A Personal Intelligent Chatbot To Provide Medical Assistance To Patients

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Abstract- *Artificial intelligence is playing a key role in all the upcoming technologies. With the booming technology a conversational application known as chatbot is designed for medical assistance. Medbot as the application is named as many features accessible at one place like appointment booking, first aid and medicine knowledge, ambulance booking and tracking, maintaining a medical report and so on. Dialogflow, a chatbot framework is where the input data are feeded and trained. The server script is deployed in firestore and a NoSQL database from the same cloud platform is utilized. The application can be integrated in various social platforms like Google assistant, facebook, slack etc.*

Keywords- Intents, Entities, webhook, natural language processing, Rich messages, Actions and Parameters, fulfilment, contexts, events, dialogs

I. INTRODUCTION

Chatbot is a conversational application that runs with the pre trained data inputs and it employs a machine learning algorithm for the training of the data. A lot of applications are emerging daily for the chatbot. It has been accepted warmly for the commercial purpose. The ease of use and less cost as made it a important technology of the decade. Apart from the commercial sector chatbot can also be used wisely for medical sector too and MedBot is such an application. People now are not willing to go to the hospitals for the sake of time and cost. Buying medicines from medical shops on their own might sometimes lead to dangerous side effects. Also there is a issue of having the ambulance at emergency situations on time. It is also said hard for people to remember their medical history. MedBot provide all in one solution. With this application one can book an appointment with a specialist doctor in the nearest hospital, see their past medical history, call and track an ambulance, get first aid and medicines for different complaints which are suggested by the experts. There are various platforms for the development of chatbots namely Microsoft's Bot Framework, Dialogflow earlier known as api.ai, IBM Watson etc. In all the frameworks the flow is simple and the same. The user provides with different inputs and in the backend machine learning algorithm trains them periodically. A server side script is written by the developer for the user application and this code is deployed on to cloud storage and it is linked with the agent created. A bot can be created with this flow for any application and can be integrated with any social platform.

II. RELATED WORKS

Artificial Intelligence brought a change in technology where it moved the applications to the next level. In the earlier stages websites were used widely in transferring the information, then applications moved the technology in smart phones. But now the technology improved to Chatbot Assistants that provide any type of information from wide resources. In this work many research papers and Journals were analyzed to solve the work by using the technology. Divya Madhu et al. published their paper in

International Conference on Inventive Communication and Computational Technologies [1] worked on the Artificial Intelligence in predicting the diseases based on symptoms and provides medicines in the form of application. Kyo Joong Oh et al. published the paper on 2017 IEEE 18th International Conference on Mobile Data Management worked on chatbot assistance in providing Psychiatric Counseling in Mental Health Care service based on Emotion dialogue analysis [2]. Natural Language Understanding (NLU) is used to analyze the input provided by the user and detecting the emotions of the patients. Conversational services can be provided that helps user in communicating with the bots so the user retrieves the necessary information and can solve the problems. Open street map technology provided a support for applications, but advanced algorithm that finds the optimal routes to the nearest locations are implemented in Google Maps and Google provide a platform for map resources. Chatbots acquire the data from the firebase with the user permission to retrieve the user location and our finest algorithms based on Distance Matrix algorithms provided an effective way in identifying the nearest locations of the hospitals within the user location. Veton Kepuska et al. published a Journal on Next-generation of virtual personal assistants (Microsoft Cortana, Apple Siri,

Amazon Alexa and Google Home) worked on the virtual personal assistants to assists users by connecting the chatbots to the Internet of Things with home appliances [3]. This assistive technologies help users to access wide data that are retrieved from the servers and other cloud platforms

III. SYSTEM OVERVIEW

A. Intents and Entity creation:

Google Dialogflow provides developers a platform for creating chatbots in the field of artificial intelligence. The Dialogflow contains agents, intents, entities and fulfillments (like webhooks hosting through a cloud platform). We can create new agents and using the agents we can communicate to the user in the form of request and responses. These requests can be provided by the user and the Dialogflow which identifies the user's language using Natural Language Programming (NLP) which delivers the content what the user needs. It solves any type of problem by using the chatbot that we have developed in this work. We can create intents which are the requests provided by the user so that the machine learning algorithm that process using the Natural language programming understands and provide the necessary responses.

1. Agents:

An agent is the medium through which the user can interact with the application. The agent is created by the developer in the framework where several intents and entities are created. The agent has its machine learning algorithm to get trained with the data provided and it can also interact with the user in multiple languages as defined by the developer. It uses the NLP to understand what the user says further putting them under intent and getting the parameters.

2. Machine Learning in Dialogflow:

Rule- based and Machine Learning algorithms are used in the dialogflow framework to generate a confidence value for each and every phrase entered by the user. If the phrase is relevant to the trained data, then the confidence value will be higher than the threshold value and the result with most positive true value is returned as the response. If the value generated is less than the threshold value then it is understood that there are no relevant response trained for that particular input and the fallback intent with default response is triggered. The algorithm also has spell correction and detection of the words when user starts to type a particular word. This facility makes it easy for the users who are not strong with their spelling.

B. Server-side scripting

User queries are sent to the server in JSON format with the parameters in it, and the server sends the response in JSON format based on the backend coding. It is this backend work that is responsible for filtering out what the user desires and a proper response is generated with accordance to the parameters. The server side script creates a channel between user and the server, where user request, edit or even delete things from a database. The responses are generated through an API call Node.js is used in the proposed system. For large fulfilments the code has to be moved out in order to access multiple files using npm modules or advanced firebase features like environment config.

In such cases the scripted code has to be deployed on to the cloud storage so that it acts as the server where all requests come in and proper action is performed. In this code the actions are specified properly in order to call the intent mapped to it.

The web service receives a POST request from the dialogflow in the form of response to a user query matched with webhook enabled intents. The API structures the exchange of data between the database and dialogflow. The intents should be webhook enabled so that the link carrying the back end code is called through fulfilment. The dependencies are acquired by installing the node modules. Any further advancement can be included in it and can be deployed later.

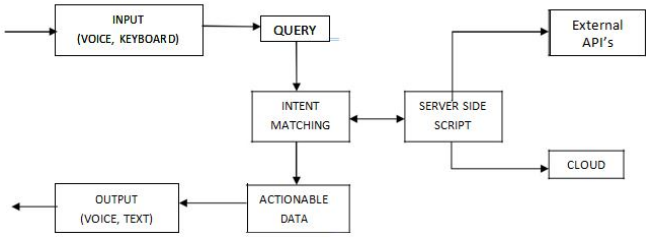

Figure 1: Dataflow Diagram

C. Deployment

The external code written by the developer has to be deployed to the cloud. Here the code is deployed to the firebase. This is done in order to access the firebase functions. Once deployment is successful a link to the function is generated which has to be used as the webhook in the fulfilment section of the agent. Any problem during the

deployment can be detected and the reason for the failure will be displayed in the logs in the firebase functions of the project.

D. Responses and Integrations:

1. Responses:

The user provides the query as input in the application and the bot recognizes the input and provides a valid response to the user. It can be either text response or custom payload. Text responses are the natural languages that are used for communicating with other users. In dialogflow when the user requires a response from the bot, it communicates to the user in a natural language. If the user wants rich messages as responses, dialogflow provides custom payload interface where the user can provide a json code for developing the response.

These responses are rich rather than using a normal text response. The response from the bot is in the form of textual format where the user can understand the reply which is obtained from the chatbot. The responses can be textual response and audio response using Natural Language Processing.

These responses that are provided by the bot are directly obtained as response from the firebase cloud. We can also obtain the response in the form of voice output and it can be useful for people who understand in their own language.

2. Integrations:

The chatbot can be integrated in many other platforms. Dialogflow provides an important feature of providing integrations with third party applications like integrating with a website, Google Assistant, Slack, Facebook, Kik, Microsoft Cortana, Twitter, Twilio, Line and Amazon Alexa. These integrations make the application to be used by any end user in different platforms. A user has an account in facebook then he can use the MedBot by using facebook messenger or the user has an account in Google then it can be directly used in Google Assistant where it supports Natural Language Processing and it identifies user input and replies in the audio format. It uses text-to-speech application integrated within the dialogflow to identify the user input. This integrations provides a different user experience and the application can be available in different platforms, so the users can use it different applications that is compatible in their phone.

E. Features

With Medbot users are provided with many features such as doctor appointment booking in the nearest hospital, with just few basics queries from the bot personal details of the patient are gained to book an appointment. The gathered data are sent to the firestore database which is accessed only by the hospital. The hospital management can manage the appointments based on the requests they have got. Calling an emergency ambulance and tracking them is made possible in Medbot. Users are also provided with facility of finding the nearest hospital to their current location and an optimal route to reach the same on time. This is done by tracking user's current location and finding the details of the hospitals nearby using google maps API. Image processing is also an added feature where the patient can take a picture of the infected area which can be processed by the chatbot and can provide the first aid process for the infected area. Doctors can view their appointments based on specific date which can be retrieved from the cloud.

IV. RESULTS AND DISCUSSIONS

An Experimental setup for an doctor appointment booking agent was created. After proper creation of intents and entities and the webhook being triggered in the fulfilment, the agent trains itself using machine learning techniques. Once agent training is complete the agent is integrated for the web demo for testing and results end up for forwarding request for doctor appointment booking as shown in Figure1, Figure2, and Figure 3 respectively

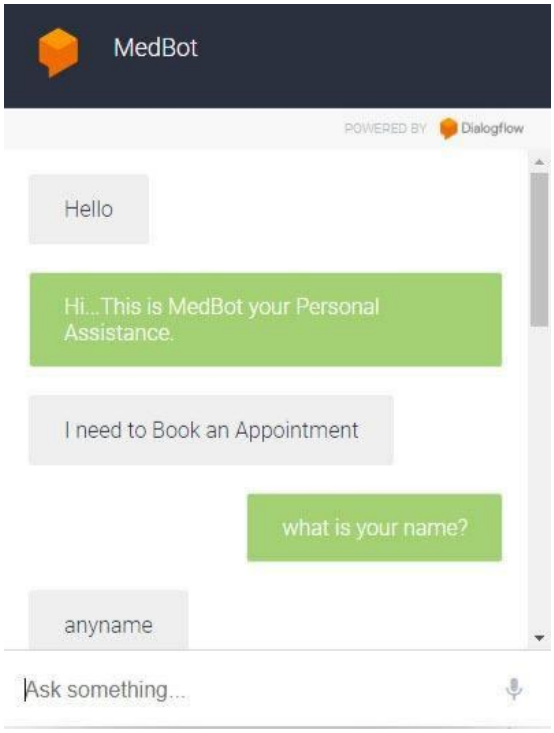

Figure 2

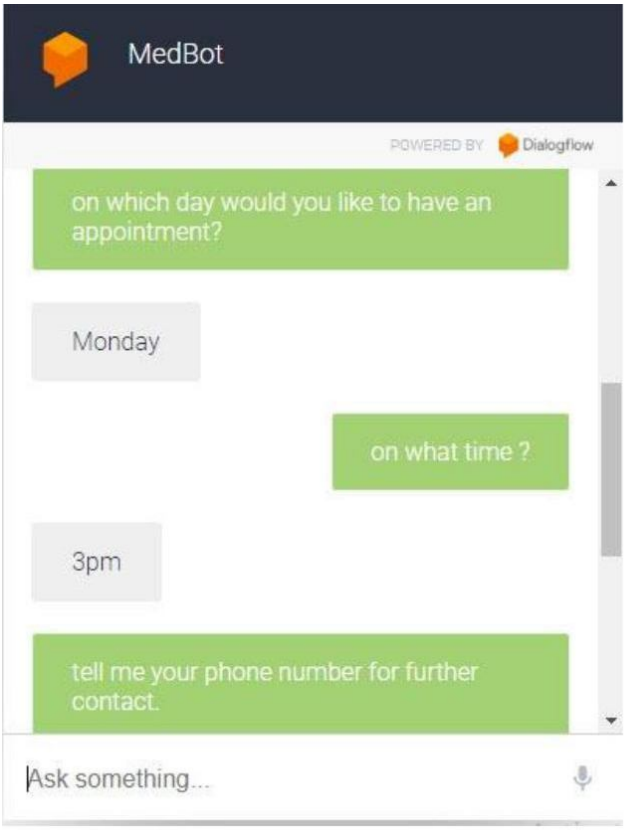

Figure 3

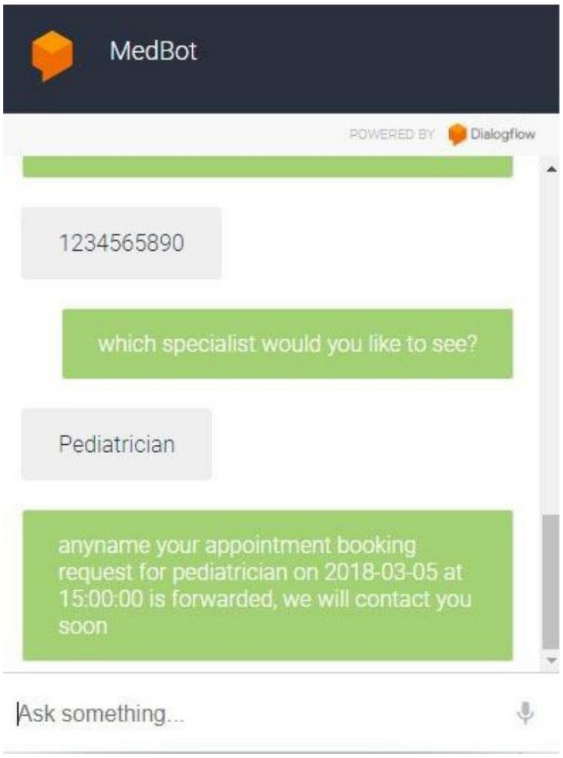

Figure 4 – Appointment request is forwarded

With successful testing of appointment booking the intent is completed, the agent next works for the hospital management where they can access the appointment request history from the database. The result of hospital management requesting for all the appointments is shown in Figure 4.

The appointment booking request from the user side and the appointment history request from the hospital management side share a common point, that is both intents have their data processed in a firestore database. Figure 5 shows how the user requests for appointment booking are stored in the database. This database is used for fetching the results for the hospital management's requests.

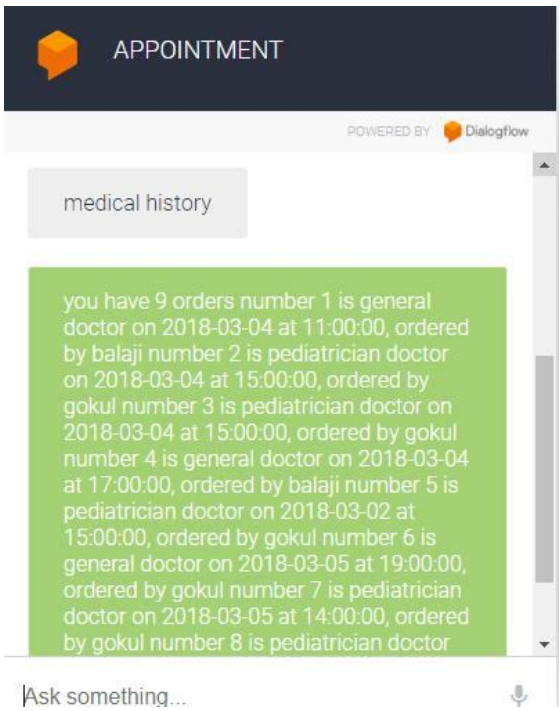

Figure 5 – Appointment History delivered

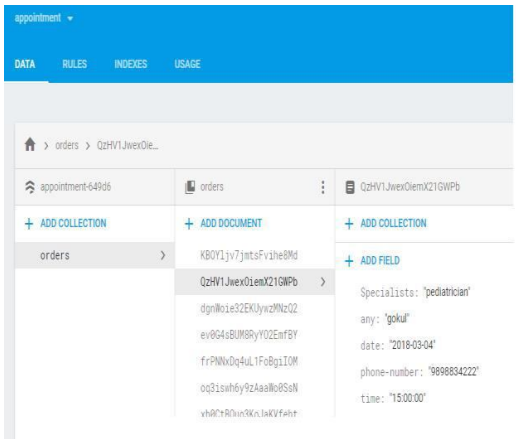

Figure 6 – Firestore Database

V. CONCLUSION

In this paper, an artificial intelligent chatbot for helping medically ill people is proposed. It is very important for each and every person to know about the medications they are undergoing as a small mistake may play with their life. With current advancement in technology treating complicated diseases may be possible but delayed treatment or improper first aids and misconception of medications are still taking lives of people. Medbot helps people deal with their basic to complicated problems on the healthcare. In future with even more advancements to technology, bots can even be ready enough to monitor the users heart rate and can send alert notifications during abnormalities. This could be useful foR elderly people left alone. Technology is always the companion for those left alone.

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