ABSTRACT

Machine learning (ML) is the scientific study of algorithms and statistical models that computer systems use to perform a specific task without being explicitly programmed. Learning algorithms in many applications that's we make use of daily. Every time a web search engine like Google is used to search the internet, one of the reasons that work so well is because a learning algorithm that has learned how to rank web pages. These algorithms are used for various purposes like data mining, image processing, predictive analytics, etc. to name a few. The main advantage of using machine learning is that, once an algorithm learns what to do with data, it can do its work automatically. In this paper, a brief review and future prospect of the vast applications of machine learning algorithms has been made. Chatbots are intelligent conversational computer systems designed to mimic human conversation to enable automated online guidance and support. The increased benefits of chatbots led to their wide adoption by many industries in order to provide virtual assistance to customers. Chatbots utilize methods and algorithms from two Artificial Intelligence domains: Natural Language Processing and Machine Learning. However, there are many challenges and limitations in their application. In this survey we review recent advances on chatbots, where Artificial Intelligence and Natural Language processing are used. We highlight the main challenges and limitations of current work and make recommendations for future research investigation. A chatbot is AI computer software that can act as a conversation through textual or auditory methods. The core of chatbots analyses a customer's data using the artificial intelligence which integrates the response with them. Different tasks can be replaced with AI-powered bots as they are much more powerful—and are capable of performing multiple tasks at once. Machine Learning techniques are basically used in the process of understanding the input that we get from the user and replying to the user. Natural language processing allows a bot to have a conversation as naturally as possible. The ideal interaction between user and chatbot is a balanced mix of Innovative technology and human Intervention.

CHAPTER-1

Introduction

Chatbots are intelligent conversational computer programs that mimic human conversation in its natural form [1–3]. A chatbot can process user input and produce an output [4,5]. Usually, chatbots take natural language text as input, and the output should be the most relevant output to the user input sentence. Chatbots can also be defined as "online human-computer dialogue system with natural language" [6]. Chatbots constitute therefore an automated dialogue system, that can attend to thousands of potential users at once. Chatbots are currently applied to a variety of different fields and applications, spanning from education to e-commerce, encompassing healthcare and entertainment. Therefore, chatbots can provide both support in different fields as well as entertainment to users [7]; this is the case for chatbots such as Mitsuko and Jessie Humani, "small talk" oriented chatbots that could provide a sense of social connection [8]. Chatbots appear, in fact, to be more engaging to the user than the static Frequently Asked Questions (FAQ) page of a website. At the same time, chatbots can simultaneously assist multiple users, thus resulting more productive and less expensive compared to human customer supports services. In addition to support and assistance to customers, chatbots can be used for providing entertainment and companionship for the end user [7]. Nonetheless, different levels of embodiment-the way chatbots are human-like [5]-and disclosure-how and when the nature of the chatbot is revealed to the user-seem to impact users' engagement with and trust in chatbots [8].

In recent years, with the commoditization and the increase of computational power and the sharing of open-source technologies and frameworks, chatbots programmes have become increasingly common. Recent developments in Artificial Intelligence and Natural Language Processing techniques have made chatbots easier to implement, more flexible in terms of application and maintainability, and increasingly capable to mimic human conversation. However, human-chatbot interaction is not perfect; some areas for improvement. Chatbots are contextual and emotional understanding and gender biases. Chatbots are, in fact, less able to understand conversational context [6] and emotional linguistic cues compared to humans, which affects their ability to converse in a more entertaining and friendly manner [3]. At the same time, chatbots tend to take on traditionally feminine roles which they perform with traditionally feminine features and often displaying stereotypical behaviour, revealing a gender bias in chatbots' implementation and application [8]. Since chatbots are so widespread and applied to many different fields, improvements in their implementations and evaluation constitute important research topics.

A chatbot can conduct smart conversation—either via text or voice. They are armed with machine learning which can interact with humans and become increasingly agile with each interaction. It recognizes using pattern matching, user input as well to access information to provide a predefined acknowledgment. In dialog systems they are used for numerous practical intends comprising information acquisition or customer service. Keywords are scanned with the input in simple chatbot and then respond with the most similar matching keywords or patterns from a database while some chatbots use sophisticated. Their applications make the communication between people and services, intensify the experience of customer. To have better customer engagement and operational efficiency they provide companies new opportunities by lowering the cost of customer service. A Chatbot is a computerized program that acts like a colloquist between the human and the bot, a virtual assistant that has become exceptionally popular in recent years mainly due to dramatic

improvements in the areas like artificial intelligence, machine learning and other underlying technologies such as neural networks and natural language processing.

Chatbots are not a recent development. They are simulations that can understand human language, process it, and interact back with humans while performing specific tasks. For example, a chatbot can be employed as a helpdesk executive. Joseph Weizenbaum created the first chatbot in 1966, named Eliza. It all started when Alan Turing published an article named "Computer Machinery and Intelligence" and raised an intriguing question, "Can machines think?" ever since, we have seen multiple chatbots surpassing their predecessors to be more naturally conversant and technologically advanced. These advancements have led us to an era where conversations with chatbots have become as normal and natural as with another human. Before looking into the AI chatbot, learn the foundations of artificial intelligence. Today, almost all companies have chatbots to engage their users and serve customers by catering to their queries. We practically will have chatbots everywhere, but this doesn't necessarily mean that all will be well-functioning. The challenge here is not to develop a chatbot but to develop a well-functioning one. Natural language bot (NLPs) can understand the context, even though the questions are more complicated. Because of their ability to learn from their mistakes, they improve their response to the customer's inquiry. Think of all the different scenarios or tasks that designer wants their CHATBOT to do and put together all the related questions in other forms to accomplish these same tasks.

Each task users wish CHATBOT to do will set by an intention [7]. After this designer tests CHATBOT by conversing or text like a human. As a result, every question asked or intended by clients can be expressed in many ways. That depends on the manner in which the user wants wishes to convey. For instance, Alexa's, turn off the TV. Alexa's, could you please turn off the TV? Why don't you turn off the TV? A user may use either of these phrases to instruct the Bot to turn off the television. These phrases have the same intention/task of turning off the TV, but they request different expressions /variants [7]. In the next step designer design, the flow of conversation. A designer needs to write all the logic to keep the user bound to the flow after acknowledging the user's goal. For instance, let's say the organization is building a bot to schedule a medical appointment with the doctor. The Bot asks the user to give their working mobile number, name, and a specialist to whom to consult, and then the Bot shows the open slots and then book the slot by user confirmation through a one-time password through a registered mobile number [7]. The designer has to select a suitable platform for deployment, choosing the right platform where BOT can deploy, such that it is easily accessible for users— for example, WhatsApp, Telegram, Your Website, Facebook Messenger Slack, etc. Intelligence Methods are knowledgeable systems to generate responses, and they use the natural language understanding (NLUs) component to comprehends the user's query. Such systems are used where a narrow domain and sufficient data exist to form a network system. Rule-based system bots interact with users with the defined outline trees. It is a flowchart where conversations are predicted in such a way as to anticipate what a client might ask and how the Bot should respond. Hybrid systems are the combination of rules like Algorithms and machine learning. For instance, a system uses an outline flow chart to manage conversation direction, but they use natural language processing (NLPs) to respond.[6].

The CHATBOT utilizes the concepts of Artificial Intelligence and Machine Learning to interact with people virtually. Firstly, the development history is reviewed, followed by an explanation of the architecture, and different CHATBOT classifications according to their utility are presented. After that, various design techniques and approaches and varying

platforms of build Bot are reviewed, followed by the advancement in CHATBOT is presented. Real-life practical examples and application of CHATBOT are also presented. This review proposed that CHATBOT can be very well utilized for Computer Aided Design (CAD) software applications, which can overcome the difficulty faced in procedural-based knowledge method.

1.1Chatbots Background:

Although the quest for being able to create something that can understand and communicate with its creator has deep roots in human history, Alan Turing is thought to be the first person to have conceptualized the idea of a chatbot in 1950, when he proposed the question: “Can machines think?”. Turing’s description of the behaviour of an intelligent machine evokes the commonly understood concept of a chatbot.

Chatbots have evolved with the progressive increase in computational capabilities and advances in Natural Language Processing tools and techniques. The first implementation of a chatbot, which relied heavily on linguistic rules and pattern matching techniques, was achieved in 1966 with the development of ELIZA. It could communicate with the user through keyword matching program. It searches for an appropriate transformation rule to reformulate the input and provide an output, i.e., an answer to the user. Eliza was a landmark system that stimulated further research in the field. Nonetheless, ELIZA’s scope of knowledge was limited because it depended on minimal context identification and, generally, pattern matching rules are not flexible to be easily implemented in new domains. A marked evolution in chatbot in the 1980s is the use of Artificial Intelligent. A.L.I.C.E. (Artificial Intelligent Internet Computer Entity) is based on the Artificial Intelligence Markup Language (AIML), which is an extension of XML. It was developed especially so that dialogue pattern knowledge could be added to A.L.I.C.E.’s software to expand its knowledge base. Data objects in AIML are composed of topics and categories. Categories are the basic unit of knowledge, which are comprised of a rule to match user inputs to chatbot’s outputs. The user input is represented by rule patterns, while the chatbot’s output is defined by rule template, A.L.I.C.E. knowledge base. The addition of new data objects in AIML represented a significant improvement on previous pattern matching systems since the knowledgebase was easily expandable. Furthermore, Chat Script, the successor of AIML, was also the base technology behind other Loebner’s prize-winning chatbots. The main idea behind this innovative technology was to match textual inputs from users to a topic, and each topic would have specific rule associated with it to generate an output. Chat Script ushered in a new era for chatbots’ technology evolution. It started shifting the focus towards semantic analysis and understanding. The main limitation in relying on rules and pattern matching in chatbots is they are domain dependent, which makes them inflexible as they rely on manually written rules for specific domains. With the recent advances in machine learning techniques and Natural Language Processing tools combined with the availability of computational power, new frameworks and algorithms were created to implement “advanced” chatbots without relying on rules and pattern matching techniques and encouraged the commercial use of chatbots. The application of machine learning algorithms in chatbots has been investigated and new architectures of chatbots have emerged.

The application of chatbots has expanded with the emergence of Deep Learning algorithms. One of the new, and the most interesting application, is the development of smart personal assistants (such as Amazon’s Alexa, Apple’s Siri, Google’s Google Assistant, Microsoft’s Cortana, and IBM’s Watson). Personal assistants chatbots or conversational agents that can

usually communicate with the user through voice are usually integrated in smartphones, smartwatches, dedicated home speakers and monitors, and even cars. For example, when the user utters a wake word or phrase the device activates, and the smart personal assistant starts to listen. Through Natural Language Understanding the assistant can then understand commands and answer the user's requests, usually by providing pieces of information (e.g., "Alexa, what's the weather today in Los Angeles'In Los Angeles the weather is sunny and there are 75◦F"), or by completing tasks (e.g., "Ok Google, play my morning playlist on Spotify"). Nonetheless, the task of understanding human language has proven to be quite challenging because of tonal, regional, local, and even personal variations in human speech.

All smart personal assistants present the same core characteristics in terms of technologies used, user interface and functionalities. Some chatbots have, however, a more developed personality than others, and the most developed ones can also provide entertainment and not merely assistance with day-to-day tasks; these chatbots are referred to as social chatbots. An interesting example of a social chatbot is Microsoft's XiaoIce. XiaoIce is meant to be a long-term companion to the user, and in order to achieve high user engagement it has been designed to have a personality, an Intelligent Quotient (IQ) and an Emotional Quotient (EQ). Knowledge and memory modelling, image and natural language comprehension, reasoning, generation, and prediction are all examples of IQ capabilities. These are critical components of the development of dialogue abilities. They are required for social chatbots to meet users' specific needs and assist them. The most critical and sophisticated ability is Core Chat, which can engage in lengthy and open-domain conversations with users. Empathy and social skills are two critical components of EQ. The conversational engine of XiaoIce uses a dialogue manager to keep track of the state of the conversation and selects either the Core Chat (the open domain Generative component) or the dialogue skill in order to generate a response. Therefore, the model incorporates both Information-Retrieval and Generative capabilities.

1.2Chatbot and Machine learning:

AI was coined by John McCarthy, an American computer scientist, in 1956 at The Dartmouth Conference where the discipline was born. Today, it is an umbrella term that encompasses everything from robotic process automation to actual robotics. It has gained prominence recently due, in part, to big data, or the increase in speed, size and variety of data businesses are now collecting. AI can perform tasks such as identifying patterns in the data more efficiently than humans, enabling businesses to gain more insight out of their data. Automation is the process of making a system or process function automatically. Robotic process automation, for example, can be programmed to perform high-volume, repeatable tasks normally performed by humans. RPA is different from IT automation in that it can adapt to changing circumstances. Machine learning is the science of getting a computer to act without programming. Deep learning is a subset of machine learning that, in very simple terms, can be thought of as the automation of predictive analytics. There are three types of machine learning algorithms: supervised learning, in which data sets are labeled so that patterns can be detected and used to label new data sets; unsupervised learning, in which data sets aren't labeled and are sorted according to similarities or differences; and reinforcement learning, in which data sets aren't labeled but, after performing an action or several actions, the AI system is given feedback. Machine vision is the science of making computers see. Machine vision captures and analyzes visual information using a camera, analog-to-digital conversion and digital signal processing. It is often compared to human eyesight, but machine vision isn't bound by biology and can be programmed to see through walls, for example. It is

used in a range of applications from signature identification to medical image analysis. Computer vision, which is focused on machine-based image processing, is often conflated with machine vision.

Machine learning chatbots works using artificial intelligence. User need not to be more specific while talking with a bot because it can understand the natural language, not only commands. This kind of bots get continuously better or smarter as it learns from past conversations it had with people. In order to achieve the ultimate goal, I have taken an iterative approach and divided my work into four major deliverables. These deliverables not only helped me in understanding the code structure of Yioop but also enhances Yioop's functionality. In the rest of the report, I will be discussing about the four deliverables. To understand more on chatbot service, I had implemented a Facebook Messenger Weather Bot in deliverable 1, which is discussed in next section. The purpose of deliverable 2 is to introduce chatbots to the Yioop. I have added Bot Configuration settings which is used to add bot users in Yioop. In the next deliverable, I have added a functionality where the user will be able to call bots in a group thread. Activation of bots will happen by calling respective callback URL which is already configured that helps bots to have a conversation with users. More details on this is discussed in deliverable 3 section. As a deliverable 4, I have created a weather bot i.e., a web application in php that calls yahoo API to get weather information. The last section of the report contains the conclusion and future work.

1.3Types of Chatbot:

CHATBOTS can be classed using other variables, such as the interaction level and how responses are generated [9]. The first type of CHATBOT is a domain of knowledge classified according to the knowledge available to them or the amount of data trained. They are further classified into Open Domain and Closed domain. Open-domain bots can address general topics and answer them appropriately. Closed domain bots focus on one specific area of knowledge and may not answer other questions. For instance, a flight booking Bot won't tell you the name of Canada first President. It may tell you a joke or reply the way your day is, but it is not meant to do any other tasks, considering that its job is to book a flight and give the user all the necessary information about the booked flight [9]. The second one is service provided; these Bots are sentimental proximity to the user, how much intimate interaction occurs, and depends on the Bot's task.

Further classified into Interpersonal, Intrapersonal, and Inter-agent. Interpersonal bots are for communication and allow services such as Table booking in Restaurants, Train booking, FAQ bots, etc. These CHATBOTS are supposed to get information and pass it on to the user. These types of BOTS can become user-friendly and likely to remember previous information about the user. Intrapersonal bots will exist in the user's personal domain, such as chat applications like Facebook messenger, Telegram, and WhatsApp, and perform tasks under the user's intimate part. Managing calendar, storing the user's opinion, etc. They will become the companions of the user and understand the user as a human [9]. Inter-agent bots are becoming ubiquitous as all CHATBOTS require opportunities for intercommunication. There is an emerging need for Inter-agent CHATBOT protocols for communication. The Alexa-Cortana integration is one example of an Inter-agent BOT [8].

Intelligence Methods are knowledgeable systems to generate responses, and they use the natural language understanding (NLUs) component to comprehends the user's query. Such systems are used where a narrow domain and sufficient data exist to form a network system.

Rule-based system bots interact with users with the defined outline trees. It is a flowchart where conversations are predicted in such a way as to anticipate what a client might ask and how the Bot should respond. Hybrid systems are the combination of rules like Algorithms and machine learning. For instance, a system uses an outline flow chart to manage conversation direction, but they use natural language processing (NLPs) to respond.[9]

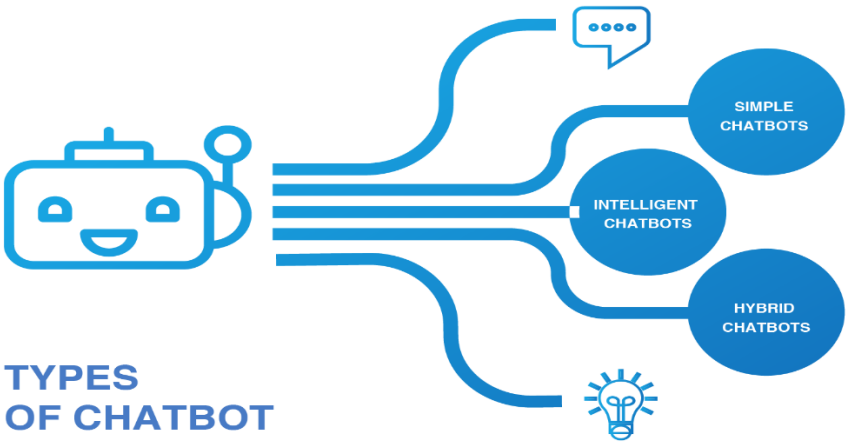

Fig 1.3.1: Types of Chat-Bots

CHAPTER-2

Review of Relevant Literature

In this section we outline the following main aspects of chatbots based on our finding from the literature review: implementation approaches, available public database used in previous data-driven approaches to chatbot implementation, the main evaluation methods for measuring the performance of chatbots and the application of chatbots in different domains.

2.1. Implementation Approaches to Chatbots:

In this section, we will give an overview of chatbots' implementation methods. We will distinguish between Rule-based chatbots, and Artificial Intelligence (AI) based chatbots. Within AI-based chatbots, we will further distinguish among Information-Retrieval chatbots and Generative Chatbots. We will also discuss drawbacks and limitations of each implementation approach, as well as recent improvements.

2.2 Rule-Based Chatbots:

The very first attempts at chatbots' implementation were rule-based. Rule-based models are usually easier to design and to implement, but are limited in terms of capabilities, since they have difficulties answering complex queries. Rule-based chatbots answer users' queries by looking for patterns matches; hence, they are likely to produce inaccurate answers when they come across a sentence that does not contain any known pattern. Furthermore, manually encoding pattern matching rules can be difficult and time consuming.Further more, pattern matching rules are brittle, highly domain specific, and do not transfer well from one problem to the other.

2.3 Artificial Intelligence Chatbots:

AI models, contrary to Rule-based models, are based on Machine Learning algorithms that allow them to learn from an existing database of human conversations. In order to do so, they need to be trained through Machine Learning algorithms that can train the model using a training dataset. Through the use of Machine Learning algorithms, there is no longer the need to manually define and code new pattern matching rules, which allows chatbots to be more flexible and no longer dependent on domain specific knowledge. As stated, AI models can be further categorized into Information Retrieval based models and Generative models.

Information Retrieval Models. Information Retrieval based models are designed so that given a dataset of textual information, the algorithm will be capable of retrieving the information needed based on the user's input. The algorithm used is usually a Shallow Learning algorithm there are also cases of Information Retrieval models that use Rule-based algorithms and Deep Learning ones. Information Retrieval based models include a pre-defined set of possible answers; the chatbot processes the user query and based on this input it picks one of the answers available in its set. The knowledge base for this kind of model is usually formed by a database of question-answer pairs. A chat index is constructed from this database, in order to list all the possible answers based on the message that prompted them. When the user provides the chatbot with an input, the chatbot treats that input as a query, and an Information Retrieval model akin to those used for web queries is used to match the user's input to similar ones in the chat index. The main advantage of this model is that it ensures the quality of the responses since they are not automatically generated. These models have seen a surge in

popularity with the advent of the Web 2.0 and the increase in available textual information that could be retrieved on social media platforms, forums, and chats.

Finally, Information Retrieval systems, due to the fact that they do not generate answers but rather retrieve answers from a pre-defined set in their knowledge base, are arguably less suitable to be used as the underlying algorithm for conversational or chit-chat agents-the so-called social chatbots. Information Retrieval models are in fact less suitable to develop a personality, which is an important trait for this kind of chatbot . Nonetheless, some progress has been made in developing new Information Retrieval algorithms in recent time, and it is worth mentioning what Machine Learning algorithms are currently being used as underlying technology for this kind of model. Proposed a new model to represent local textual co-occurrence and map hierarchical information across domains for more semantically distant terms. This model was based on the idea that the higher the co-occurrence of two terms across domains, the more closely related the two terms are. Accordingly, a high co-occurrence within a specific domain could inform the information retrieval process. This model was, thus, based on two steps: topic modelling for parallel text, and getting the hierarchy architecture. The first step aims at finding meaningful co-occurrence patterns of words. The second step aims at modelling the architecture of co-occurrences across topics. This architecture will be used to create the neural network that powers this machine learning algorithm. The interesting development made by this model lies therefore in its use of co-occurrences of words to define a context. The underlying aim of this research was to use contextual information to improve matching performances for Information Retrieval models.

One interesting development, which aims at taking into consideration previous turn in the conversation, thus obtaining more contextual information in order to improve the quality and the correctness of the output is the one proposed by. In this model the Information Retrieval process is enhanced by a Deep Neural Network that ranks not only the question/answer pair matched with the last user's input, but also those question/answer pairs that match with reformulated versions of previous conversation turns. The ranking lists corresponding to different reformulations are then merged. In this way, contextual information can be leveraged from the user's previous queries, and these pieces of information can be used to retrieve a better answer within the knowledge base.

Among AI models, Sequence to Sequence models have become the industry standard for chatbot modelling. They were first introduced to solve Machine Translation problems, but the underlying principles do in fact seem to perform well for Natural Language Generation as well. These models are composed of two Recurrent Neural Networks (RNN), an Encoder and a Decoder. The input sentence of the chatbot user becomes the input of the Encoder, which processes one word at a time in a specific hidden state of the RNN. The final state represents the intention of the sequence and is called the context vector. The Decoder takes the context vector as its input and generates another sequence (or sentence) one word at a time. The overall objective for this probabilistic model is to learn to generate the most probable answer given the conversational context, which in this case is constituted by the previous turn in the conversation, or the input sentence. In the learning phase, the answer, or output sentence, is given to the model so that it can learn through back propagation. For the interference phase, two different approaches can be used. The beam search approach provides several candidates as the input sentence and the output sentence is selected based on the highest probability. A greedier approach uses the predicted output token as an input to predict the next sentence in the conversation . This model does offer some interesting advantages. First, it does not

involve domain specific knowledge, but is rather an end-to-end solution that can be trained using different datasets, thus on different domains. Furthermore, although the model does not need domain-specific knowledge to provide valuable results, it can be adapted to work with other algorithms if further analysis on domain-specific knowledge is needed. It is thus a simple yet widely general and flexible model that can be used to solve different NLP tasks. For these reasons, the Sequence-to-Sequence model seems to have become the industry standard choice for dialogue generation and many NLP tasks in recent years.

2.4 Natural Language Processing:

Natural Language Processing (NLP) is the study of letting computers understand human languages. Without NLP, human language sentences are just a series of meaningless symbols to computers. Computers don't recognize the words and don't understand the grammars. NLP can be regard as a "translator", who will translate human languages to computer understandable information Traditionally, users need to follow well-defined procedures accurately, in order to interact with computers. For example, in Linux systems, all commands must be precise. A single replace of one character or even a space can have significant difference. However, the emergence of NLP is changing the way of interacting. Apple Siri and Microsoft Cortana have made it possible to give command in everyday languages and is changing the way of interacting.

2.5 Machine Learning:

Machine Learning (ML) is an area of computer science that "gives computers the ability to learn without being explicitly programmed". The parameter of the formulas is calculated from the data, rather than defined by the programmer. Two most common usage of ML is Classification and Regression. As Classification means to categorize different types of data, while Regression means to find a way to describe the data. Basic ML program will have two stages, fitting and predicting. In the fitting stage, the program will be given a large set (at least thousands) of data. The program will try to adjust its parameter based on some statistical models, in order to make it "fit" the input data best. In the predicting stage, the program will give a prediction for a new input based on the parameters it just calculated out. For example, the famous Iris flower dataset contains the measurement of several features of three different species of flowers, such as the length of sepals and petals. A well-defined ML program can learn the pattern behind this feature and give prediction accordingly.

Chatbots are applied in many different domains. As far as Education and Research go, chatbots in this domain seem to be mostly Information Retrieval or AIML based. Little to no Deep Learning application have been used in these fields. The choice seems justified by the fact that chatbots created for educational purposes are often aimed at providing specific information (such as class schedules) or educational material. For similar reasons as in the field of education, most HealthCare oriented chatbots are Information Retrieval based. E-commerce oriented chatbots present different configurations, mostly Information Retrieval based configurations, but with some Deep Learning algorithms also involved in the overall architecture.

CHAPTER-3

Methodology

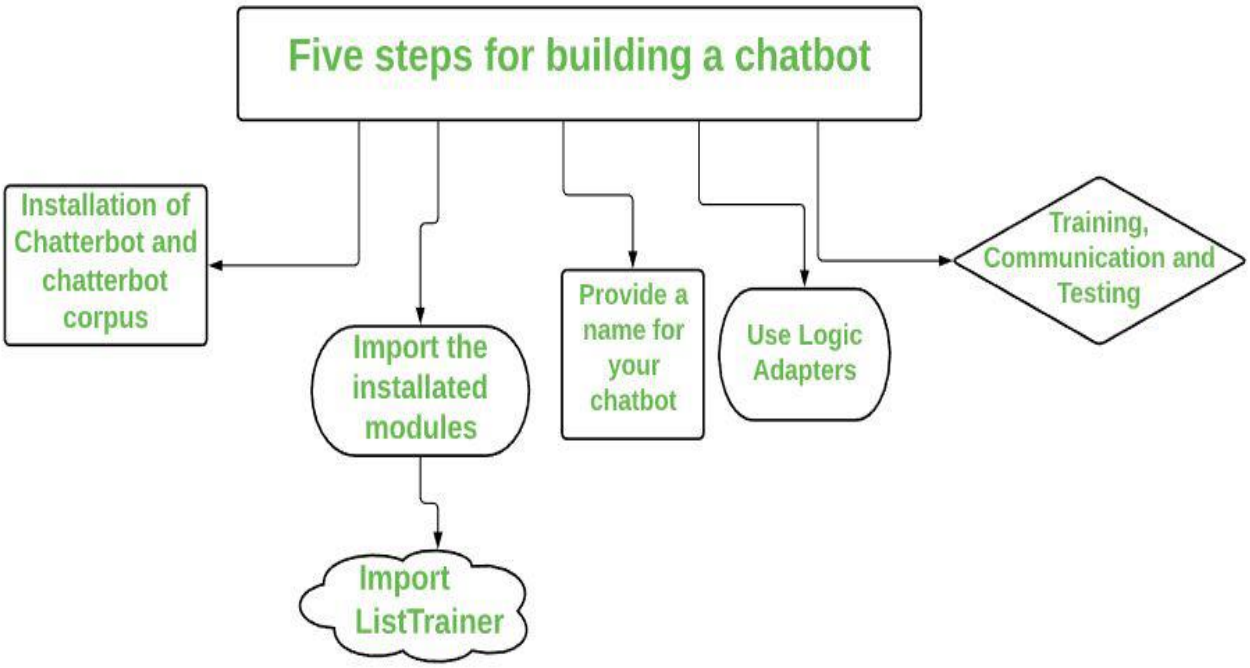

Fig 3.0: Architecture of chat-bot

3.1 Creating Interface:

The interfaces are the front-end chat box for user to talk to the bot, which can be the Bot Portal, Skype, Facebook, etc. The connector works as a common gateway for all the interfaces. The outbound side calls different APIs to different front end, but the inbound APIs kept the same for our bot to connect. Fortunately, this connector has already been implemented by the bot framework SDK, we only need to rightly configure them. The Bot part contains the main flow control of our project. It is responsible for redirect the input to different models, parse the return values, and determines what to do next. It is also connected to the database to retrieve and update values. A CHATBOT platform is a program that makes system software by the developer to create and improve Bot. The platform selection depends on a different parameter, such as what type of Bot organization has to develop, whether Bot will be goal-oriented, use for conversation, etc. A conversational-based Bot concentrates on conversing with the user only; it does not rely upon understanding what the user is requesting, and also Bot need not remember the entire or previous conversations. The whole purpose of making this Bot is used for entertainment purposes. While goal-oriented CHATBOT is often used for business, education, FAQ purpose only.

3.2 Responses Scripting:

we created the JS file that only handles one pattern, load Response.js. When we enter that command to the bot, it will try to load Response.js. It won't work unless we actually create it. Here is what you can put Response.js. We will match two basic patterns and respond.

```
const responseObj = {
    hello: "Hey ! How are you doing ?",
    hi:"Hey ! How are you doing ?",
    hey: "Hey! What's Up",
    date: new Date().toDateString(),
    time: new Date().toLocaleTimeString(),
    universitycode:"MRUH",
    hodofdatascience:"Dr.G.Naveen kumar",
    hodofaiml:"Dr.Thayyaba Khatoon",
    hodofcse:"Dr.E.V.Reddy",
    feeforaiml:"150000",
    feefordatascience:"150000",
    feeforcse:"150000",
```

Fig 3.2.1: Responses

3.3 Speeding up Chat bot (Brain Load):

When you start to have a lot of Response files, it can take a long time to learn. This is where Response files come in. After the bot learns all the Response files it can save its brain directly to a file which will drastically speed up load times on subsequent runs.

3.4 Loading Bot-responses (Brain):

This is the simplest program we can start with. It creates the js object, learns the startup file, and then loads the rest of the Response files. After that, it is ready to chat, and we enter an infinite loop that will continue to prompt the user for a message. You will need to enter a pattern the bot recognizes. The patterns recognized depend on what Response files you loaded. We create the startup file as a separate entity so that we can add more Response files to the bot later without having to modify any of the programs source code. We can just add more files to learn in the startup js file.

3.5 Technology:

Talking to a bot implies talking in a chat, meaning that a user will have to write a lot. And in case a bot cannot understand the user's request, he will have to write even more. It takes time to find out which commands a bot can respond to correctly, and which questions are better to avoid. Thus, talking to a chatbot does not save time in the majority of cases. Perhaps the efficiency of virtual assistants will increase due to the implementation of voice recognition function in the future. But for the time being their functional capabilities are very restricted, and they can be truly useful only in a few business areas. Chatbots have the benefit that it can quite easily be used in any industry. Unlike other products where you have to do a lot of development and testing to change platforms, chatbots are relatively easy to switch. One has to just train the bot by giving the right conversation structure and flow to switch its current field or industry. Unlike humans who can only communicate with one human at a time, chat bots can simultaneously have conversations with thousands of people. No matter what time of the day it is or how many people are contacting you, every single one of them will be answered immediately. Chatbots, on the other hand, are bound by some rules and obey them as long as they're programmed to. They will always treat a customer in the perfect way no matter how rough the person is or how foul language the person uses. Not everyone orders the same food every day, people's choices may change every day. In this case, it can use your order history to make suggestions for the next order, learn your address details and much more. Customers love this smooth interaction and want all their transactions to be as simple as possible.

3.6 Accessible anytime:

I'm sure most of you are always kept on hold while operators connect you to a customer care executive. On an average people spend around 7 minutes until they are assigned to a person. Gone are the frustrating days of waiting in a queue for the next available operative. They are replacing live chat and other forms of slower contact methods such as emails and phone calls. Since chatbots are basically virtual robots they never get tired and continue to obey your command. They will continue to operate every day throughout the year without requiring to take a break. This improves your customer and helps you rank highly in your sector. Another advantage of this instant response is that you can also skillfully craft your chatbot to maintain your image and brand. Before you want to accomplish a task, you first must learn how to work on the task and complete it. Only then will they be considered fit for the job. There is a continuous teaching involved in every level of hierarchy the employee will go through. Also, there will be a lot of change in the employees, some stay, some get fired, some more join in etc. What we want to say is, employees will change; it's a fact. And this would require you to allot a lot time of your employees into grooming the new joiners. Chatbots could eliminate that time to almost zero, but provide a very clean and easy to understand conversation flow and structure that needs to be maintained by the chatbot. No doubt there will be changes in this too, but it will rather take a fraction of your time to resolve as compared to human employees.

3.7 Handling Capacity:

Unlike humans who can only communicate with one human at a time, chat bots can simultaneously have conversations with thousands of people. No matter what time of the day it is or how many people are contacting you, every single one of them will be answered immediately. Imagine you own a restaurant, and you have a good reputation for your food of which most of your revenues come from delivery. As the demand keeps rising, you will have more customers to take orders from but very few staff to attend them all. Companies like Taco Bell and Dominos are already using chatbots to arrange delivery of parcels.

3.8 Flexible attribute:

Chatbots have the benefit that it can quite easily be used in any industry. Unlike other products where you have to do a lot of development and testing to change platforms, chatbots are relatively easy to switch. One has to just train the bot by giving the right conversation structure and flow to switch its current field or industry. Or if there is a lot of back and forth between two sections of the industry say customer support and sales, then you could have custom built presets which would already have the conversation flow and structure to carry out the interactions with the user

CHAPTER-4

Results and Discussions

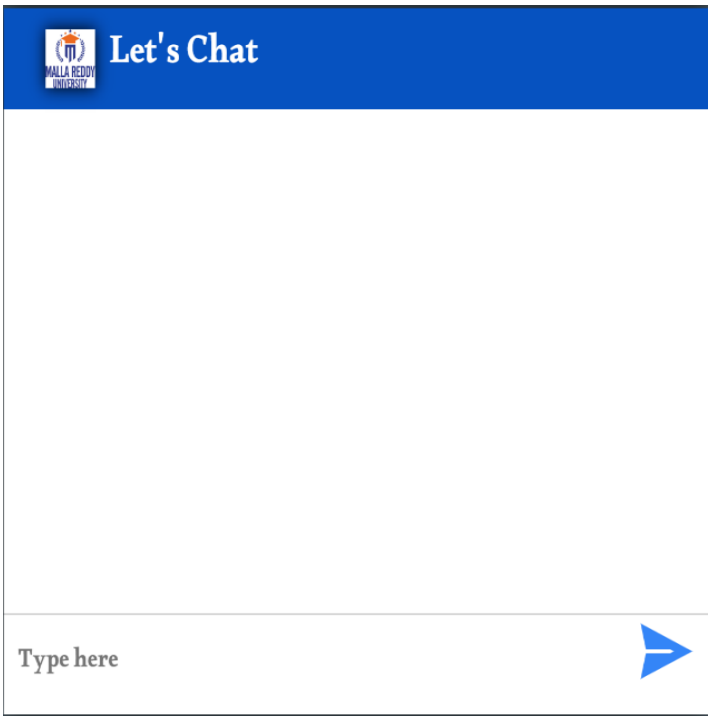

Fig 4.1: Interface

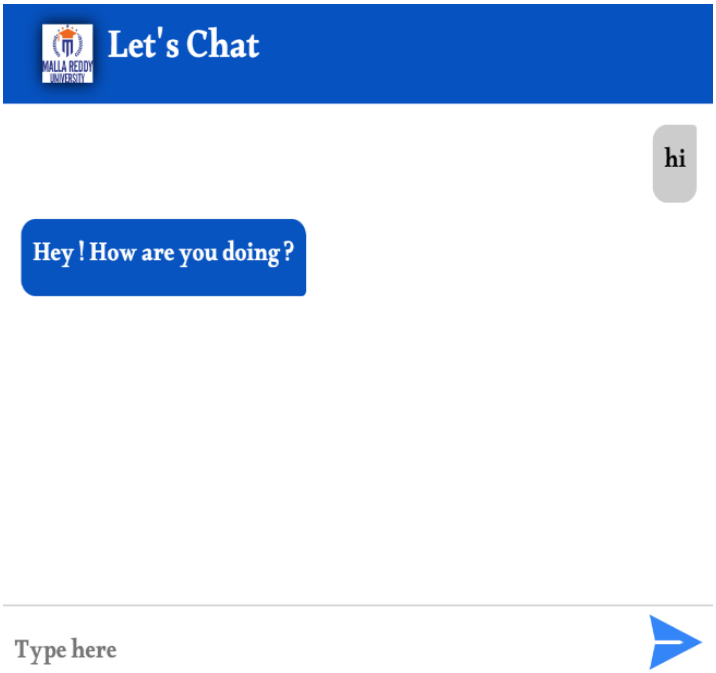

Fig 4.2: Response for hi

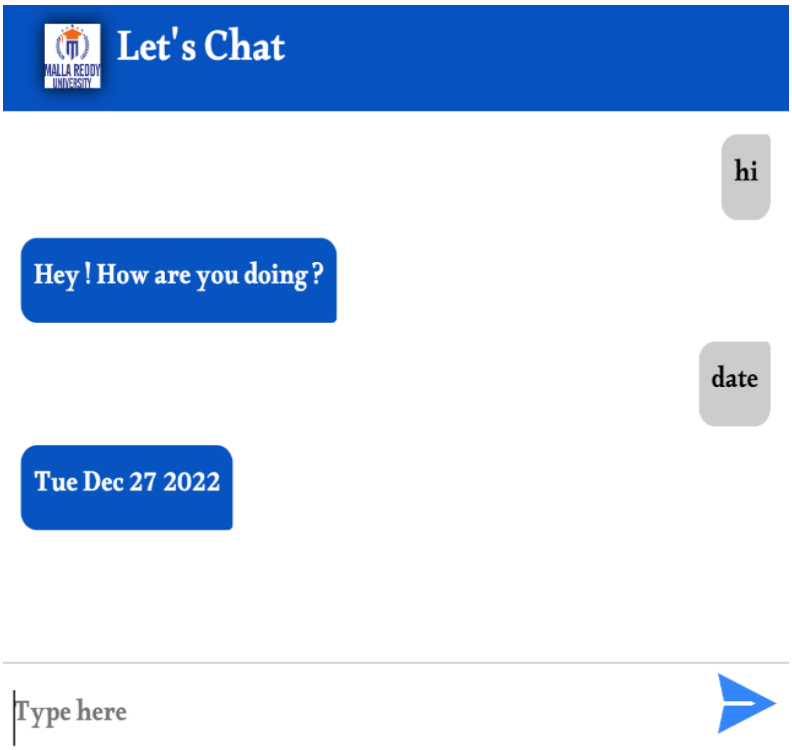

Fig 4.3: Bot-Response for date

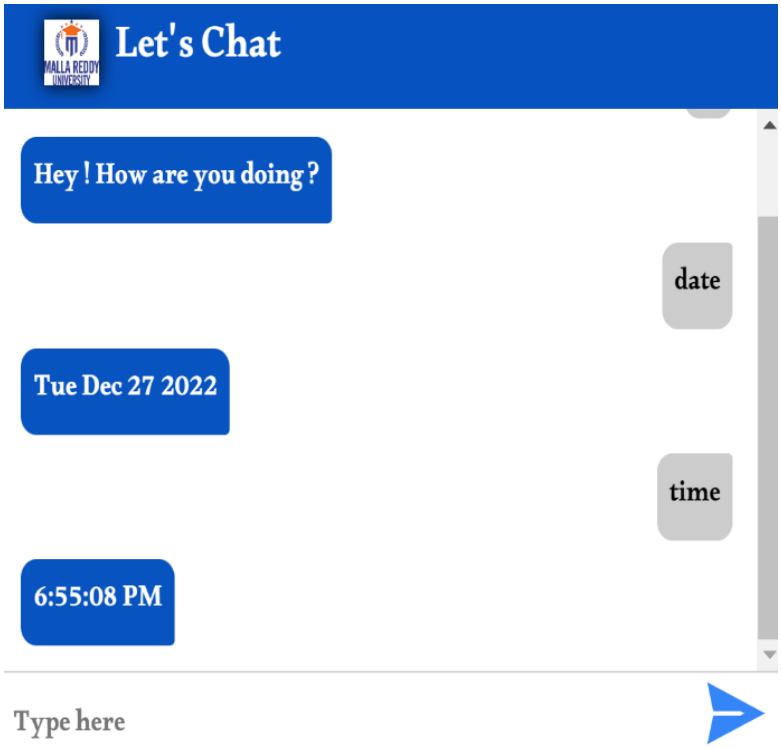

Fig 4.4: Bot-Responses for time

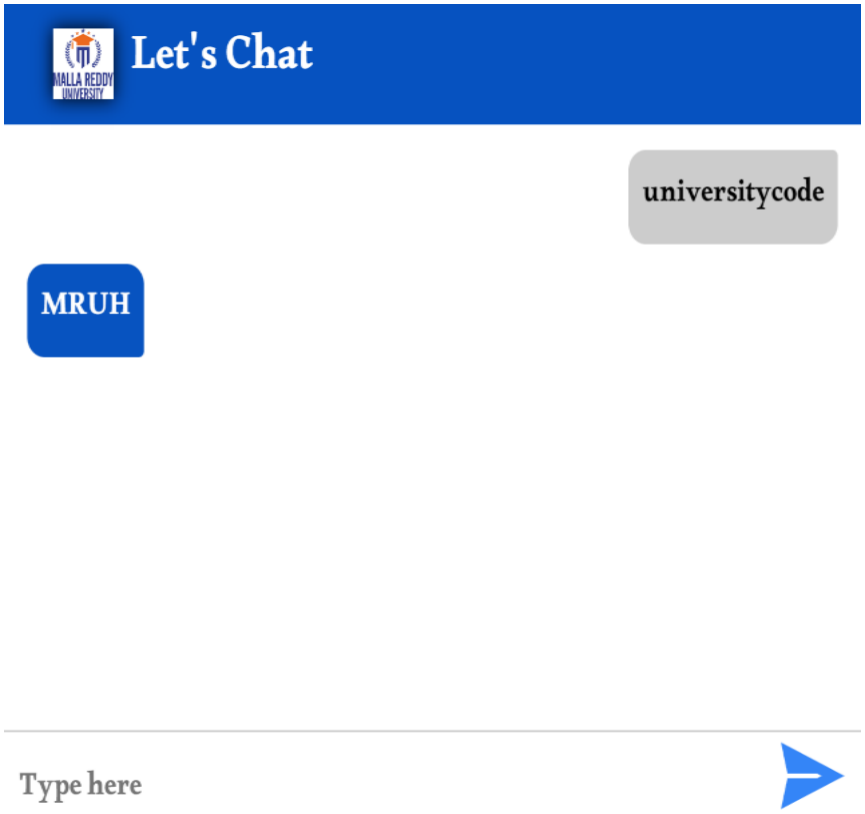

Fig 4.5: Bot-response for university code

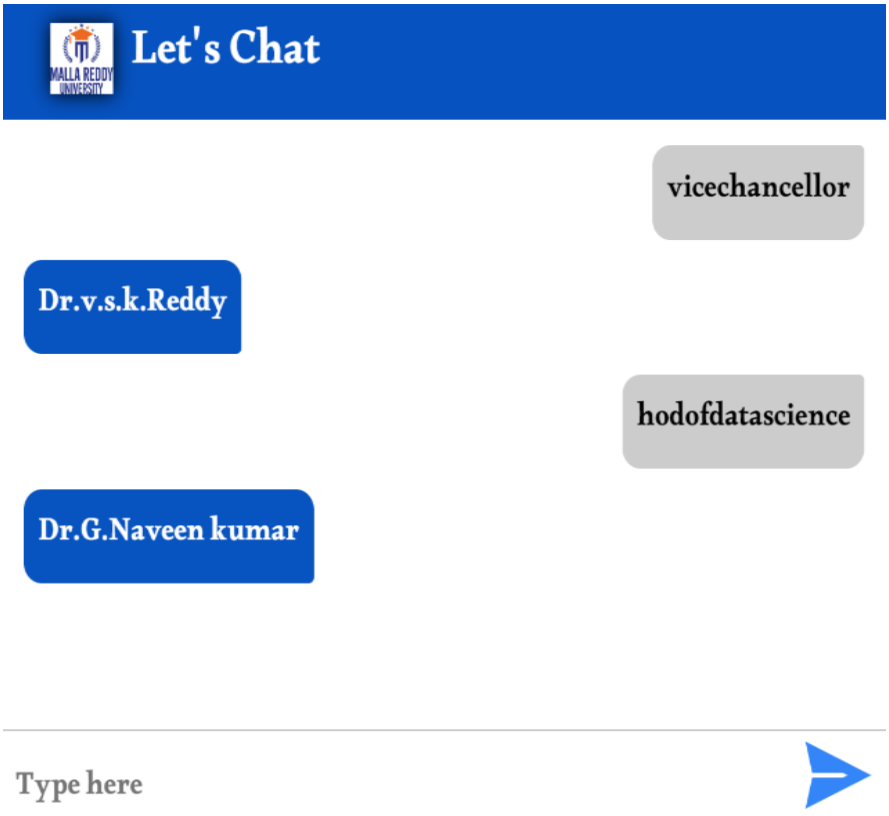

Fig 4.6: Bot-response for faculty details

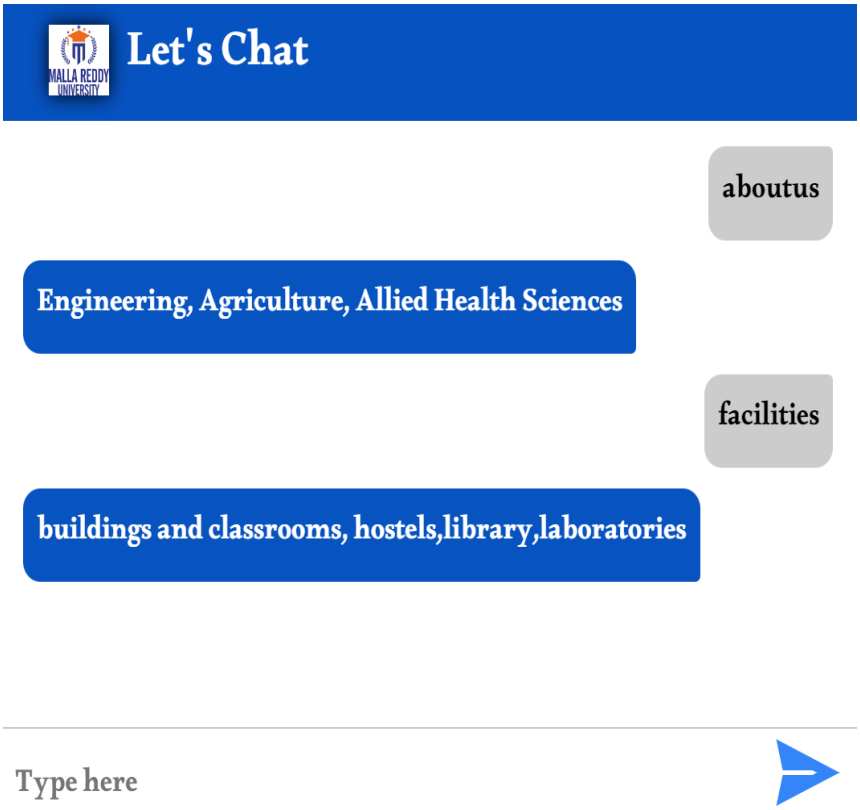

Fig 4.7: Response for university details

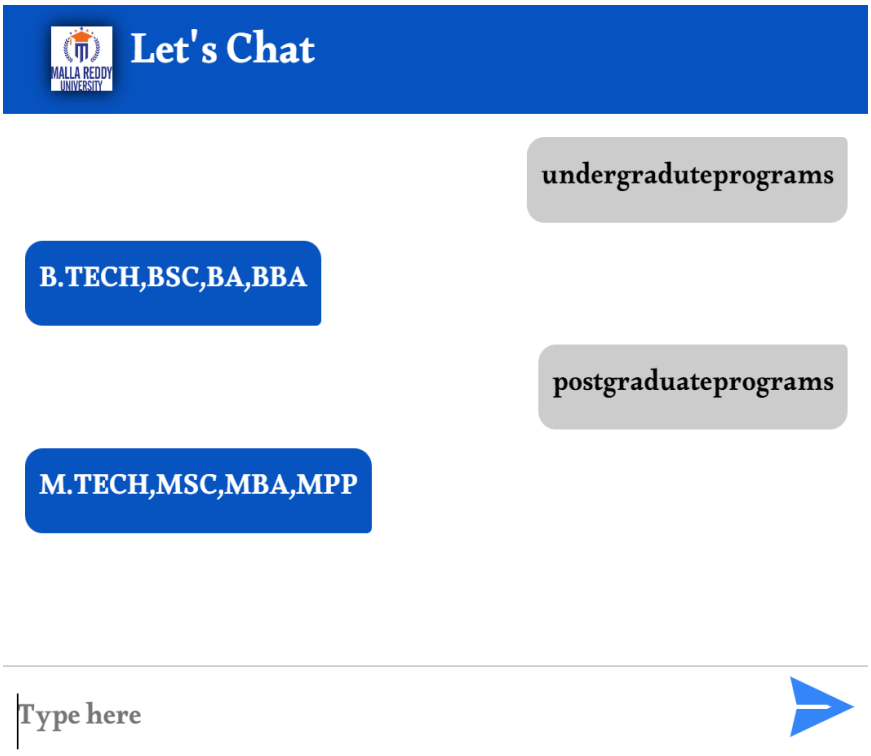

Fig 4.8: Response for university programs

CHAPTER-5

Conclusions and Future Scope of Study

Under this study, an attempt is made to understand the automated process of various chatbots by using smart algorithms. The classification of text in chatbot by using pattern matching to build, train, test it, helps in getting the desired output. It allows spoken or written phrases to be analyzed by computers to determine the intent of the user. Architecture and designing process of the chatbot is studied to understand how they interact with humans.AI chatbots helps better decision making. The advantages, disadvantages and various other applications of a chatbot are mentioned. s. We have also underlined current challenges and limitations, as well as gaps in the literature. Despite technological advancements, AI chatbots are still unable to simulate human speech. This is due to a faulty approach to dialogue modeling and a lack of domain-specific data with open access. For Information Retrieval chatbots, there is also a lack of a learnt AI model. A model like this might be used in a variety of sectors. There is still a gap to be closed in terms of applications between industry models and current advancements in the sector. Large models necessitate a lot of computing power and a lot of training data.

There is no universal framework for evaluating chatbots. Several models depend on human evaluation, yet human evaluation is expensive, time-consuming, difficult to scale, biased, and lacks coherence. A new, reliable automatic evaluation approach should be provided to overcome these restrictions. Furthermore, recent studies have revealed a scarcity of data on the most recent developments in language models that may be used to chatbots like Transformers. As a result, it's critical to examine and analyze the data used to train the various models. This type of study provides for a more accurate comparison of different models and their results. In fact, the distinction between chatbots' applications and social or companion chatbots appears to be hazy. Chatbot modeling is a fascinating challenge that mixes Deep Learning and Natural Language Processing. Despite the fact that the first chatbots were created sixty years ago, the area has continued to grow and provide new and exciting problems. To bridge these gaps, smaller, flexible, less domain dependent models would be beneficial. Improved, scalable, and flexible language models for industry specific applications, more human-like model architectures, and improved evaluation frameworks would surely represent great steps forward in the field.

Future Scope:

There are limitations to what has been currently achieved with chatbots. The limitations of data processing and retrieval are hindering chatbots to reach their full potential. It is not that we lack the computational processing power to do so. However, there is a limitation on "How" we do it. One of the biggest examples is the retail customer market. Retail customers are primarily interested in interacting with humans because of nature of their needs. They don't want bots to process their needs and respond accordingly.

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