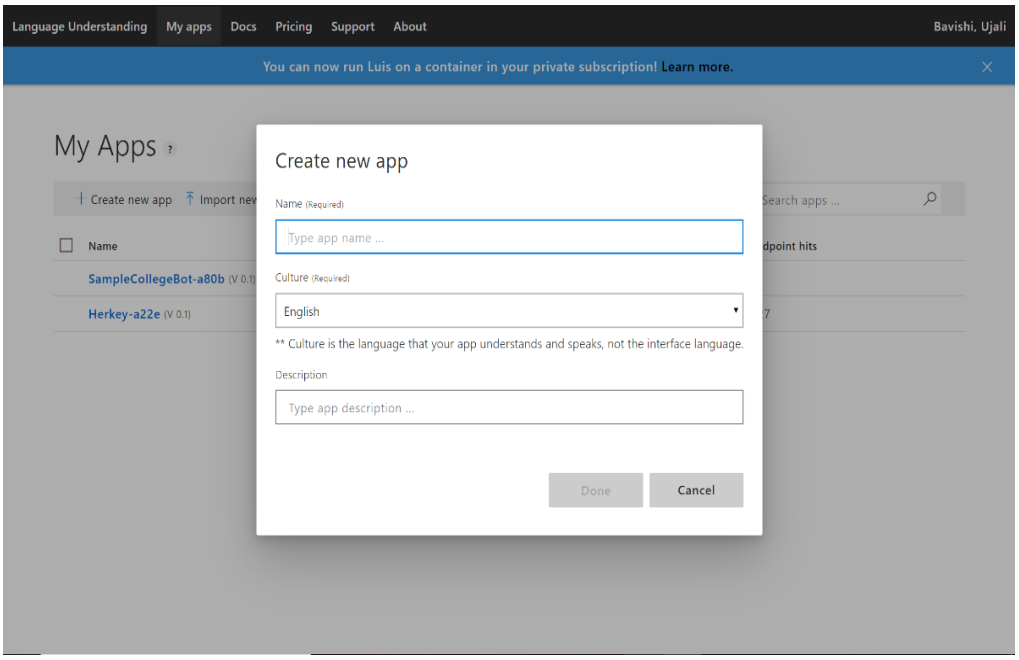


Figure 9: LUIS App Creation

3.2.2 Intents Creation

Go to created LUIS app and click on “Create new intent” and provide a specific intent name as shown in Figure 10. The next step would be to add training data to train the intent with all different types of utterances as shown in Figure 11.

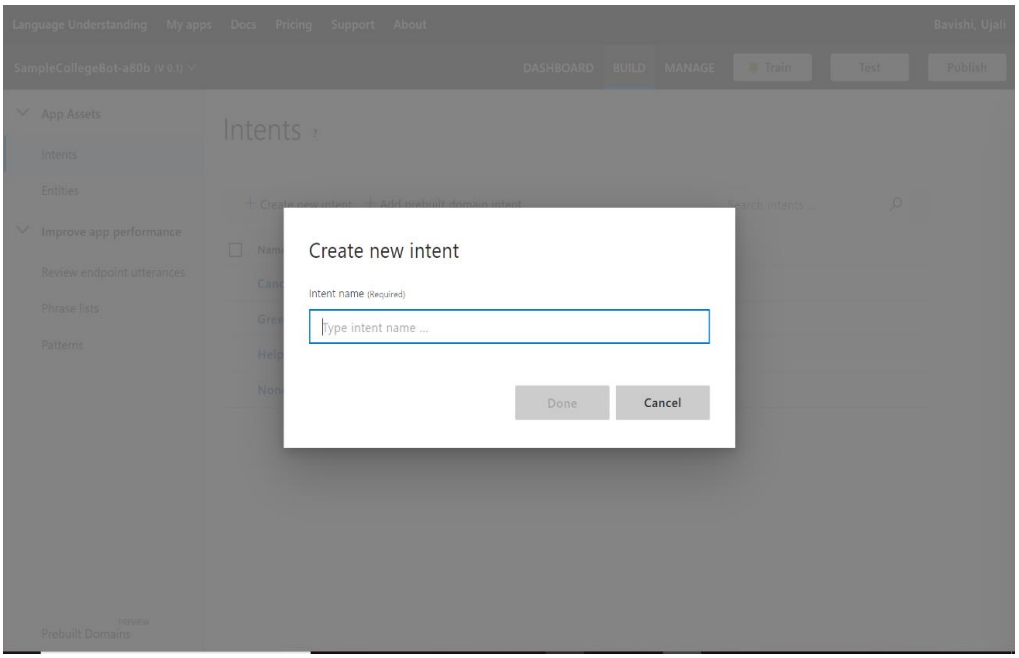


Figure 10: Intent Creation in LUIS

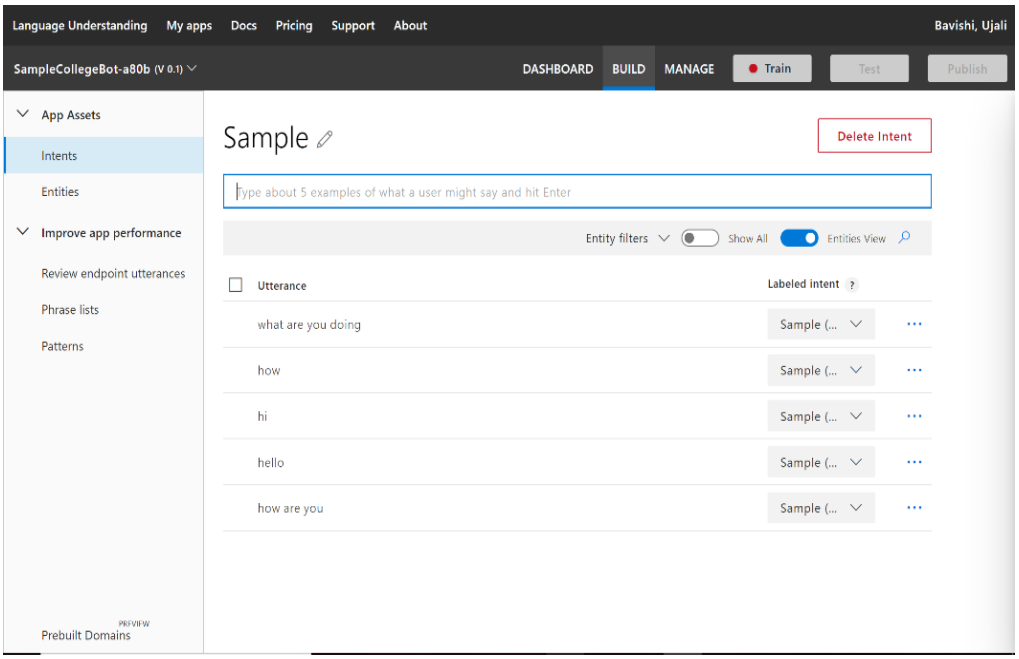


Figure 11: Adding Training Data to Created Intent

3.2.3 Entity Creation

In the left side pain, click on “entities” and then select “Create an Entity” and provide a name for the entity. In this project, a list type of entity is used since the professor and course values are stored in the entity sub list as shown in figures 12 and 13.

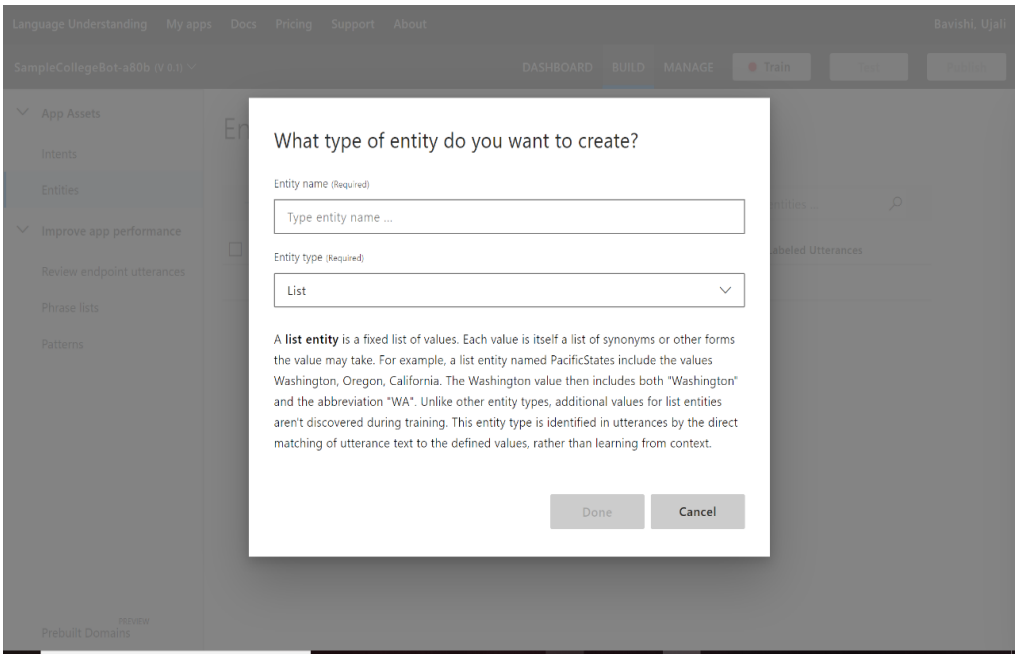


Figure 12: Entity Creation in LUIS - 1

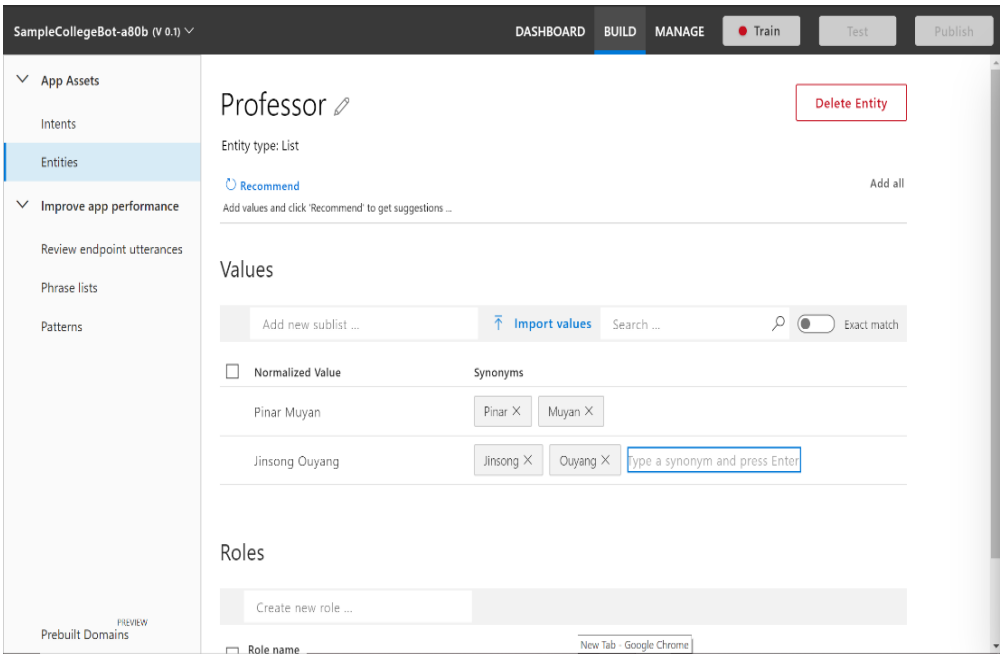


Figure 13: Entity Creation in LUIS - 2

3.2.4 Train and Publish the Model

After adding the intents and entities, the model is trained and published. After the model is published, REST API can be accessed from the service to access the LUIS endpoint to get the intent and entity from the user's query.

3.3 QnA Maker Setup

Go to https://www.qnamaker.ai to setup the questions and answers from the FAQs listed in any website and also to include some of the responses to be displayed depending on user's emotions based on some metadata.

3.3.1 QnA Maker App Creation

After visiting the website, sign in with the same Azure credentials, click on “Create a knowledge base” from the top navigation bar as shown in Figure 14. Then, follow the steps as shown in figures 15 and 16.

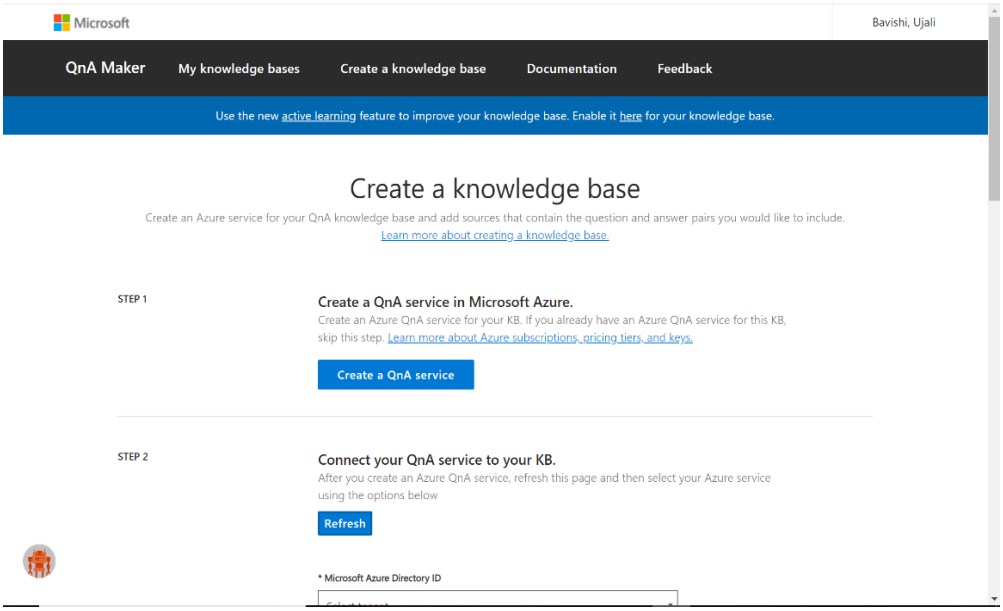


Figure 14: QnA Maker App Creation - 1

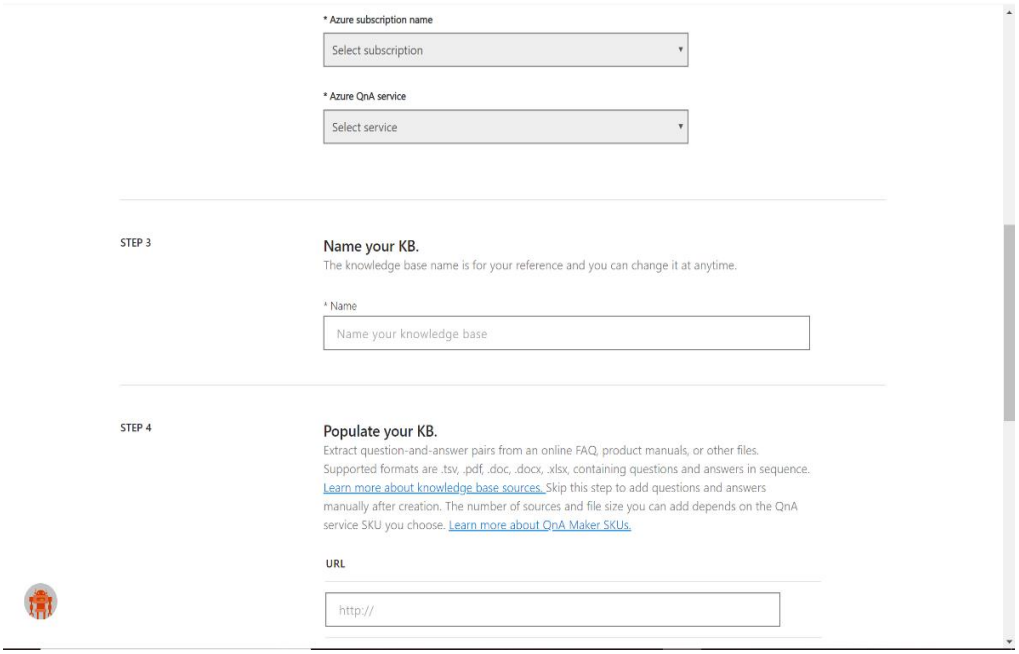


Figure 15: QnA Maker App Creation - 2

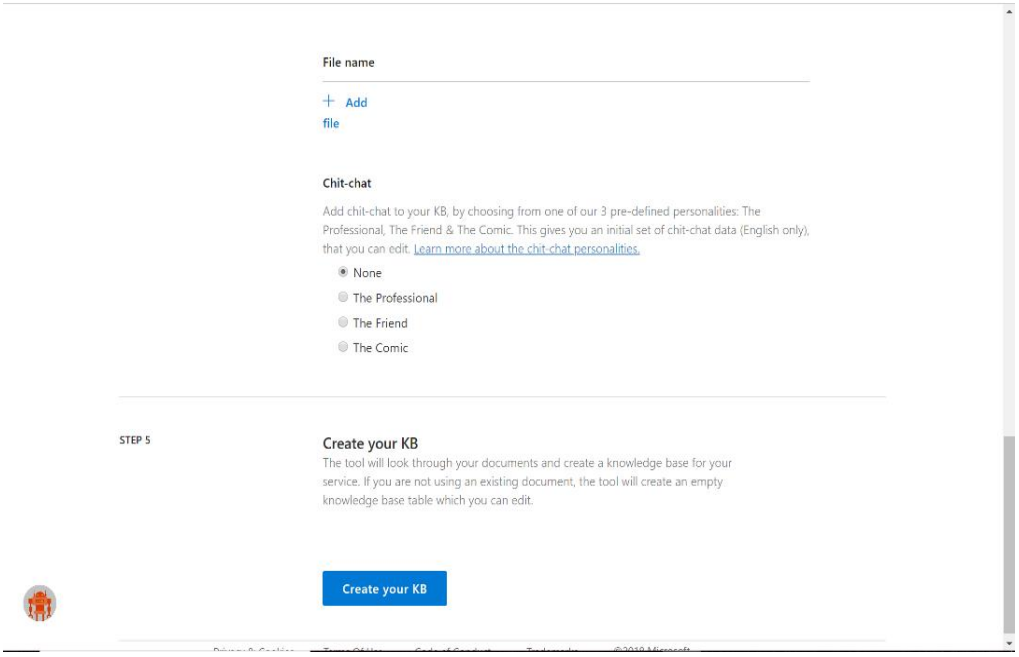


Figure 16: QnA Maker App Creation – 3

3.3.2 Add/Manage Knowledge base

Click on “Settings” from the top navigation and add FAQs URL from the CSUS website which are needed to be included in the knowledge base as shown in Figure 17

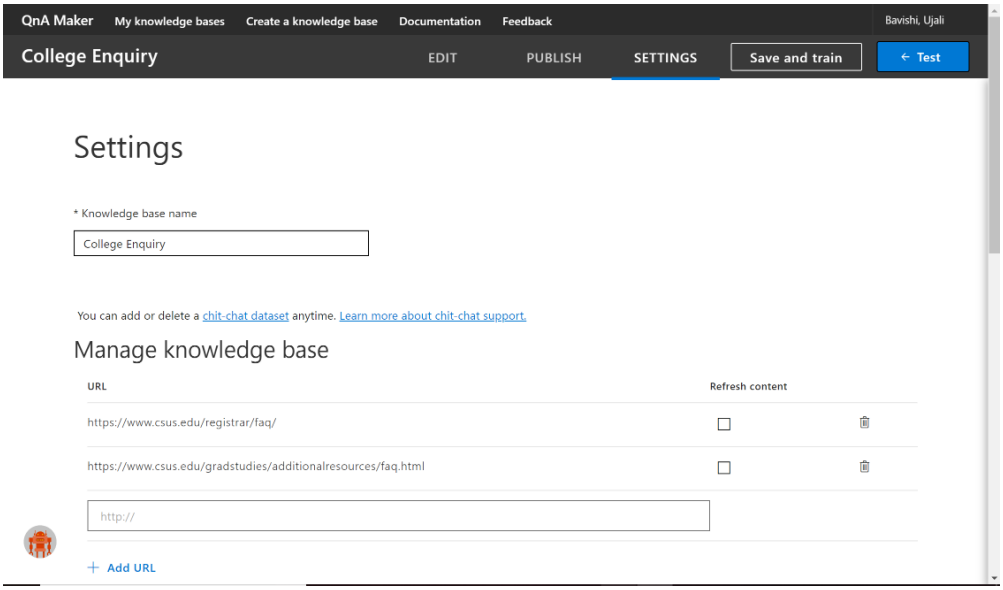


Figure 17: Knowledge Base Configuration Page

3.3.3 Train and Publish the Knowledge Base

After the knowledge bases are added, the next step is to train the app and publish to get a published endpoint to use the QnA Maker service.

3.4 Service Code Setup

I am using Azure DevOps to setup continuous deployment with a source control repository where the code will reside.

3.4.1 Create Project, Repository, and Branches

Sign in to Azure DevOps using the Azure account, create a new project and setup a repository based on the needs as shown in figures 18-20.

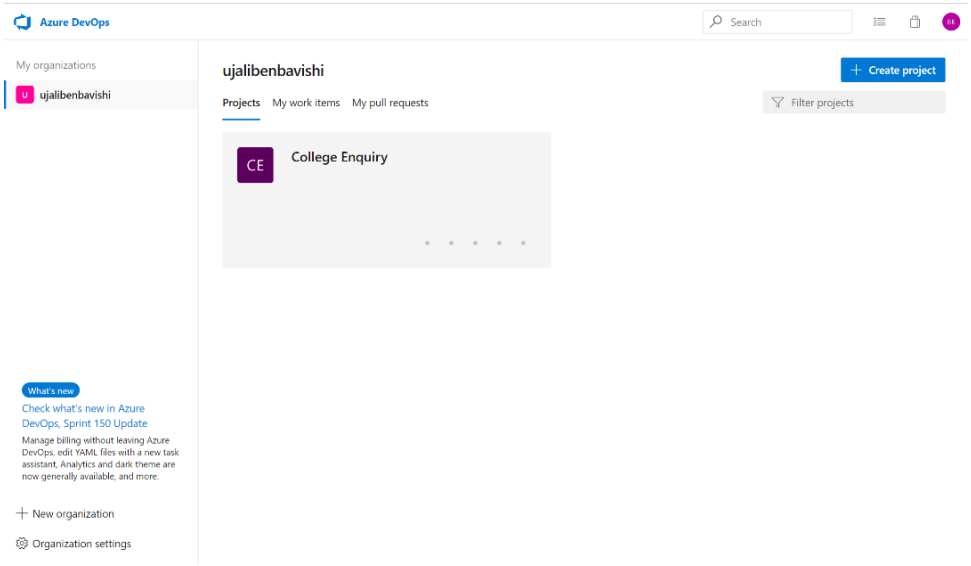


Figure 18: Azure DevOps Source Control Repo

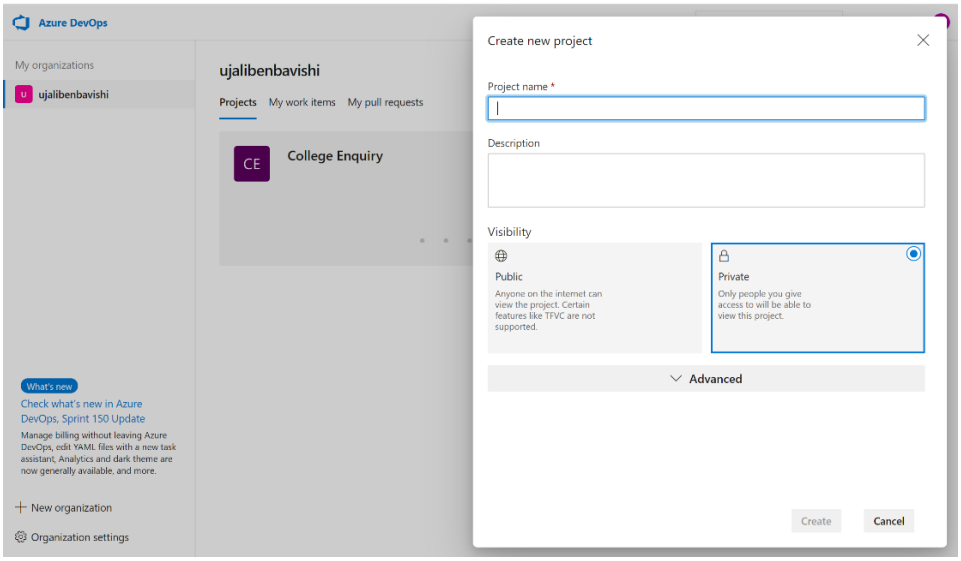


Figure 19: Project Creation on Azure DevOps

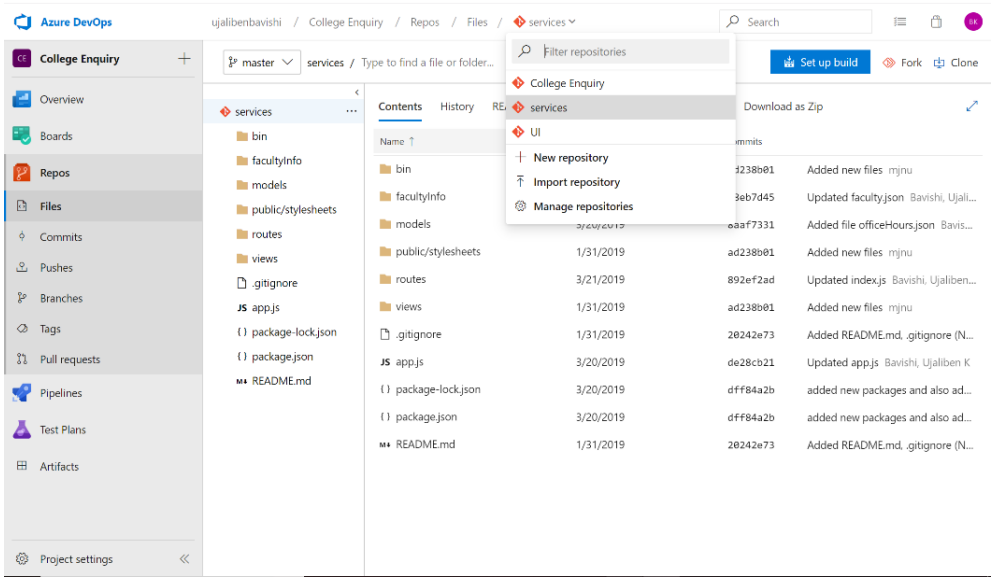


Figure 20: Repository and branch configuration in Azure DevOps Project

3.4.2 Sync Service Code with Azure DevOps

After the repository is setup, use Git clone functionality to clone the repo onto the local system and add all the files related to the service into the project. Finally, when a Git push is made from the same folder, all the files will be copied over to Azure DevOps.

3.5 Setup Continuous Deployment

As a last step, we need to configure the project created on Azure DevOps with the application created on Azure portal as shown in figures 21-24.

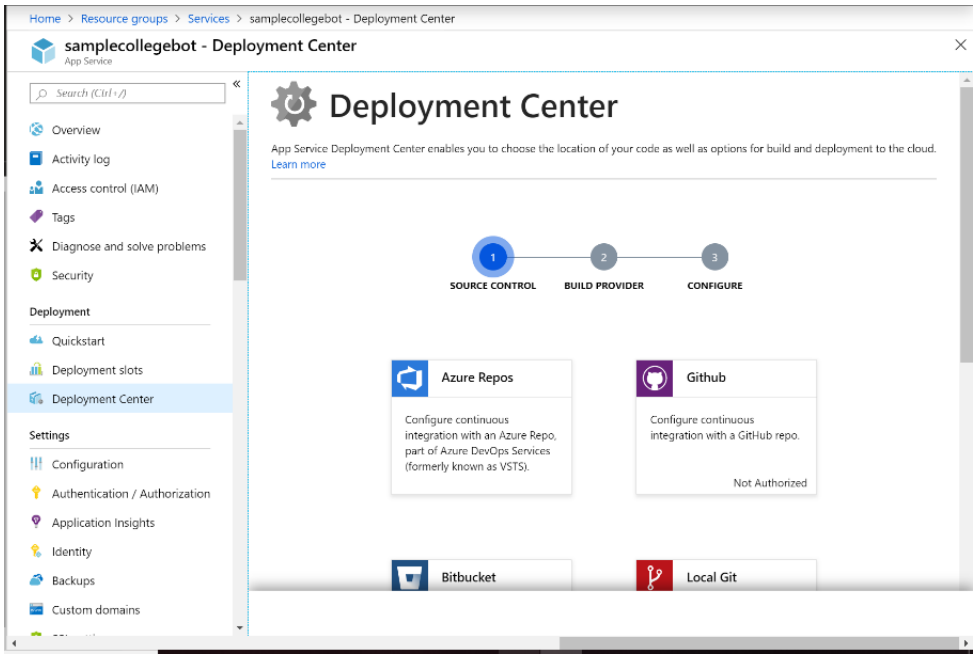


Figure 21: Continuous Deployment Configuration - 1

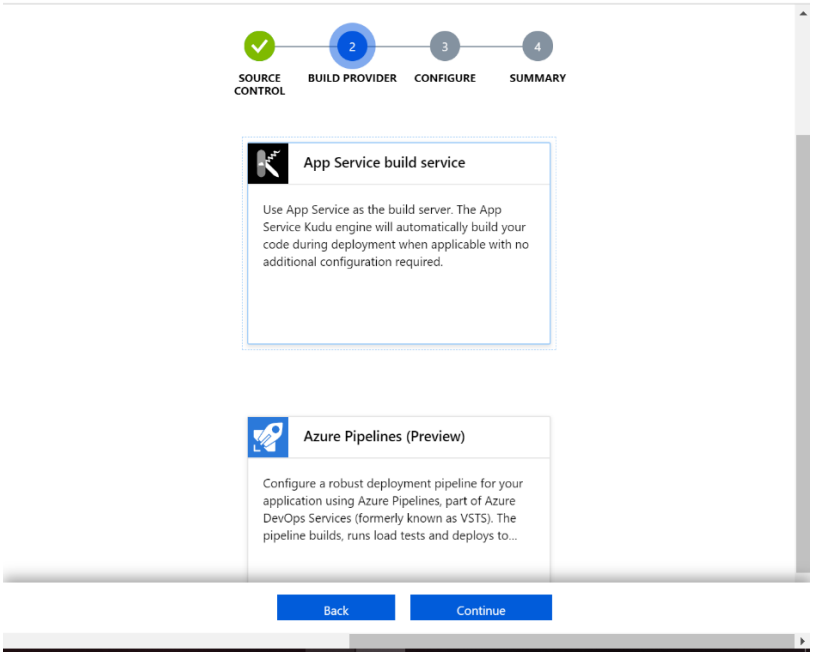


Figure 22: Continuous Deployment Configuration - 2

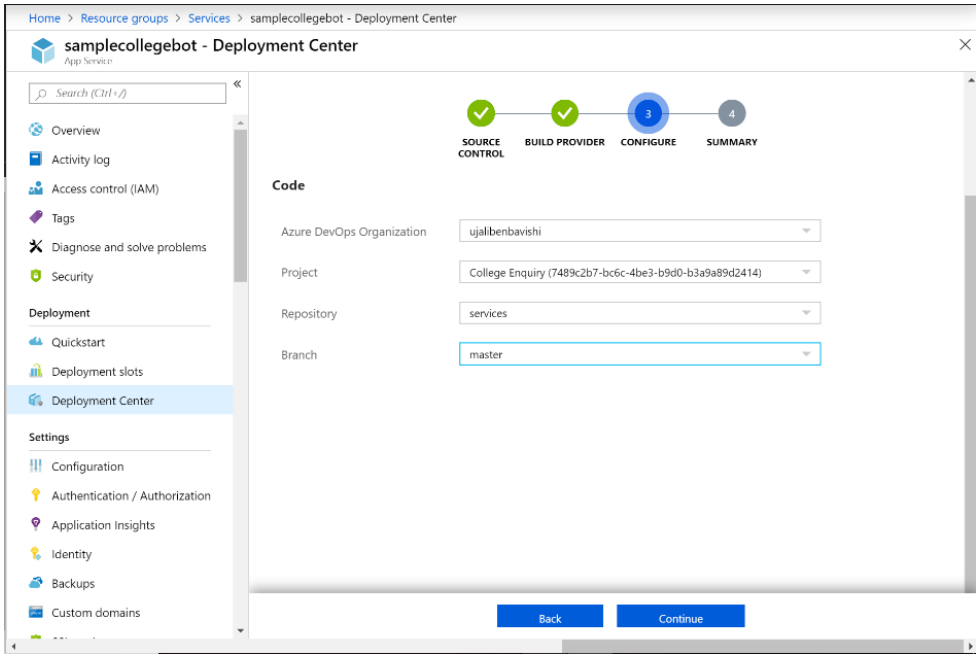


Figure 23: Continuous Deployment Configuration - 3

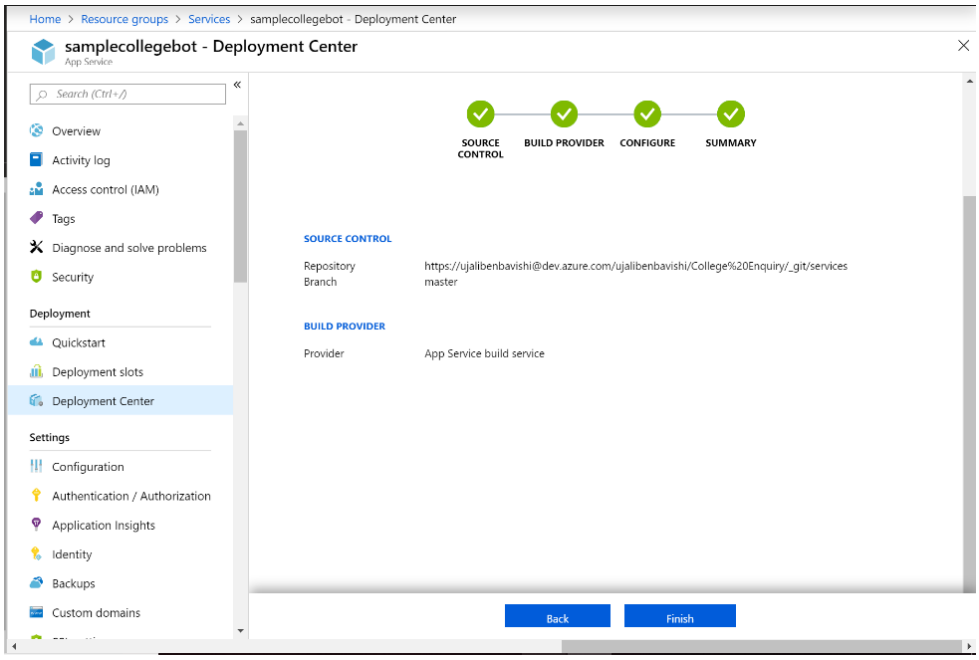


Figure 24: Continuous Deployment Configuration – 4

3.6 Service Code Snippets

In order to provide overview of the service code and some of the utility functions that are used by the bot, this section provides some screenshots. Figure 25 shows the overall structure of the code which utilizes NodeJS and ExpressJS frameworks.

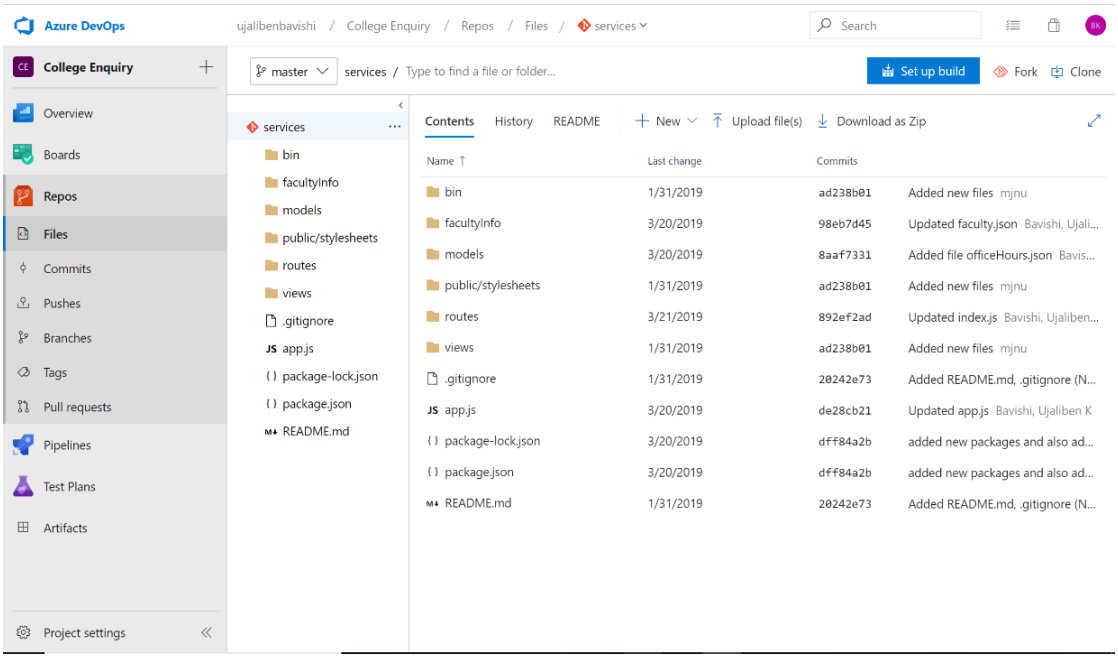


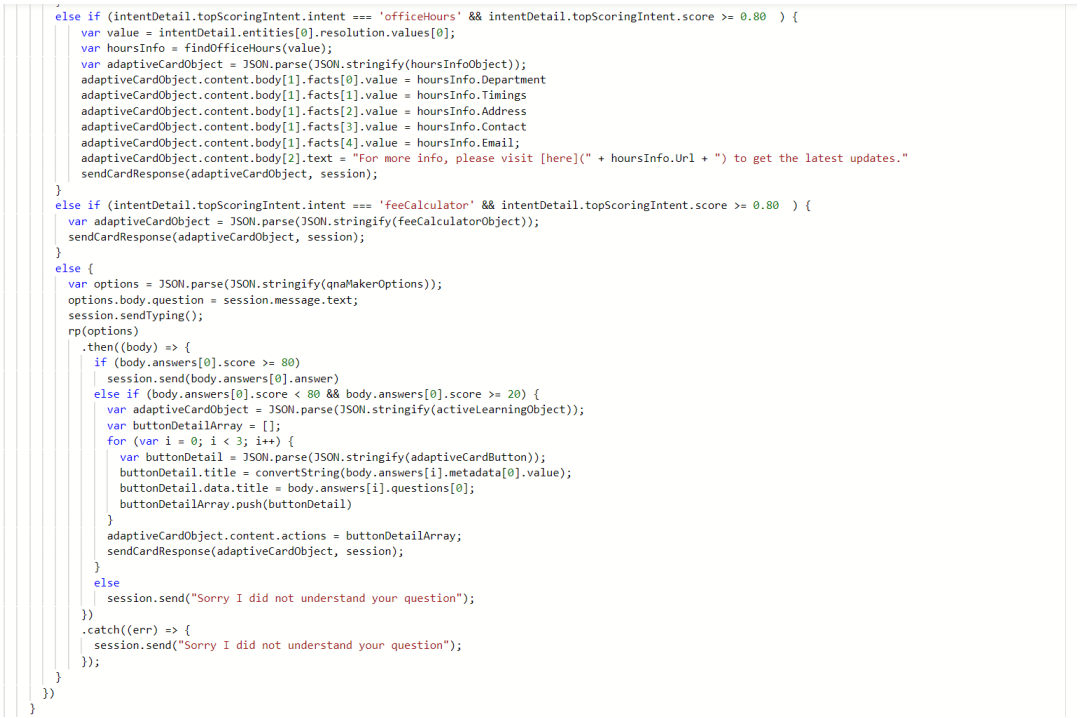
Figure 25: Code Structure Overview

Figures 26 and 27 show various functionalities including calling LUIS REST API, intercepting bot messages to save the chat history to the database and presenting the logic to show feedback card used in active learning.

```
bot.use({
  botbuilder: function (session, next) {
    if (session.message && session.message.value) {
      var studentType = session.message.value.studentType;
      var credits = session.message.value.credits;
      var registrationFee = 0;
      var totalFee = 0;
      if (studentType === "UnderGraduate") {
        if (parseInt(credits) > 6)
          totalFee = 3655 + parseInt(credits) * 396;
        else
          totalFee = 2449 + parseInt(credits) * 396;
      }
      else if (studentType === "Graduate") {
        if (parseInt(credits) > 6)
          totalFee = 4372 + parseInt(credits) * 396;
        else
          totalFee = 2866 + parseInt(credits) * 396;
      }
      var resp = "Based on your input, the total fees would be approximately $" + totalFee + ".00";
      session.send(resp);
    }
    else if (session.message && session.message.text !== "") {
      getIntentOptions.url = LuisModelUrl.concat(session.message.text);
      rp(getIntentOptions).then((result) => {
        var intentDetail = JSON.parse(result);
        console.log(result);
        var timeStamp = moment(new Date()).tz("America/Los_Angeles").format("MM/DD/YYYY hh:mm:ss a");
        var updates = {};
        if (intentDetail.sentimentAnalysis) {
          if (Math.round(intentDetail.sentimentAnalysis.score) === 1) {
            updates = { $setOnInsert: { startTimeStamp: timeStamp }, $set: { endTimeStamp: timeStamp }, $inc: { positive: 1 }, $push: { conversations: { $each: [{ "use
            }
            else {
              updates = { $setOnInsert: { startTimeStamp: timeStamp }, $set: { endTimeStamp: timeStamp }, $inc: { negative: 1 }, $push: { conversations: { $each: [{ "use
            }
          }
          else {
            updates = { $setOnInsert: { startTimeStamp: timeStamp }, $set: { endTimeStamp: timeStamp }, $push: { conversations: { $each: [{ "user": session.message.text,
          }
          insertIntoDb(session.message.address.conversation.id, updates)

          if (intentDetail.topScoringIntent.intent === 'courseInfo' && intentDetail.topScoringIntent.score >= 0.80  ) {
```

Figure 26: LUIS and Active Learning Logic - 1



```
    else if (intentDetail.topScoringIntent.intent === 'officeHours' && intentDetail.topScoringIntent.score >= 0.80  ) {
      var value = intentDetail.entities[0].resolution.values[0];
      var hoursInfo = findOfficeHours(value);
      var adaptiveCardObject = JSON.parse(JSON.stringify(hoursInfoObject));
      adaptiveCardObject.content.body[1].facts[0].value = hoursInfo.Department
      adaptiveCardObject.content.body[1].facts[1].value = hoursInfo.Timings
      adaptiveCardObject.content.body[1].facts[2].value = hoursInfo.Address
      adaptiveCardObject.content.body[1].facts[3].value = hoursInfo.Contact
      adaptiveCardObject.content.body[1].facts[4].value = hoursInfo.Email;
      adaptiveCardObject.content.body[2].text = "For more info, please visit [here](" + hoursInfo.Url + ") to get the latest updates."
      sendCardResponse(adaptiveCardObject, session);
    }
    else if (intentDetail.topScoringIntent.intent === 'feeCalculator' && intentDetail.topScoringIntent.score >= 0.80  ) {
      var adaptiveCardObject = JSON.parse(JSON.stringify(feeCalculatorObject));
      sendCardResponse(adaptiveCardObject, session);
    }
    else {
      var options = JSON.parse(JSON.stringify(qnaMakerOptions));
      options.body.question = session.message.text;
      session.sendTyping();
      rp(options)
        .then((body) => {
          if (body.answers[0].score >= 80)
            session.send(body.answers[0].answer)
          else if (body.answers[0].score < 80 && body.answers[0].score >= 20) {
            var adaptiveCardObject = JSON.parse(JSON.stringify(activeLearningObject));
            var buttonDetailArray = [];
            for (var i = 0; i < 3; i++) {
              var buttonDetail = JSON.parse(JSON.stringify(adaptiveCardButton));
              buttonDetail.title = convertString(body.answers[i].metadata[0].value);
              buttonDetail.data.title = body.answers[i].questions[0];
              buttonDetailArray.push(buttonDetail)
            }
            adaptiveCardObject.content.actions = buttonDetailArray;
            sendCardResponse(adaptiveCardObject, session);
          }
          else
            session.send("Sorry I did not understand your question");
        })
        .catch((err) => {
          session.send("Sorry I did not understand your question");
        });
    }
  })
}
```

Figure 27: LUIS and Active Learning Logic - 2

Figure 28 shows a sample file which contains basic information related to the course like course id, name, information, prerequisites, professor's name and URL of the course.

```
[
    {
        "Course Id": "CSC201",
        "Course Name": "Programming Language Principles",
        "Course Information": "Notations for the specification of programming language syntax and semantics; attribute, translational, operational, axiomatic, algebra
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Dr. Cui Zhang",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc201.pdf"
    },
    {
        "Course Id": "CSC204",
        "Course Name": "Data Models for Database Management Systems",
        "Course Information": "Database management system (DBMS) architecture. Database file organizations and access methods. The relational model and relational alg
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Bill Mitchell",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc204.pdf"
    },
    {
        "Course Id": "CSC205",
        "Course Name": "Computer Systems Structure",
        "Course Information": "Overview of computer systems structure, covering hierarchical structure from software and hardware points of view. Concepts of relocati
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Dr. Weide Chang",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc205.pdf"
    },
    {
        "Course Id": "CSC206",
        "Course Name": "Algorithms and Paradigms",
        "Course Information": "Design and analysis of algorithms. Classical design paradigms including greedy, divide-and-conquer, dynamic programming, and backtracki
        "Prerequisites of Course": "Fully classified graduate status in Computer Science or Software Engineering",
        "Units": "3",
        "Professor for the course": "Dr. Chung-E Wang",
        "Course Url": "https://www.ecs.csus.edu/wcm/csc/pdfs/advising/csc206.pdf"
    },
```


Figure 28: Sample Course Details

Figure 29 shows a sample file which contains basic information related to the professors like name, office hours, location, and email.

```
[
{
    "Name":"Dr. Nik Faroughi, Department Chair (CSC)",
    "Location":"RVR 3018G",
    "Email":"faroughi@ecs.csus.edu",
    "Phone":"916-278-7628 ",
    "Office Hours": "M W F 11:00am-12:00pm",
    "Webpage":"https://athena.ecs.csus.edu/~faroughi/"
},
{
    "Name":"Dr. Scott Gordon, Assoc. Chair (CSC)",
    "Location":"RVR 3018F",
    "Email":"gordonvs@ecs.csus.edu",
    "Phone":"Use Email",
    "Office Hours": "W 2:00pm - 4:00pm",
    "Webpage":"https://athena.ecs.csus.edu/~gordonvs/"
},
{
    "Name":"Dr. Jinsong Ouyang, Graduate Coordinator (CSC)",
    "Location":"RVR 3018I",
    "Email":"jouyang@csus.edu",
    "Phone":"916-278-5769",
    "Office Hours": "Tu R 1:30pm - 3:00pm",
    "Webpage":"https://www.csus.edu/faculty/o/jouyang/"
},
{
    "Name":"Dr. Pinar Muyan-Ozcelik",
    "Location":"RVR 5008",
    "Email":"pmuyan@ecs.csus.edu",
    "Phone":"916-278-6713",
    "Office Hours": "Tu 3:00pm - 3:50pm, R 1:40pm - 3:50pm",
    "Webpage":"https://athena.ecs.csus.edu/~pmuyan/"
},
{
    "Name":"Dr. Haiquan Chen",
    "Location":"RVR 5018",
    "Email":"chenh@ecs.csus.edu",
    "Phone":"916-278-6087",
    "Office Hours": "M W 3:00pm - 4:00pm",
    "Webpage":"https://athena.ecs.csus.edu/~chenh/"
},
```


Figure 29: Sample Faculty Details

4 EXECUTION RESULTS

In this section, execution results of College Enquiry Chatbots are provided by listing several functionalities included in this project and explaining these functionalities with the help of the screenshots.

4.1 How to chat

To start chat with the chatbot, a student will have to go to the university website www.csus.edu and click on the question mark icon as shown in Figure 30.

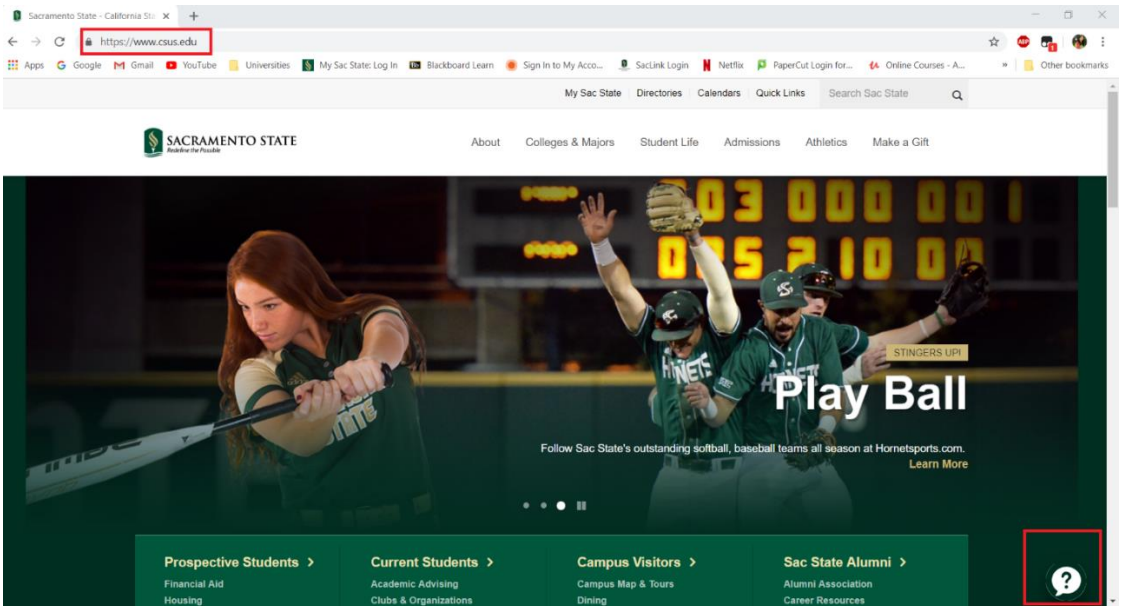


Figure 30: How to Chat

To have the chatbot on a live website, access to the codebase of a website is required. However, for now a software called Tampermonkey is used to inject the Java script into the browser.

4.2 Sentiment Analysis

Figures 31 and 32 show how a bot is answering the irrelevant questions of a user for which normal bots are not showing any kind of empathy. To make the bot to be able to respond these kinds of responses, the bot is trained with the chitchat integration which is provided by QnA Maker in which there are lots of questions and answers pairs are available.

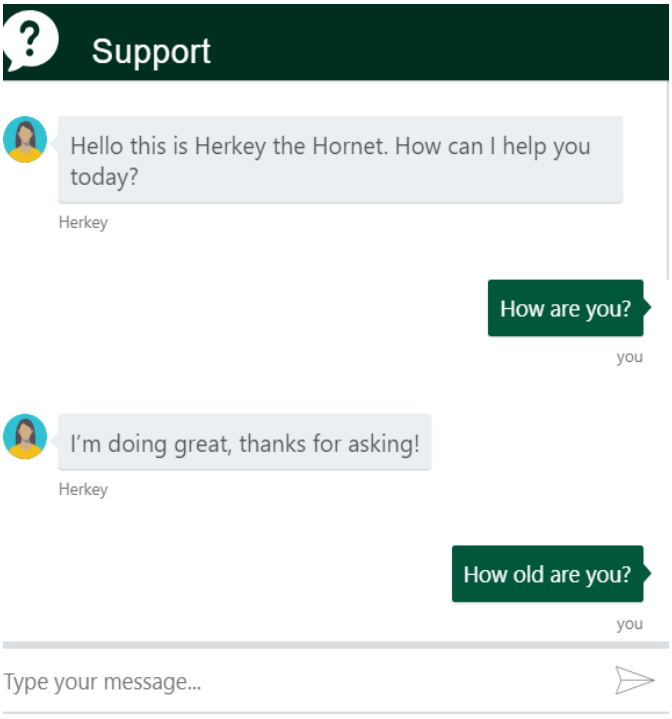


Figure 31: Friendly Conversations - 1

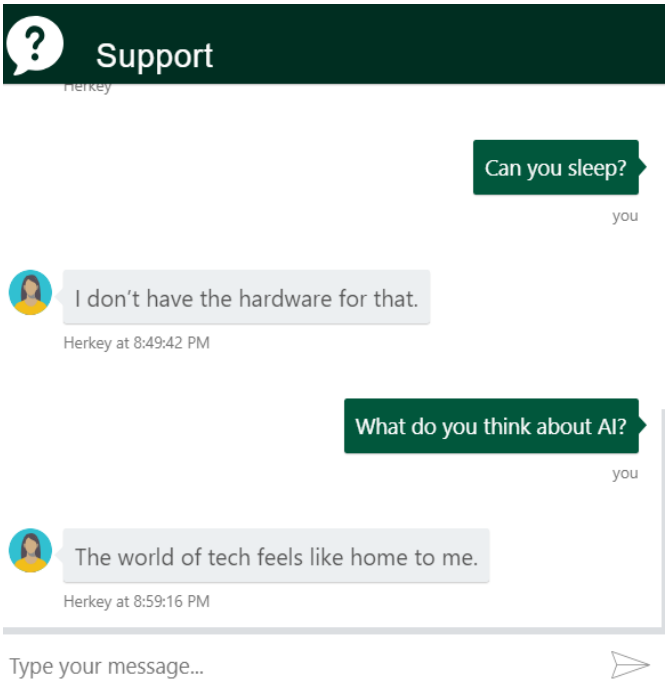
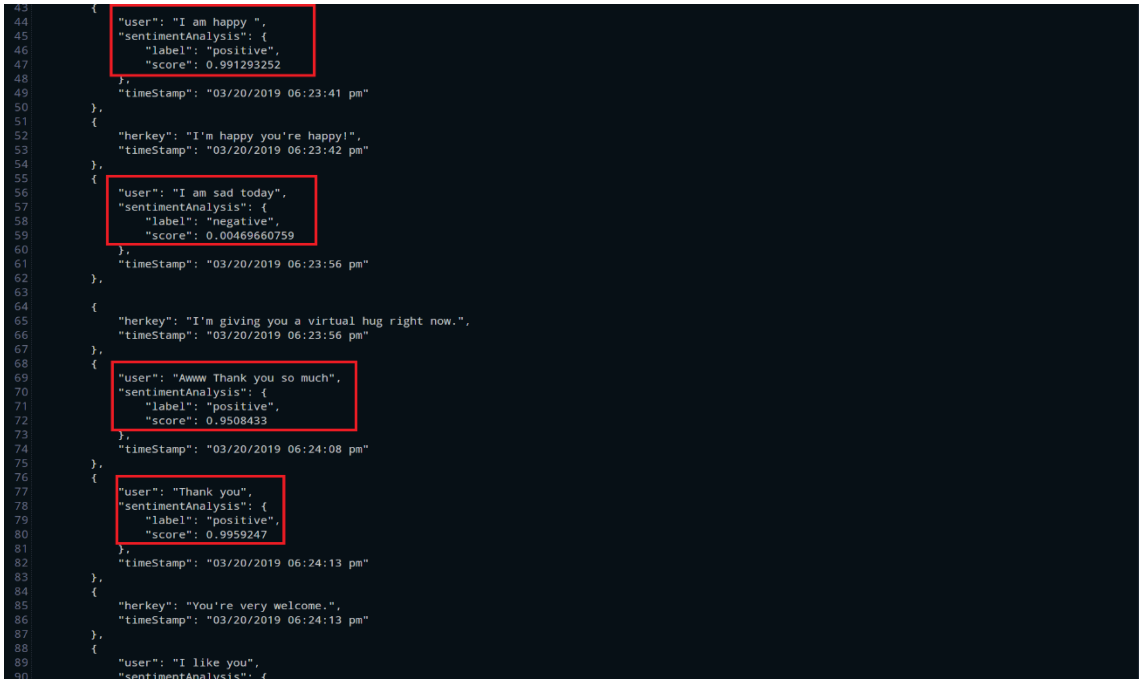


Figure 32: Friendly Conversations – 2

Figures 33 and 34 shows how conversations are being stored in the database and how LUIS performs sentiment analysis on user queries based on which it gives the response back to the user. A bot interceptor is used in the service where conversations are tracked and user's query is passed onto the LUIS endpoint which has an in-built sentiment analyzer to track whether the query is positive, negative or neutral. These results are then stored into the database for any further analysis.

```
{
    "_id": {
        "$oid": "5c92e666fca6e5e29a2628fd"
    },
    "sessionId": "GUOv9o6K91K6B03TidJJtH-g",
    "conversations": [
        {
            "herkey": "Hello this is Herkey the Hornet. How can I help you today?",
            "timeStamp": "03/20/2019 06:18:30 pm"
        },
        {
            "user": "What can you do?",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.843127966
            },
            "timeStamp": "03/20/2019 06:20:17 pm"
        },
        {
            "herkey": "I'm here to chat and to try to help out.",
            "timeStamp": "03/20/2019 06:20:18 pm"
        },
        {
            "user": "professor info",
            "sentimentAnalysis": {
                "label": "neutral",
                "score": 0.5
            },
            "timeStamp": "03/20/2019 06:22:47 pm"
        },
        {
            "herkey": "I can help you with that. Please provide the name of the Professor",
            "timeStamp": "03/20/2019 06:22:47 pm"
        },
        {
            "user": "Pinar Muyan",
            "sentimentAnalysis": {
                "label": "neutral",
                "score": 0.5
            },
            "timeStamp": "03/20/2019 06:23:00 pm"
        },
```


Figure 33: Sentiment Analysis on User Queries - 1



```
        {
            "user": "I am happy ",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.991293252
            },
            "timeStamp": "03/20/2019 06:23:41 pm"
        },
        {
            "herkey": "I'm happy you're happy!",
            "timeStamp": "03/20/2019 06:23:42 pm"
        },
        {
            "user": "I am sad today",
            "sentimentAnalysis": {
                "label": "negative",
                "score": 0.00469660759
            },
            "timeStamp": "03/20/2019 06:23:56 pm"
        },

        {
            "herkey": "I'm giving you a virtual hug right now.",
            "timeStamp": "03/20/2019 06:23:56 pm"
        },
        {
            "user": "Awww Thank you so much",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.9508433
            },
            "timeStamp": "03/20/2019 06:24:08 pm"
        },
        {
            "user": "Thank you",
            "sentimentAnalysis": {
                "label": "positive",
                "score": 0.9959247
            },
            "timeStamp": "03/20/2019 06:24:13 pm"
        },
        {
            "herkey": "You're very welcome.",
            "timeStamp": "03/20/2019 06:24:13 pm"
        },
        {
            "user": "I like you",
```


Figure 34: Sentiment Analysis on User Queries – 2

4.3 Active Learning

Whenever a user asks anything which is outside of the script, the bot asks questions back to the user to understand what exactly user wants to ask and gives the responses accordingly. Figures 35 and 36 shows how a student has asked “on campus” randomly and then bot has asked question in return with three different options to understand what the user means. Once user has selected one of the options it did frame a question based on that option and gave the response to the user.

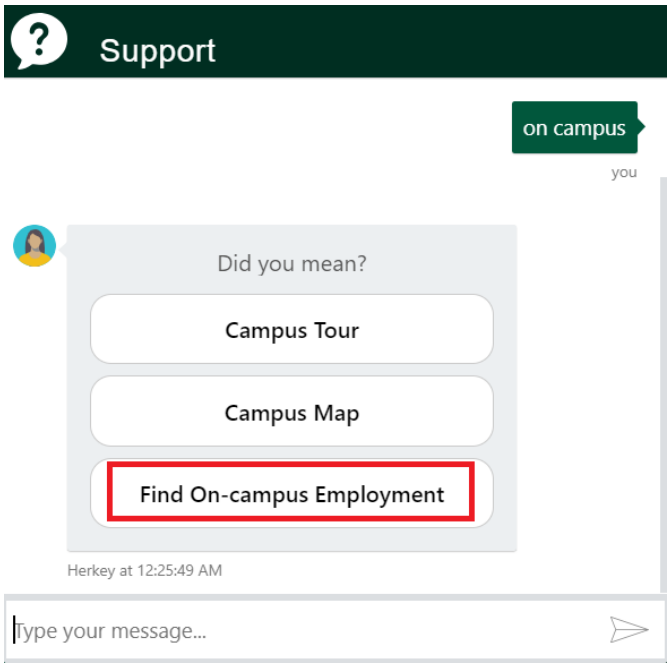


Figure 35: Active Learning - 1

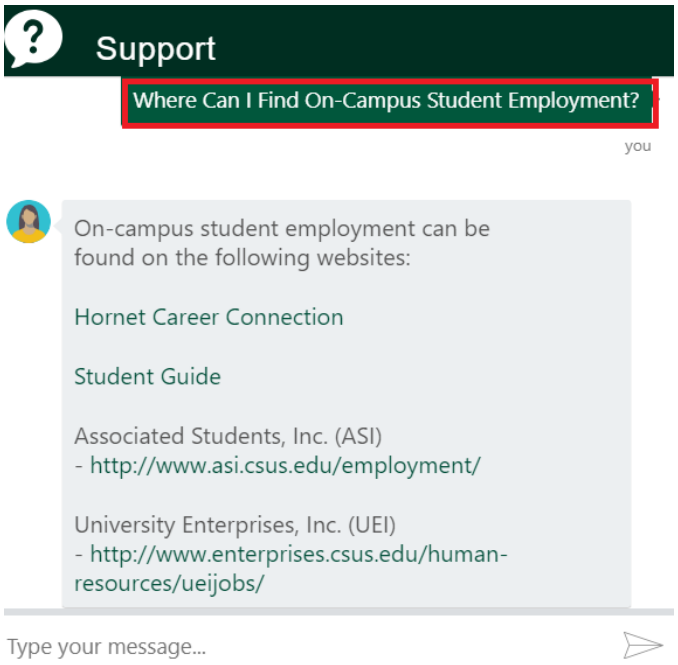


Figure 36: Active Learning – 2

4.4 Frequently Asked Questions

The system inserts FAQs related to academics, registration, records, evaluations/graduation, applications, current students, and campus information. Figures 37 and 38 show two different highlighted questions and answers from two different FAQ URLs which are added to QnA Maker.

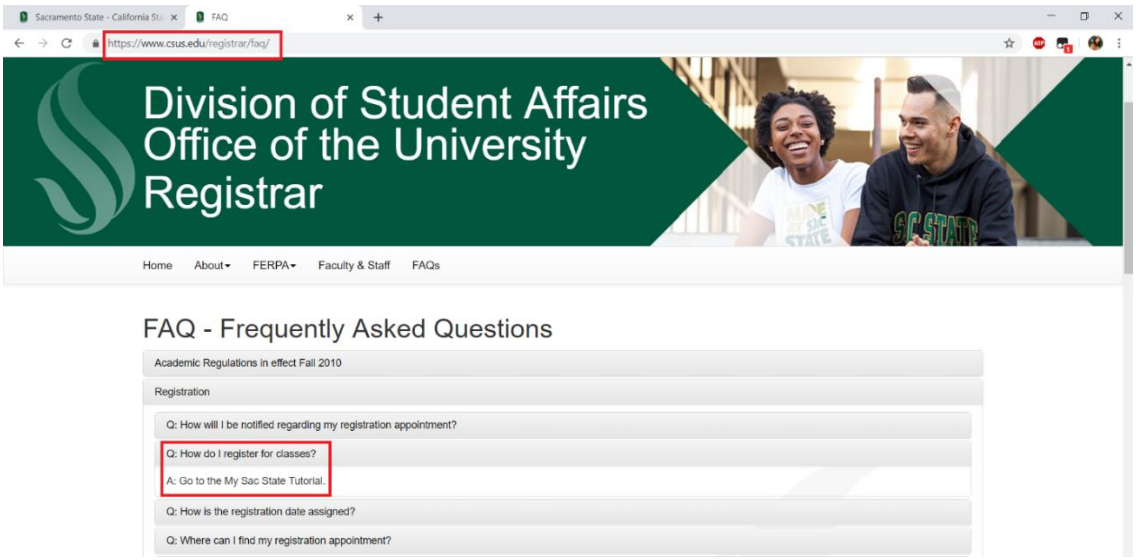


Figure 37: FAQs from Registrar

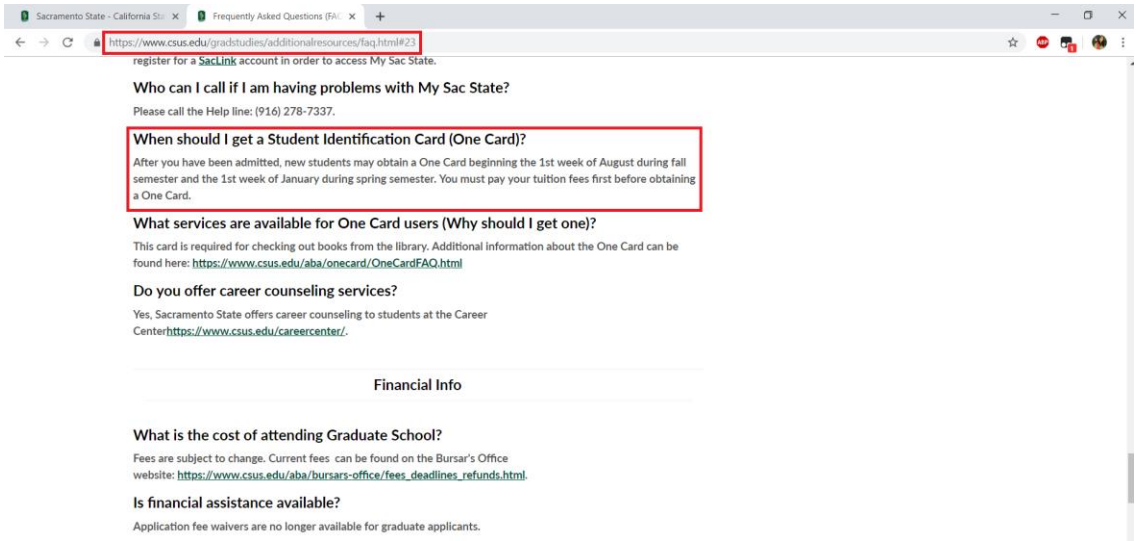


Figure 38: FAQ from Graduate Studies

Figure 39 shows how questions from FAQs are asked and responded in an exact same way. In this case, notice that a student does not have to ask an exact same question included in FAQs. This is the main advantage of an AI-powered chatbot.

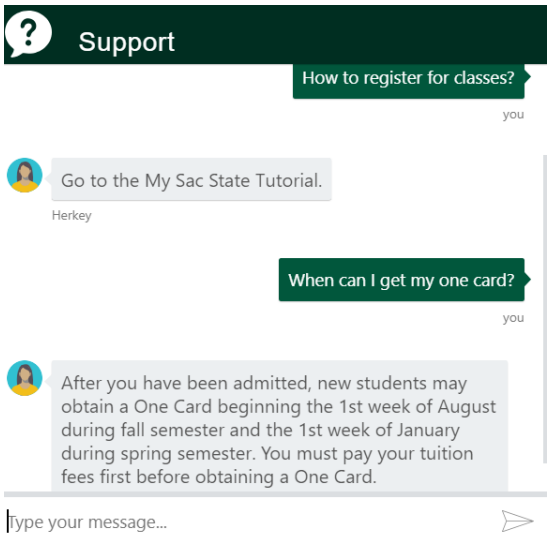


Figure 39: FAQs Asked to Chatbot

4.5 Course and Faculty Details

Figure 40 shows how chatbot is giving the information about course when asked. It shows name, overview, prerequisites, number of units, and professor of the subject. It also gives a course link to the student for more information.

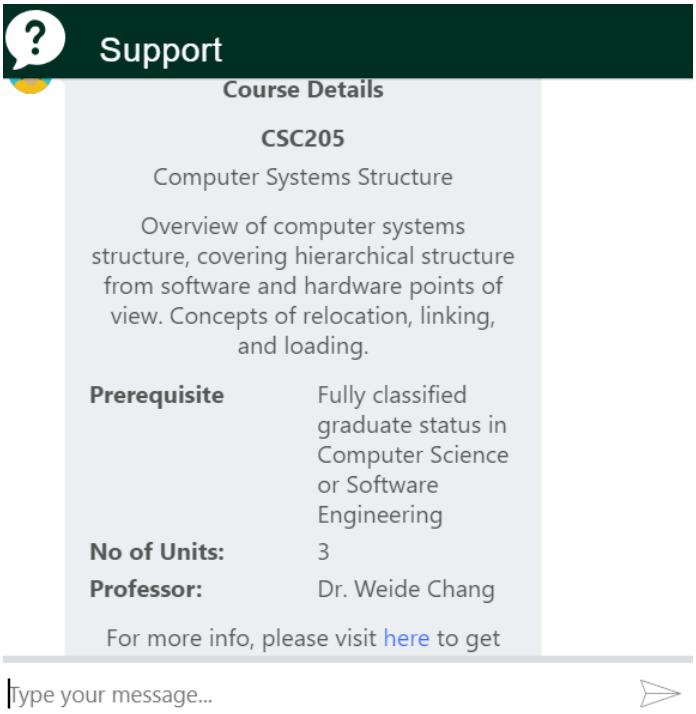


Figure 40: Course Information

Figure 41 shows the chatbot's response about office hours of a faculty. It gives all the necessary details about the faculty such as name, location of the office, email, phone, and office hours of the faculty. It also gives a link to the faculty's website for more information.

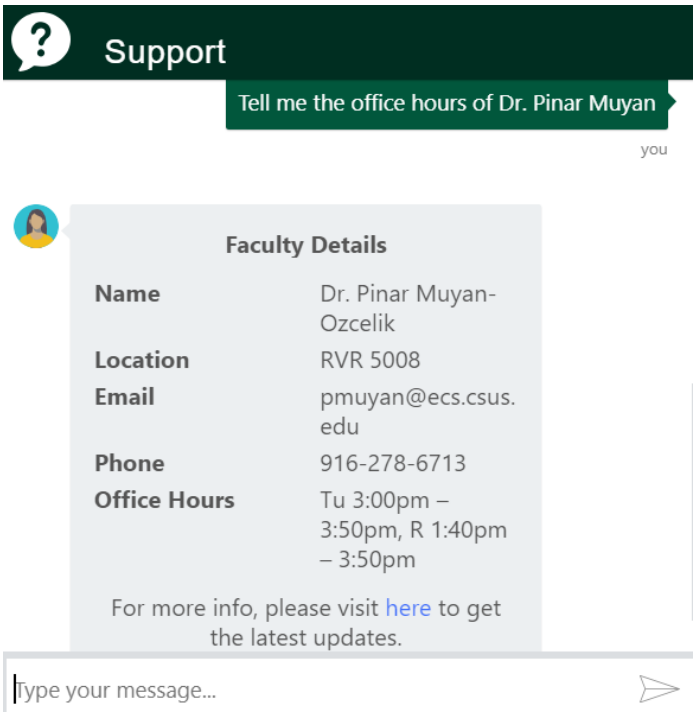


Figure 41: Faculty Information

4.6 Academic Calendar

Figure 42 shows how the bot gives a link to an academic calendar if a student is asking about all the holidays of the semester.

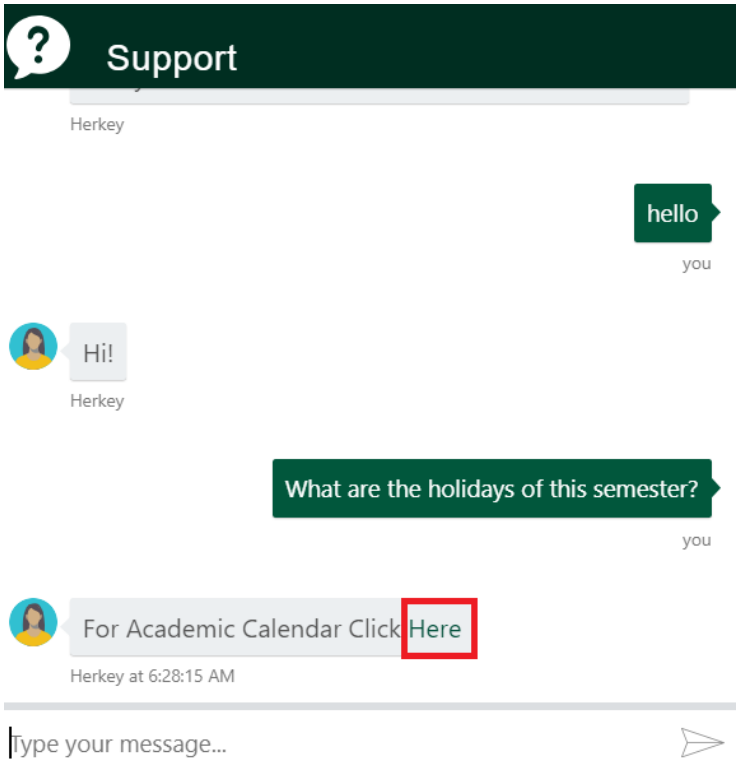


Figure 42: Academic Calendar

4.7 Fee Calculator

Figures 43 and 44 shows about the chatbot providing facility of calculating the fees by just selecting undergraduate or graduate and inserting number of units.

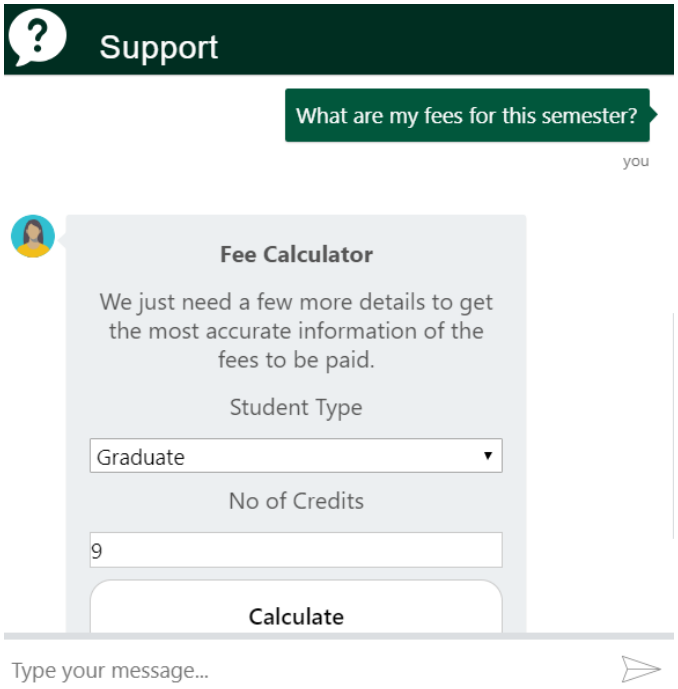


Figure 43: Fee Calculator – 1

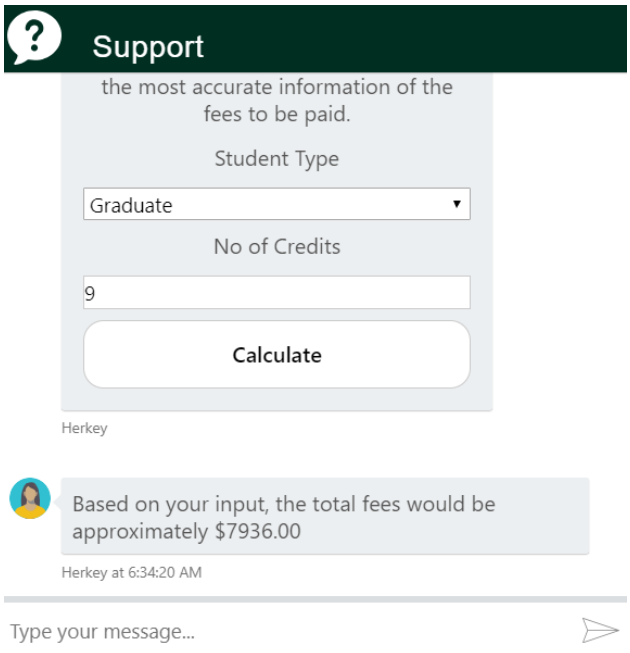


Figure 44: Fee Calculator - 2

4.8 Other Departmental Information

Figures 45 and 46 shows how the chatbot gives information about IPGE and Union office hours, address, contact info, and email. It also gives a link to the respected department for more information.

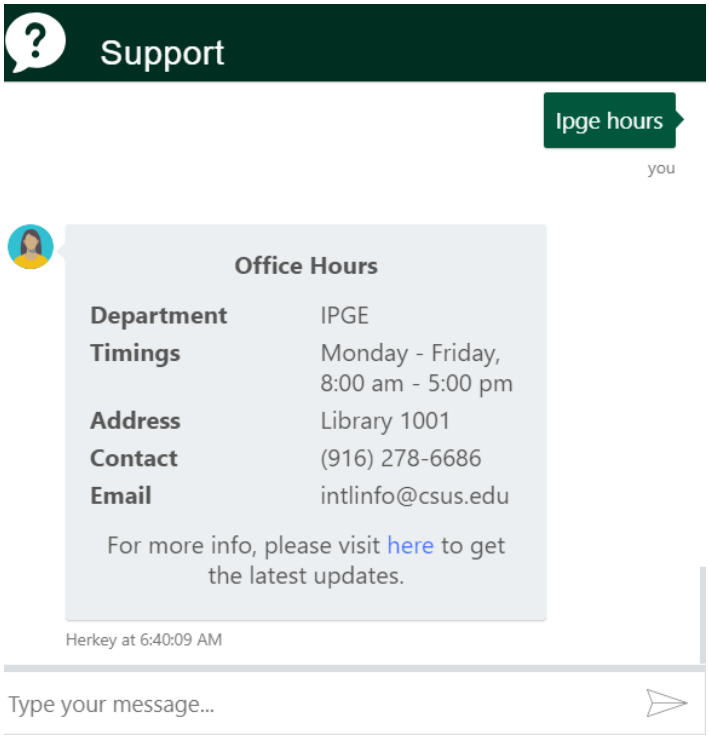


Figure 45: IPGE Hours Information

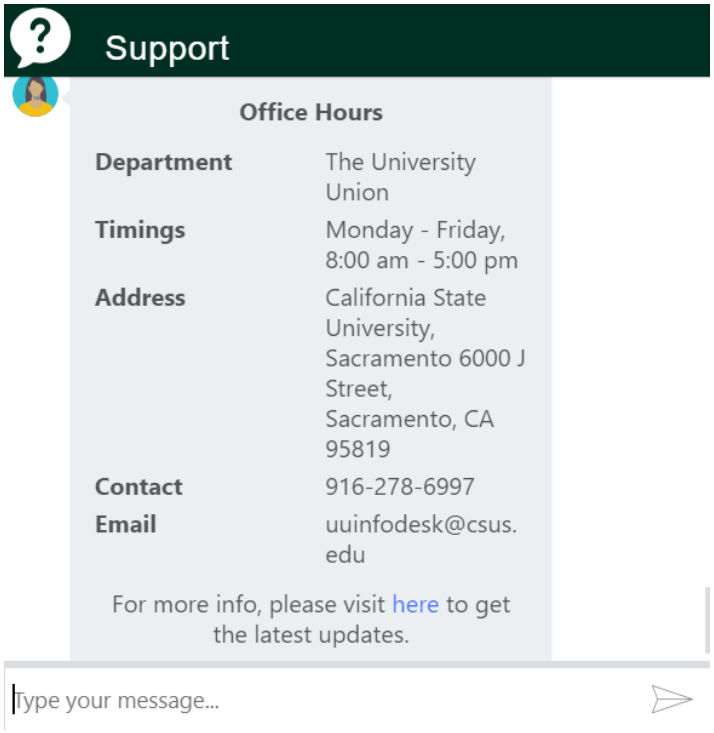


Figure 46: Union Hours Information

4.9 Results

The results of this project are measured in whether sentiment analysis and active learning is correctly implemented or not. Sentiment analysis correctly recognizes the user's query such as positive, negative, and neutral by storing all the conversations in the database (as shown in Figures 33 and 34). These results are used to add empathy to the bot. However, the system was partially successful in adding empathy to the bot. It is because, although large amount of data was added to include some common answers to the queries which are off scripts and to add empathy to the bot (so that it understands what is the current mood of the user and responds accordingly), since scope of these queries is vast, the system

requires more rigorous data to handle all the questions which are out of script. This can be illustrated in the Figure 47 where the bot understood that I am in a negative sentiment, so it answered with a proper response. But, it did not understand the meaning of 'I am excited' since bot did not have any training data related to the typed query as shown in Figure 48.

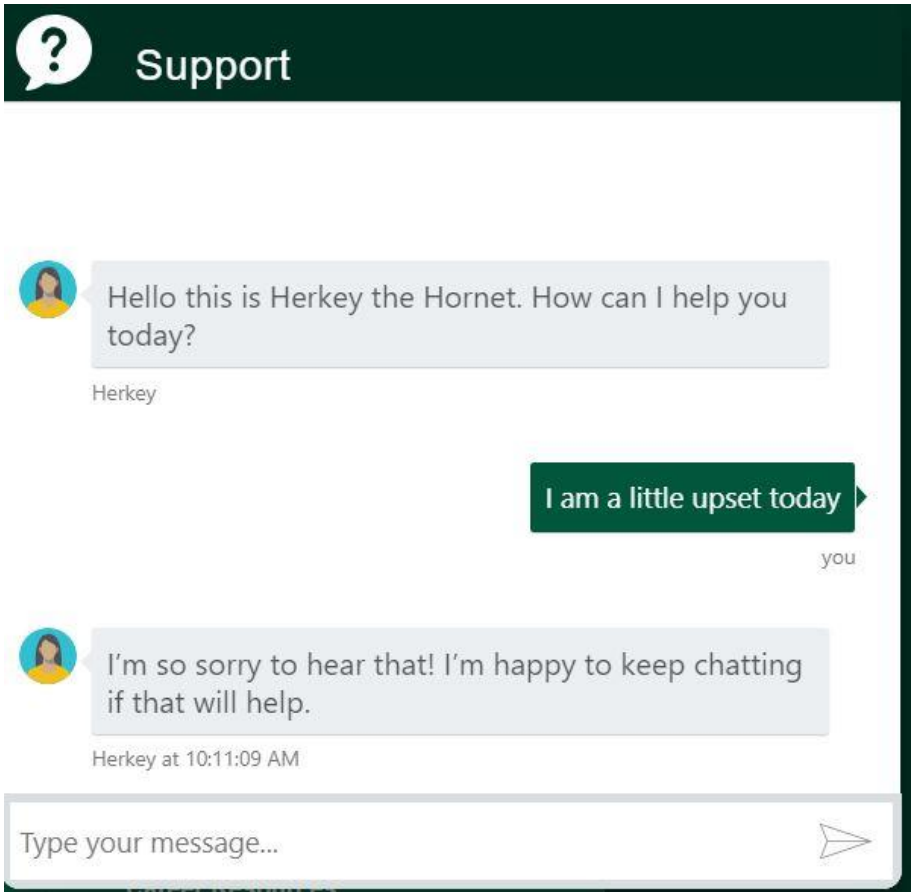


Figure 47: Bot successfully detecting the sentiment of the query

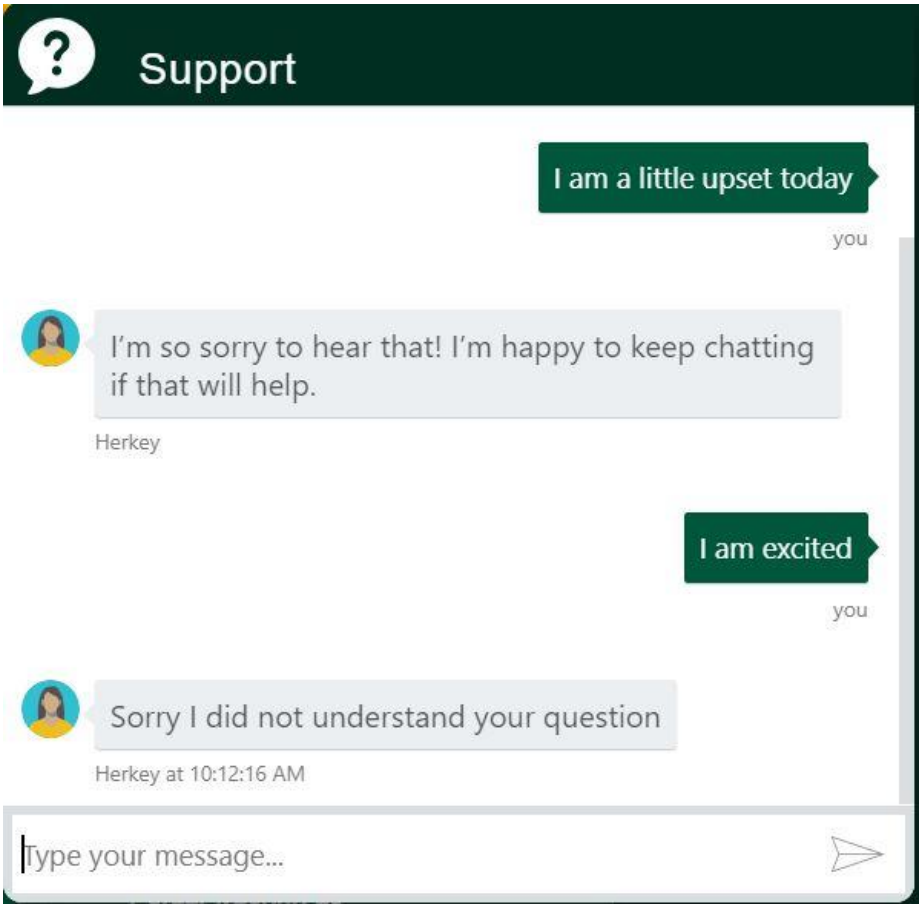


Figure 48: Bot failed to detect the sentiment of the query

On the other hand, active learning helps to improve the bot performance for handling off-script queries. It correctly understands the user's questions, asks clarifying question, and then re-trains the NLP to give response what the user is intended to get.

5 CONCLUSION AND FUTURE WORK

To conclude, College Enquiry Chatbot is helpful in guiding students with correct and most up to date sources of information. It is advantageous for international applicants for queries such as fee payment and academic matters. Students can get the information at their fingertips rather than visiting college office. It improves efficiency by taking over tasks for which humans are not essential.

Sentiment analysis implemented in College Enquiry Chatbot correctly recognizes the user's query such as positive, negative, and neutral by storing all the conversations in the database. However, the system was partially successful in adding empathy since scope of these queries is vast and the system requires more rigorous data to handle all the questions which are out of script. Nevertheless, active learning helps to improve the bot performance for handling off-script queries.

To improve the current functionalities of College Enquiry Chatbot, in the future, the scope of the chatbot can be increased by inserting data for all the departments, training the bot with varied data, testing it on live website, and based on that feedback inserting more training data to the bot. Some of the new features which can be added to the bot are 1) speech recognition feature through which students can ask their queries verbally and get the answers from the bot, 2) integration with multiple channels such as phone call, SMS, and various social media platforms like Skype, Facebook and Twitter, 3) handling context aware and interactive queries in which bot will be aware of the context of an ongoing conversation with a student, 4) integration with services such as password reset and course

enrollment, and 5) adding a capability for the bot to perform analytics based on user's sentiment based on which the bot can be re-trained on human emotions so that more empathy can be added to the bot.

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Chat-Bot For College Management System Using A.I

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Abstract- *A chat-bots aims to make a conversation between both human and machine. The machine has been embedded knowledge to identify the sentences and making a decision itself as a response to answer a question. Chat-bots will be completely based on a text-based user interface, allowing the user to type commands and receive text as well as text to speech response. Chat-bots are usually stateful services, remembering previous commands in order to provide functionality. It can be utilized securely by an even larger audience when chat-bots technology is integrated with popular web services. The college inquiry chat-bots will be built using artificial algorithms that analyze user's queries and understand user's message. The response principle is matching the input sentence from a user. The User can ask the question any college-related activities through the chat-bot without physically available to the college for inquiry. The System analyses the question and then answers to the user. With the help of artificial intelligence, the system answers the query asked by the students. The system replies using an effective Graphical User Interface as if a real person is talking to the user. The user just has to register himself to the system and has to login to the system. The chat-bots consists of core and interface that is accessing the core in (MySQL).Natural language processing technologies are used for parsing, tokenizing, stemming and filtering the content of the complaint.*

KEYWORDS: **NLP (Natural language processing), Sentiment Analysis, synsets, Word Net**

1. INTRODUCTION

Chatbot (also known as a talkbot, chatterbox, Bot, IM bot or Artificial Conversational Entity) is a computer program that mimics human conversations in its natural format including text or spoken language using artificial intelligence techniques such as Natural Language Processing (NLP), image and video processing, and audio analysis.

Chat-bot for college management system project will be developed using artificial intelligence algorithms that will analyze users queries. This system will be a web application which will provide answers to the analyzed queries of the user. Users will just have to select the category for queries and then ask the query to the bot that will be used for answering it. Artificial intelligence will be used to answer the user's queries. The user will get the appropriate answers to their queries. The answers will be given using the artificial intelligence algorithms. Users won't have to go personally to the college for inquiry.

The Users has to register to the system and has to login to the system. After login user can access the various helping pages. There will be various helping pages through which the user can chat by asking queries related to college activities. The system will reply to the user with the help of effective graphical user interface (GUI). The user can query about the college-related activities with the help of this web application. College-related activities such as annual day, sports day, Intake and other cultural activities. It will help the students/user to be updated about the college activities.

2. RELATED WORK

[1]Question Answering (QA) systems can be identified as information accessing systems which try to answer to natural language queries by providing answers instead of providing the simple list of document links. QA system selects the most appropriate answers by using linguistic features available in natural language techniques. They differ mainly from the knowledge sources, the broadness of Dialog Systems (NLDS) is an appropriate and easy way to access information. QA system based on Semantic enhancement as well as the implementation of a domain-oriented based on a pattern-matching chat-bots technology developed within an industrial project (FRASI). The proposed approach simplifies the chat-bots realization which uses two solutions. First one is the ontology, which is exploited in a twofold manner: to construct answers very actively as a result of an deduction process about the domain, and to automatically populate, off-line, the chat-bots KB with sentences that can be derived from the ontology, describing properties and relations between concepts involved in the dialogue. Second is to pre-process of sentences given by the user so that it can be reduced to a simpler structure that can be directed to existing queries of the chat-bots. The aim is to provide useful information regarding products of interest supporting consumers to get what they want exactly. The choice was to implement a QA system using a pattern-matching chat-bots technology.

[2]This paper describes an approach to the idea of identifying the most important facts in texts describing the life of a historical figure for building a conversational agent

that could be used in middle-school CSCL scenarios. This paper presents a method for building a chat-bot that can simulate a historical figure. The can receive as "input" a plain text or a web page about the historical figure and has as "output" a trained conversational agent which is able to answer all kind of questions about the life experience of that specific person. the purpose is to provide a generic solution to this problem, so the goal is not to simulate the life and behavior of

[3]Chat-bots are mainly to used to provide conversation between both human and machine. Admin feeds some knowledge to the machine so that machine can identify the sentences and taking a decision itself as a response to answer a question. The chat used is actually Indonesian conversational pattern and the database used in this project is MySQL. It can miss in defining a sentence and how to the response it while connecting chat application to the database. So knowledge representation and implementation of SQL in the pattern-matching operation are needed. A data that has been modeled based on the pattern of the conversation would be tested by the help of a series of scenarios. The conversation with the chat-bots would be crosschecked back to the basic pattern. It is done so that it can add some knowledge to the database as it has not been modeled before. If in case the input sentences in the database did not match then it will be remodeled.

3. PROPOSED SYSTEM

1. User Login and Complaint:

User registers himself/herself on Chat-Bot application. Then submits his/her complaints and queries regarding the electronic and home appliances purchased.

2. Chat BOT Responding System:

a. NLP Processing and Sentiment Analysis for Complaint:

When user complaint is submitted to the system, NLP is applied and sense of the complaint is detected. The sense of the words is found using part of speech tagging and wordnet dictionary.By Using the sentiment analysis negation level of a complaint is detected. And user complaints are prioritized accordingly.

b. Search Questions in knowledge database:

Once the negation level of the complaint is detected, furthermore, the exact question in the complaint is detected using WorldNet.

As the complaint description can change from person to person. The same question may be asked differently from multiple users. One user ask a question so simply and clearly while another user may ask the same question with more negatively. So it is necessary to find what is the exact technical issue with the particular product to give a correct solution

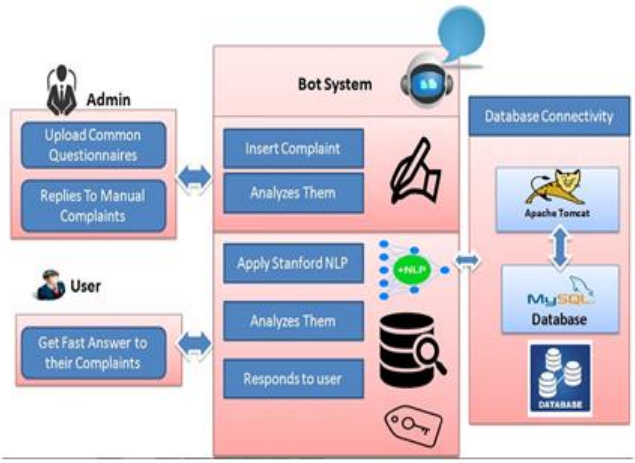

Fig -1: Architecture Diagram For ChatBot

3. Answer the Complaints

As described above whenever user submits a complaint, the negation level and exact issue/question of the complaint are detected. Then it is checked that is there such question registered in database. If the answer is found then that answer is sent to that User. If a particular question is not found in the database such questions are answered by admin person. Once he answered the question the answer is sent to that user. And that question along with answer is stored in database so that whenever such questions will be asked so that they get answered directly from the database. Due to this admin doesn't need to answer same question manually anymore

Interface. WorldNet is a lexical and semantic database for the English language. It is used to group English words into the set of synonyms called synsets, it provides short definitions and usage examples, and records a number of relations among these synonym sets or their members.

4. PROPOSED METHOD

Algorithm Used:

1. Porter Stemmer Algorithm

Porter stemming algorithm (or 'Porter stemmer') is a process for removing suffixes from words in English. Removing suffixes automatically is an operation which is

especially useful in the field of information retrieval. Following are the steps of this algorithm:-

[1]Gets rid of plurals and -ed or -ing suffixes

[2]Turns terminal y to i when there is another vowel in the stem

[3]Maps double suffixes to single ones: -ization, -ational, etc.

[4]Deals with suffixes, -full, -ness etc. Takes off -ant, -ence, etc. Removes a final –e.

2. Word Order Similarity Between Sentences

Let's consider a particular case to illustrate the importance of word order. For example, for two sentences:

T1: A dog jumps over the lazy fox.
T2: A fox jumps over the lazy dog.

These two sentences containing words are exactly same and most words appear in the same order. The only difference is that dog appears before fox in T 1 and dog appears after fox in T 2. As above given two sentences contain the same words, any methods based on "bag of word" give a decision that T 1 and T 2 are exactly the same. However it is clear for a human interpreter that T 1 and T 2 are only similar to some extent. T 1 and T 2 are dissimilar only in word order. Therefore any efficient computational method for sentence similarity must take into account the impact of word order. Sentences consisting of exactly the same words but in different orders may result in very different meanings. It is easy for humans to process word order information. However the incorporation of order information in to computational methods for understanding natural language is a difficult challenge. This may be the reason why most existing methods do not tackle this type of information. In this section we introduce a method that stores the information of word order into account when computing sentence similarity. Let's assume that for the given two sentences, the joint word set is T. Recall the above mentioned two sentences T 1 & T 2, their joint word set is: T = {A dog jumps over the lazy fox} . A unique index number has been assigned to each word in sentences T1 & T2 respectively. The index number is simply the order number that the word appears in the sentence. For example, the index number is 4 for dog and 6 for over in T 1 . In computing word order similarity, a word order vector r is formed for T 1 and T 2 respectively based on the joint word set T . For each word wi in T, we try to find the same or a similar word in T 1 as follows: 1. If T 1 contains an occurrence of the same word, we fill the entry for this word in r 1 with the corresponding index number in T 1 . Otherwise we try to find the most similar word i w ~ in T 1 . 2. If the similarity between wi and i w ~ is greater than a pre-set threshold, the entry of wi in r 1 is filled with the index number of i w ~ in T 1 3. If the above two searches fail, the entry of wi in r 1 is null. After applying the above procedure for given sentences T 1 and T 2 , the word order vectors are r 1 and r 2 respectively. For the example sentence pair, we have: r 1 = {1 2 3 4 5 6 7 }, r 2 = {1 7 3 4 5 6 2} Thus a word order vector is the basic structural information carried by a sentence. The task of dealing with word order is then to measure how similar the word order in two sentences is. For measuring word order similarity of two sentences the proposed measure is as follows:

$$S_r = 1 - \frac{\|\mathbf{r}_1 - \mathbf{r}_2\|}{\|\mathbf{r}_1 + \mathbf{r}_2\|}$$

5.CONCLUSION

We create a software tool which will be used by any company to help the users to freely upload their queries. Once the complaint is registered in the database, automatic tokens are generated and conveyed to the customer through a text message and email for further tracking of the complaint. Natural language processing technologies are used for parsing, tokenizing, stemming and filtering the content of the complaint. The output is fed to the algorithm where the strength of the sentence is calculated. The intensity of negation is calculated, which helps prioritize the complaint automatically for the service provider to resolve the complaint.

In this way, the proposed system will help many organizations to ensure quality service provision and customer satisfaction with less human efforts.

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