HEALTHCARE VIRTUAL ASSISTANT

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ABSTRACT

The Healthcare domain is always concerned about prevention, diagnosis, and recovery from an illness. As far as India is concerned the population is growing day by day to such an extent that people cannot take appointments and go for diagnosis especially in this COVID situation. In the field of technology, a suitable approach to deal with the situation was to develop a virtual assistant. A virtual assistant is a program which can understand human speech and act accordingly. So, in our scenario we developed a virtual assistant to diagnose diseases or illness in people with the help of machine learning. The concept of tress was used which gave appropriate results when specific parameters were encountered. The user gave his symptoms as an input with the help of python's speech to text library. We also developed an appointment booking system within the assistant to book appointment with the top-rated doctors on Google, for booking an appointment the body part which had problems was asked by the assistant than as soon as the email was specified. An email regarding the appointment was sent to the user's email box Python's smtplib library was used to send email. Thus, our objectives were achieved.

Keywords: Machine Learning, Speech to Text, Trees, SMTP, Appointment.

I. INTRODUCTION

The use of AI in day to day lives has increased to a great extent in today's world be it scheduling important meetings, organizing things systematically or automating mundane tasks for personal business and work. The technology used behind creating virtual assistants is quite robust which has decreased the workload and made it easy for carrying out multiple tasks at a time. The main idea behind having a virtual assistant in place of a chatbot is very much useful because of the factor that virtual assistants can cover major number of possibilities which include understanding human emotions well and giving precise responses as well as recognizing human speech and acting smartly. The impact of virtual assistant technology motivated us to develop a real-life assistant for the healthcare domain which can assist people at any point of time. Our concept uses machine learning to find the appropriate disease as per the given input symptoms. To further increase our accuracy, we have used the appointment booking system with a professional doctor to avoid any serious health hazards.

II. METHODOLOGY

Before starting with the main methodology used behind creating the project. The knowledge about components used and how things are going with the flow is necessary. Figure 1 shows the overall illustration of the assistant architecture. The components used have been listed shortly along with how it is working for our project. Summing up each module of the architecture at the end makes the assistant complete.
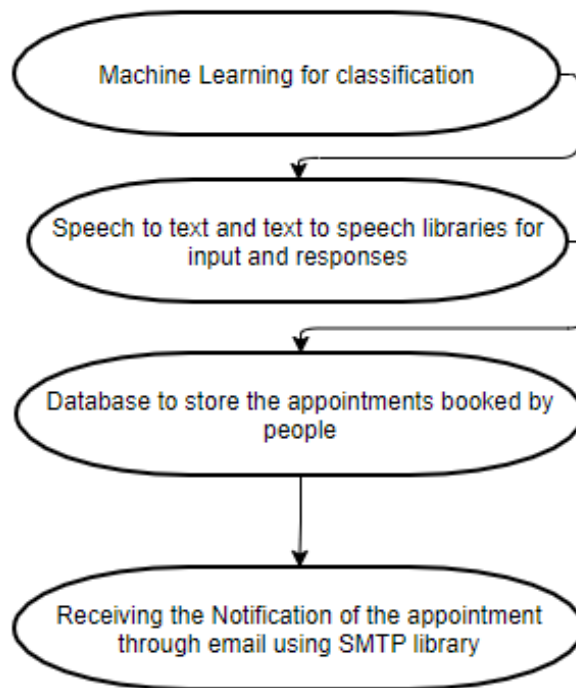
Figure-1: Main Architecture

The technology shown in Figure1 sums up the entire project apart from the components used to achieve each of them. Discussing about each of them in detail below:

Machine Learning

The concept of machine learning has been derived from Artificial Intelligence. Machine learning is basically making a system learn on its own rather than explicitly programming scenarios. A programmer can provide a set of data to a machine for which it can act with the help of certain algorithms. For our project we have used supervised learning algorithm which is decision trees. Supervised learning is based on providing the input data as well as the output data to the program. The appropriate output for an input is mapped as per the defined conditions.

How is Decision Trees doing the classification of diseases in the project?

A decision tree in machine learning is a supervised algorithm which learns on the basis of predictive modelling approach. In this project we have used the classification type of decision tree. The algorithm used behind decision trees generates a classifier model (in classification trees). The classifier model is useful to classify a data set and point out the actual class for that set of data. The decision tree is composed of a decision node, branches as well as leaf nodes. The decision node acts as the root for the tree where dataset is provided for further classification. The branches act as the decision attributes which point to the target condition. The leaf node is the outcome or the target condition which is to be addressed.

Let us look on how decision tree is working for our project:

In Figure2 The Disease node acts as the root for the tree. It contains all the attributes in the form of a predefined dataset to point to a possible condition. A root node can have 2 or more nodes as its branches. To be more accurate in the diagnosing process a greater number of parameters must be defined in the input to yield accurate results. We can see the input parameters such as "Loss of Smell"," Taste", "Difficulty Breathing" they act as attributes which point to the target condition that is Coronavirus. In case the person does not have all the possible conditions the assistant has been programmed well to ask for more symptoms from the user for accurate results. Even if the accuracy is hindered by little with the data it is covered in the appointment system.
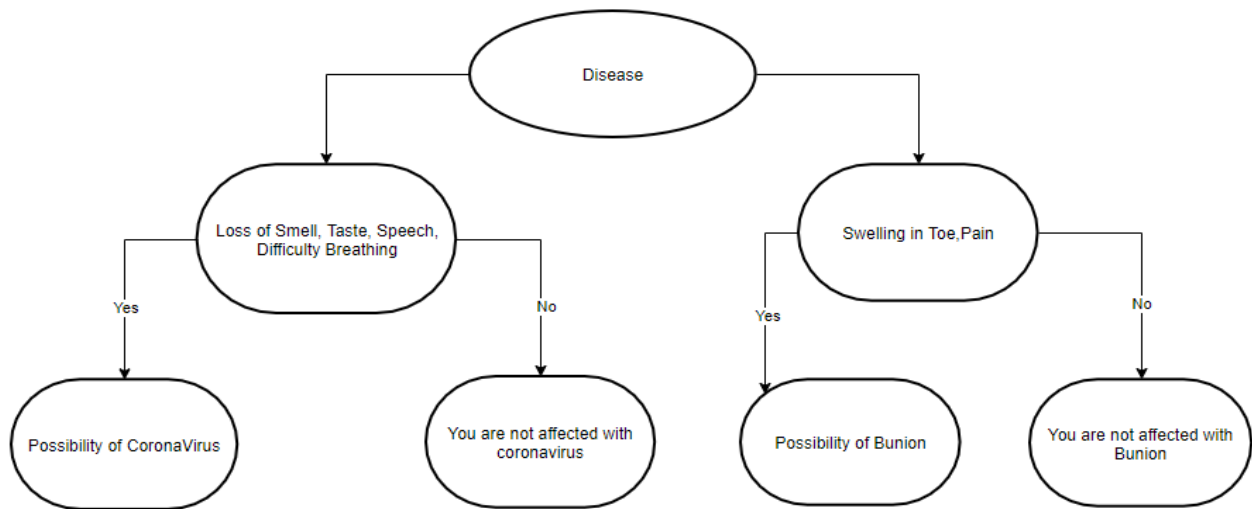
Figure-2: Classification Trees to identify a disease.

Speech to Text and Text to Speech library

Python Language has inbuilt libraries for both. The communication interface with the assistant mainly revolves around 3 core libraries they are speechrecognition, pyaudio and pyttsx3.

Speechrecognition library: The speech recognition library in python is generally used to recognize speech input which is given from the microphone. It can transcribe an audio file; it is also helpful in saving the audio file.

Pyaudio library: The pyaudio library is often used to play and record audio it is used more with speechrecognition library if there is a use of microphone. It is used for interfacing with the audio drivers.

Pyttsx3 library: The pyttsx3 is a text to speech conversion library. The pyttsx3 can work offline. It supports 2 voices male and female. The TTS engine it supports for windows is sapi5.

Appointment System

The implementation of the appointment system was necessary as the assistant would be of no use if it could only diagnose diseases. So, in order to achieve that decision trees were used for the classification process.
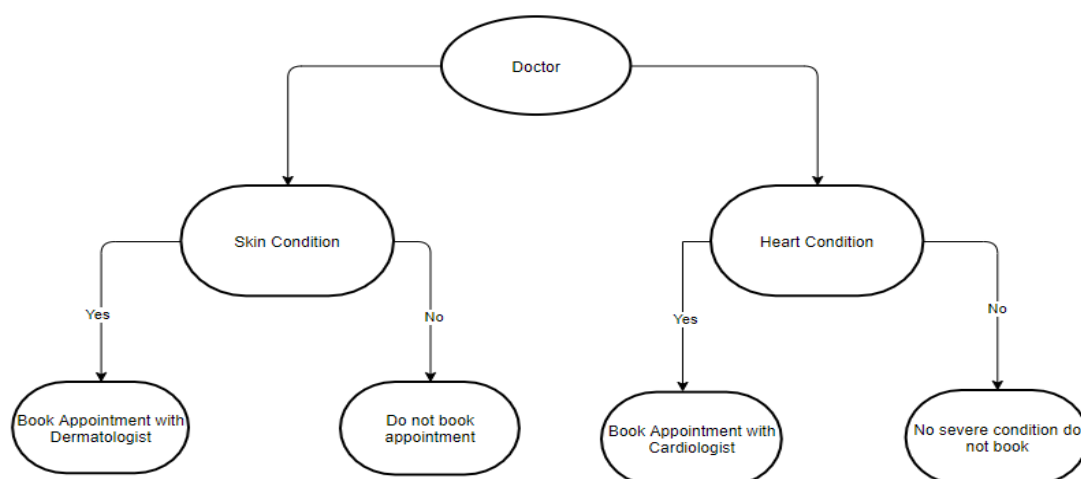

Figure:3 Classification Trees to identify the condition and book appointment

Figure 2 and Figure 3 are quite similar, the classification used in both cases are same. According to the condition the appointment is booked with the doctor specialized in that field.

XAMPP and phpMyAdmin (Database behind Appointment System)

Xampp offers various services such as apache, MySQL and phpMyAdmin. It is an open-source platform which provides a webserver. Where as phpMyAdmin uses interactive user interface to handle database operations. Regarding our scenario, a sample database named hospital was created in phpMyAdmin. The integration of the

database with our python code was done with the help of pymysql library. When the user provided the input through voice regarding their condition after the information which included name and email were specified the appointment was added to the database.

Token Number

The token number was a unique integer id which was given to the appointments in database for queuing purpose. The user would receive email with the token number mentioned in the message. He can then ask the doctor about the timings he should visit according to the queue.

Receiving Notification about Appointment through Email

The smtplib library defines a session object which can be used to send email to any internet machine with an SMTP or ESMTP listener daemon. The process of emailing in the project was possible with the help of python's smtplib library. The email message sent to the user contained hospital address and phone number with doctor's name. The user can than contact on the given phone number to know about additional information.

The contents covered thus sums up the actual methodology which was used behind creating the assistant.

III.   RESULTS

The following were the results which were obtained from the assistant as an output all of them point towards a certain functionality.

Figure:4 Identifying the disease based on the input symptoms.

Figure:5 Identifying the conditions and booking an appointment

Figure:6 The appointments list in the database with different token numbers (as t_no) for different doctor.
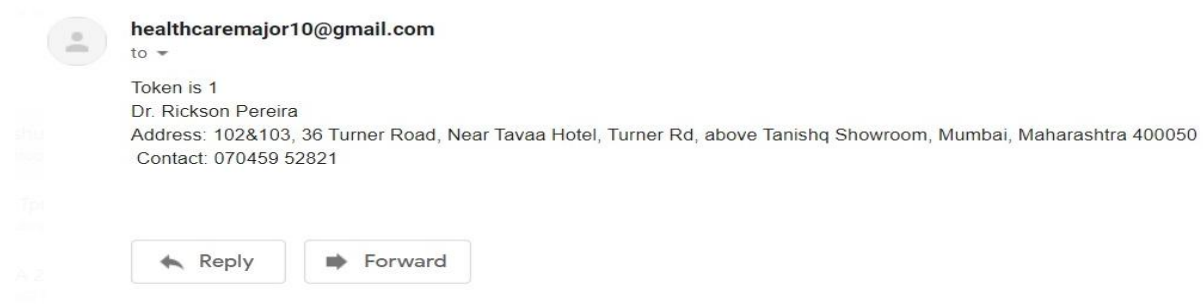

Figure:7 The received mail in the mailbox after booking the appointment.

IV.　CONCLUSION

The implementation of a virtual assistant to identify disease and book appointments can play a key role in the near future. Recognizing disease to a considerable rate is being one step closer of removing serious life conditions like death at an exceedingly early stage. Altogether the assistant developed for the project strives in the most efficient way to bring a change.

ACKNOWLEDGEMENTS

V.　REFERENCES

[1] J. Hu et al., "An advanced medical robotic system augmenting healthcare capabilities - robotic nursing assistant," 2011 IEEE International Conference on Robotics and Automation, 2011, pp. 6264-6269, doi: 10.1109/ICRA.2011.5980213.

[2] K. Ouchi, T. Suzuki and M. Doi, "LifeMinder: a wearable healthcare support system using user's context," Proceedings 22nd International Conference on Distributed Computing Systems Workshops, 2002, pp. 791-792, doi: 10.1109/ICDCSW.2002.1030864.

[3] T. Lee, J. Hong and M. Cho, "Biomedical Digital Assistant for Ubiquitous Healthcare," 2007 29th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, 2007, pp. 1790-1793, doi: 10.1109/IEMBS.2007.4352659.

[4] Moushumi Sharmin, Shameem Ahmed, S. I. Ahamed, M. M. Haque and A. J. Khan, "Healthcare aide: towards a virtual assistant for doctors using pervasive middleware," Fourth Annual IEEE International Conference on Pervasive Computing and Communications Workshops (PERCOMW'06), 2006, pp. 6 pp.-495, doi: 10.1109/PERCOMW.2006.63.

[5] H. S. Ahn, M. H. Lee and B. A. MacDonald, "Healthcare robot systems for a hospital environment: CareBot and ReceptionBot," 2015 24th IEEE International Symposium on Robot and Human Interactive Communication (RO-MAN), 2015, pp. 571-576, doi: 10.1109/ROMAN.2015.7333621.

[6] U. Bharti, D. Bajaj, H. Batra, S. Lalit, S. Lalit and A. Gangwani, "Medbot: Conversational Artificial Intelligence Powered Chatbot for Delivering Tele-Health after COVID-19," 2020 5th International Conference on Communication and Electronics Systems (ICCES), 2020, pp. 870-875, doi: 10.1109/ICCES48766.2020.9137944.