AI based Chatbot for Human Assistance

Sanchit Singhal[1], Vatsal Garg[2], Osho Garg[3], Prabhat Singh[4], Harsh Khatter[4]
[1,2,3] Student, [4] Assistant Professor
Computer Science & Engineering Department
ABES Engineering College, Ghaziabad, Uttar Pradesh-201009, India

Abstract

*Chatbot is an implementation of Artificial Intelligence technology which is used to interact with the human beings and make them feel like they are taking to the real person and the chatbot helps them to solve their queries.. A chatbot can provide 24*7 customer support so that the customer may have the good service experience by any organization. Chatbot helps to resolve the queries and respond to the questions of users. The user is providing the input to the chatbot first and then the same input will process further and this input can be in the form of text or voice. Therefore, on the basis of the given input and after processing it, the chatbot application will generate the response to the user and the same response will be the best answer found by the chat application. This response can be in any format like text format or a voice output. This chatbot is built using Dialog Flow (Google-owned) and it can be accessible through mobile phones, laptops and portable devices. Chatbots such as Facebook bot, WeChat bot, Hike bot called Natasha, etc are available in the marker and will respond on the basis of their local databases. In case of this chatbot system we will focus on the scalability, user interactivity and flexibility of the system which can be provided by adding both local as well as Web database due to which our system will be more fast and accurate.. This chatbot uses unification of emerging technologies like Machine learning and Artificial Intelligence. The motive of this Chatbot system is to support and scale businesses and maintain relations with customers. The main aim of this chatbot is to enhance the customer support experience so that the customer can get support at any time, at any place and on any device in a very less time . This chatbot will also use Google cloud services so that it can provide faster response to the human user and also become more scalable.*

Keywords: *NLP (Natural Language Processing), Machine Learning, Artificial Intelligence, Chatbot, Dialog Flow, Conversational Agents, AIML(Artificial Intelligence Markup Language)*

I. INTRODUCTION

Chatbot system or we can say that chatterbot a Conversational Entity which is using AI algorithms for its implementation and uses as to convert human language into natural language using Artificial Intelligence technology and techniques such as Image processing and video processing, NLP, and audio analysis. Chatbot can provide 24*7 customer support experience and at very low maintenance cost. Providing good customer service is one of the major and most important components for any successful business. It is not possible for the business to provide round the clock physical customer support to the human user therefore a chatbot can be used to enrich the customer support experience so that the customer can get support at any time, at any time, at any place and on any device.

In today's scenario of the world, we all know that customer service is one of the major and most important factors for any successful business. Therefore, to provide this customer supports there are many chatbots developed in the market to provide the best customer service experience. Well, bots have become an imperative part of almost every business- whether we talk about rendering anytime support, or augmenting human productivity, chatbots show a valid reason to get added as a part of customer service management. Furthermore, it improves branding with less customer effort. But due to limited and rule-based algorithms most of the chatbots failed at extreme level to respond to the user queries. Because of this, it is necessary to design a robust chatbot that is able to perform human assistance without any constraint. This chatbot will able to solve any type or query of the user without any further intervention.

This chatbot is built by making use of artificial algorithms that analyses inspect or examines the user's questions (or queries) and understand user's message what he/she wants to say. We are going to design and develop a system for various stakeholders where users can perform many tasks like food ordering, ticket booking, hospitality etc. The stakeholders will benefit from their online businesses, e-commerce, education, telecoms, IT sectors, healthcare & hospitality, tours & travels etc. This chatbot will be working across devices such as PC, Mobile, Smart watches, etc. This chatbot recognizes what users want to say and understands user's queries and respond to the user simultaneously and answer all the queries. Even if there is any error while writing the query then chatbot will automatically understand and correct the query and answer according to the situation. The already built-in system of Artificial Intelligence will understand what the user wants to

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say and realizes the user's requirements and answer accordingly. So there is no built-in or pre-defined format for the user to write or ask questions.

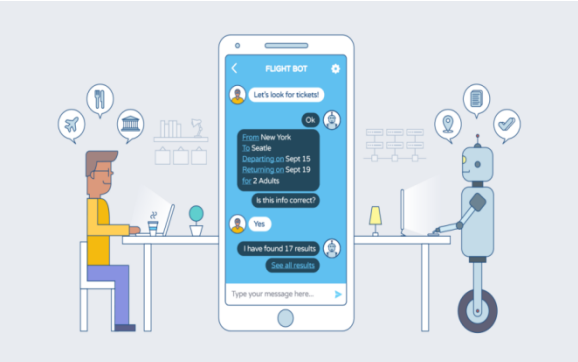

Fig 1. The Interaction of chatbot with Human

As we know that, Chatbots are the machines which have intelligence and will acts as machine-to-human conversation system. The conversation between human and computer can be done by either text or speech. The Natural Language Processing is used to understand the human text and speech recognition can be used to understand the speech dialog. In the traditional process of chatbot, the main to understand the text and reply to the query answer in text form. Chatbots are of two types i.e., classifications are of two kinds: Independent and Web based chatbots.

Independent chatbots are used in standalone computers in which there is no need to access web, while the Web-based chatbots are using web and can be accessed through web services and can be built on the cloud. In this chatbot system we are trying to build the Web-based chat application which run across all devices to provide flexibility and provide real-time conversation which makes the customer service more interactive.

II. SCOPE OF CHATBOT

1. **Initial Stage -** In the initial stage, we will focus on simple dialog flow based chatbot where there is no implementation of AI algorithms. The Dialog Flow provides us the implementation of Natural Language Processing. NLP will help us to communicate with chatbot using speech by transformation speech into text or vice-versa.
2. **Medium Stage-** In this stage, we will focus on the multiple modules with the implementation of AI algorithms and will make our chat application faster and respond to unknown queries searching from search engine also. It will have implementation based on entities and intents which are used to identify the flow and information from the given query.
3. **Enhanced stage-** We will implement our application with more furnished AI algorithms so that it can provide support to all kind of customers. We will also deploy our chatbot to cloud using GCP. It will improve the performance and provide scalability, virtual machines, control and security.

III. RELATED WORKS

The definition of a chatbot knowledge base uses one of the most popular languages which is called artificial Intelligence Markup Language (AIML). Artificial Intelligence Markup Language is one of the best and popular languages to design and build chatbots. AIML describes the class of data objects which is called as AIML objects and AIML also describes the computer programs that process them, its behavior. Units are the building block of AIML objects called as topics and categories, and these units are containing two kinds of data either parsed data or unparsed data.

[2] A new method called BPoint Tree was introduced by one of the papers to make the searching process more efficient for answers with more accuracy and no ambiguity by using one more data structure (DS) to the traditional algorithm of BST. A chatbot called FloristBot is implemented using the proposed algorithm that can be used by a florist to sell the flowers, to make customers happy and take the customer orders for the flower bouquets for various events and occasions. It uses AIML and BST. This chatbot has a user interface (UI) and also three sets of units which form modules: responder, classifier, and master-graph which is used to handle the conversation. The introduced algorithm also consists of 4 sets of units which form modules: Insertion with Shortcut, Update, Search and Environment Specification which includes Search in Unique Contexts and Duplication. The FloristBot uses one of the best programming language to code the introduced algorithm, that is C++ and for implementing the dialog interface for chat, it uses API.AI tool. The Contexts and Intents are the building blocks of our FloristBot [2].

[3] Dong Kun Lee & Kyo-Joong oh have proposed a chat bot which is used by mental health counselors also known as psychologists in psychological and emotional well-being service. This chatbot was implemented by using emotion recognition. Therefore, the patient can use this chatbot anywhere and does not need to go to the hospital at all because of this. The user can take free counseling at his/her location or home. Nikita Hatwar has also developed one more interesting chatbot, but this time it was for another field which works for sales and marketing named as Artificial Intelligence based chat bot. According to the description of the paper, the chat bot can

also be used for providing advice and information to the visitor of the mall, giving direction to shops based on the current discount and off on items in all the shops of the entire mall. This bot was implemented using guidance recommendation system and it can also advise visitors to visit a particular shop according to the rating of that shop by other visitors [3].

[4] A new chatbot known as college inquiry based chat-bot was developed using AI algorithms that first read user message and then finally try to understand the meaning of that message. The chat-bot is composed of core and whenever it needs to access the core it uses MySQL as an interface for that purpose. The technologies of Natural language processing are the main need for parsing, tokenizing, stemming and filtering the content of the question. Question Answer based system selects the most appropriate answers on the basis of using language features provided by natural language processing (NLP) techniques. The proposed solution make the chat-bots realization easy which is solved by using two approaches: Starting from the ontology, and then reach to preprocess of sentences given by the user.[4]

[5] Verbot a chatbot was developed using the best engine for regular expression based natural language processing (NLP) engine. This helps to make the chat-bot design easy and understandable & automates conversation with users. Verbot is coded in one of the famous C# language and needs Microsoft .Net 1.1 or higher version for its execution. agentsvr.exe (Microsoft Agent) and verbot4engine.exe (VERBOT) are the two main processes which make all these things happen. When we click over the knowledge base or added a knowledge base then knowledge base will load instantly into the memory of verbot player's when someone type(chat) or you can say that when you type the query and questions with verbot, it compare the inputs in the CKB or VKB files with your inputs. In this paper a new approach was invented to develop the personal assistant or friend of the user by implementing web-based artificial intelligent based chat-bot. With the help of algorithm of pattern matching, the system plans the user's work as it functions as a virtual personal assistant and also schedule the user's meetings successfully and with this they achieved the efficiency of about 70%.[5]

[6] In other related work to emulate information chat communication between a user and a computer, a language model and computational algorithm was integrated by the chatbot architecture using natural language. With the help of improvement of data-mining tools and improvement in machine-learning techniques which improves the decision-making capabilities ,and easily availability of corpora, robust language annotations/processing tools standards like XML and its applications much more better, and chatbots are now the basic necessity of daily life applications like paying bills or ordering food [6]. Chatbots can also be used as chat book for a child that is why chat bot is used in Entertainment Markets and this market is one of the biggest markets for chatbot. In today's scenario of the world it is found that to carry out more adequate chat with the user Dialog system can be used due to which it is famous and can make a log of the chats which is a good knowledge acquisition source for any kind of domain specific topic. Due to an AIML files which always gives the accurate and quick answers to the user. We can also perform multiple processing of both the messages, incoming and outgoing messages to happen without having to develop a waiting scenario or non-availability of server because of overuse or possible congestion by the core use of threads [6].

[7] Our chatbot will also use cloud platform services. So, we explore a paper that aims to find the most efficient cloud platform and most appropriate for implementing the chatbot. In today's world, different types of cloud-based platforms are available in the market which can be used for developing and deploying the chatbot such as Heroku, Microsoft Azure bot service, Microsoft bot framework, IBM Watson, Kore, Chatfuel, AWS lambda etc. but all the cloud-based platforms has some disadvantages like built-in Artificial Intelligence, conversion service, NLP, programming etc. To find the difference among all cloud-based platforms, we explore the paper which represents the differences among all cloud-based chatbot platforms with some constraints like built-in AI, completion time, setup time, complexity etc. There are two types of bots: Smart bots and command-based bots. To easily configure the chatbot, the cloud platforms give services like bot service or built-in cognitive service. The framework of chatbot consists of three sets of units: front end, back end and web hooks. The cloud platforms are compared based on some properties like Base plan price, RAM, Disk space, virtual CPU core, IDE support, server OS type etc.[7]

These previous related works provide information on how the chatbot evolves and which methods or algorithm are used to implement this. The table 1 given below is a brief description of all the related works:

Table 1: Related work

HexaBot-Library Based Chatbot	[1] It was built to explore library resources and build using Dialog flow. The methods used are pattern-matching, natural language processing, data mining [1].

FloristBot-Flower shop based Chatbot	[2] BPoint Tree method was used to make the searching process more efficient for answers with more accuracy by using one more data structure (DS) to the traditional BST algorithm. It uses AIML and BST. The FloristBot is developed using API.AI tool and C++ [2].
ML based Education System Chatbot	[3] This chatbot uses local database and web database. It uses techniques like machine learning, NLP, pattern matching, data processing algorithms [3].
College Enquiry AI based Chatbot	[4] Natural language processing (NLP) is used for parsing, tokenizing, stemming and filtering the content of the question [4].
Verbot	[5] It uses an engine called verbot. Verbot is developed using C# language and needs Microsoft .Net 1.1 or higher version for its execution. It uses pattern matching algorithm and achieved overall 70% efficiency. [5]
Entertainment Market Chatbot	[6]To emulate chat communication, a language model and computational algorithm was integrated by the architecture. It uses data-mining and improvement in machine-learning techniques, easy availability of corpora, robust language annotations [6].
Cloud Platform comparison	[7] The cloud platforms give services like bot service and built-in cognitive service which easily configure the chatbot. The cloud-based platforms are compared on properties like virtual CPU core, RAM, server OS type etc. [7].

IV. PROPOSED SYSTEM

In our proposed system, we are creating this chatbot by using Google DialogFlow API which provides us the implementation of Natural Language Processing. Using DialogFlow console we create intents and entities which are used to identify the flow and information from the given query.

We need to first create the UI for this chatbot by which users can have a wonderful conversation experience.

After creating the UI, we start connecting it to the backend using NodeJS where we need to implement the services, Account Handling, Conversational experience and creating Intents with webhook.

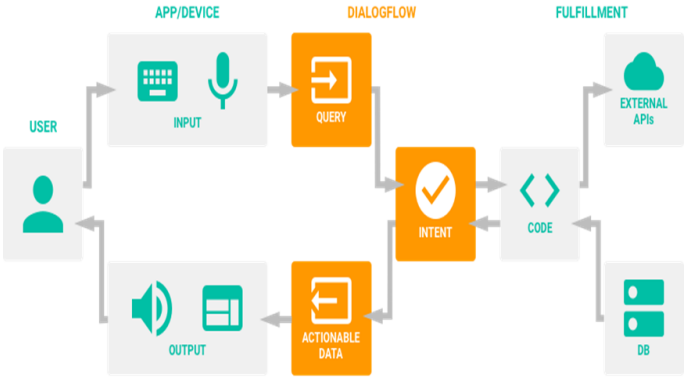

Fig 2. Proposed System Architecture

Now the Interactions will be performed with the Frontend and finally deploy project after the implementation of all the modules.

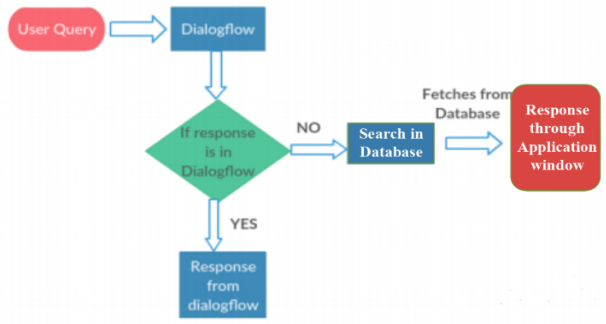

Fig 3. Selection of Response

2. CONNECT IT TO FIREBASE CLOUD FUNCTIONS (NODEJS)

- **a.** Add your service
- **b.** Account Handling
- **c.** Conversations Fulfilling
- **d.** Intents with a webhook

3. INTERACT WITH IT FROM FRONTEND ANGULAR APP

- **a.** Initial Setup
- **b.** Chatbot Component
- **c.** Chatbot

Fig 4. Working of Chatbot

4. DEPLOY THE PROJECT TO THE GOOGLE CLOUD USING GCP

- **a.** Deploy our chat application over the Google Cloud
- **b.** Use of Google Cloud Platform (GCP) , where we basically deals with different concepts of cloud computing
- **c.** Provide scalability and security
- **d.** Improve Performance

V. CONCLUSIONS

This Chatbot System is used to provide a great customer service experience among customers of various stakeholders so that they can make their profit and enhance their customer service. This chatbot can be helpful among many sectors such as Food Industry, Travel & Tourism, Food Ordering System, IT Industry and for all enterprises. This chatbot is implemented using Google Dialog Flow and deploy over Google Cloud which will first process the user query and then give an appropriate response to the user's query. It is an intelligence based system which is used to perform speech to text conversion and vice versa. Hence, our chatbot will reduce the human effort and can provide accurate response to user's query.

VI. FUTURE SCOPE

Chatbots are fully-functional and autonomous systems which are used mostly to solve the queries of customers. The future scope of this chatbot could include the profitable for big enterprises as well as provide many benefits for the business and larger enterprises. As with the help of AI based chatbots any enterprise can provide very rich conversational experience during customer support.

Therefore, AI based chatbot helps many organizations and enterprises to make their customer support automatic and the conversation experience will be more interesting just like human and provides their service for 24*7.

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