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Project Title :

Chatbot for Healthcare System Using AI

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Abstract

To live a good life health care is vital factor for individuals. But it is not so easy to consult the doctor in case of any health related issues. The proposed idea is to create chatbot for healthcare as virtual assistant using Artificial Intelligence. Artificial intelligence integrated healthcare chatbot which will diagnose and provides the common health issues details before consulting a doctor. Healthcare chatbot system will use natural language processing and neural networks to train the medical database. To reduce the healthcare overall costs and improve accessibility to medical knowledge the healthcare chatbot is built. There are certain chatbots are existing that acts as medical reference books that helps the patients to know additional information about their disease and helps to improve their health. This chatbot system engages with patients using text-to-text conversation about their health issues and provides the personalized diagnosis based on their symptoms. Hence, individuals will have the knowledge about their health status and will get to know about right treatments.

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Chapter – 1

Preamble

1.1 Introduction

Artificial Intelligence is based on how any device perceives its Environment and takes actions based on the perceived data to achieve the result successfully. It is the study of intelligent agents. Artificial Intelligence gives the ability of thinking and behaving like humans to a computer. A chatbot is also known as a talkbot, chatterbot, Bot, Interactive agent etc.is a computer program which conducts a conversation via voice or text methods and thereby it acts as a conversational partner rather than humans. For various practical purposes like customer service or information acquisition, healthcare chatbot is being used now a days. Mostly chatbots uses natural language processing for interpreting the user input and generates the corresponding response but certain simpler systems searches for the keyword within the text and then provides a reply based on the matching keywords or certain pattern. Trending, chatbots are part of virtual assistants such as Google Assistant, Siri, and Alexa are being used by many organizations' apps, websites, and on instant messaging platforms. Non-assistant applications include chatbots used for entertainment purposes, for research, and social bots which promote a particular product, candidate, or issue. Chatbot's are such kind of computer programs that interact with users using natural languages. For all kind of chatbots the flow is same, though each chatbot is specific in its own area knowledge that is one input from human is matched against the knowledge base of chatbot.

1.2 Problem Statement

a. Increasing individual healthcare expenses: This is the most common issue in healthcare sector for consulting a healthcare professional diagnosis and medication cost are too high.

b. Real time health monitoring: There is not any system available that will monitor our health in real time because less number of healthcare workforce that leads to lack of personal assistance of the patient health

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Chapter – 2

System Design

2.1   Technology selection

We used the following tools to implement the project -

- o   Python + libraries
- o   JavaScript
- o   Chatterbot, a conversational built-in dialogue box
- o   Natural language processing

2.2 Python

Python is an interpreted, high-level, general-purpose programming language. It provides good support with a lot of modules which could be used as a cookbook to use and implement to in further. It gets integrate with functionalities of AI quite well.

2.3 JavaScript

JavaScript (JS) is a lightweight interpreted and much needed tool in our web application as we want the quick response to the actions like send button. It is also important as we are implementing chatbot with web speech API inside the javascript.

2.4 Chatterbot

Chatterbot is a conversational dialog engine based on machine-learning algorithms. Chatterbot is built in Python which generates responses based on collections of already known conversations. The language independent design of Chatterbot be trained to speak any language. It is simple and easy to use for building a chatbot.

2.5 Natural Language Processing

Natural Language Processing (NLP) is the study of computer programs to understand human Language. The ultimate goal of NLP is to read, translate, understand and make sense of the human languages. Natural language processing will be used to understand the input (syntax) given by the user for automatic analysis and representation of human language that machine can understand. We will use datasets to train the model. It will perform the sentimental analysis of trained datasets and will diagnose the diseases based on input symptoms.

2.6 Numpy

NumPy is a Python library used for working with arrays. It also has functions for working in domain of linear algebra, fourier transform, and matrices. NumPy was created in 2005 by Travis Oliphant. It is an open source project and you can use it freely. NumPy stands for Numerical Python. In Python we have lists that serve the purpose of arrays, but they are slow to process. NumPy aims to provide an array object that is up to 50x faster than traditional Python lists. The array object in NumPy is called ndarray, it provides a lot of supporting functions that make working with ndarray very easy. Arrays are very frequently used in data science, where speed and resources are very important.
NumPy is a Python library and is written partially in Python, but most of the parts that require fast computation are written in C or C++.

2.7 PyTorch

PyTorch is an open-source Torch based Machine Learning library for natural language processing using Python. It is similar to NumPy but with powerful GPU support. It offers Dynamic Computational Graphs that you can modify on the go with the help of autograd. PyTorch is also faster than some other frameworks. It was developed by Facebook's AI Research Group in 2016.

2.8 Regular Expression

A Regular Expressions (RegEx) is a special sequence of characters that uses a search pattern to find a string or set of strings. It can detect the presence or absence of a text by matching with a particular pattern, and also can split a pattern into one or more sub-patterns. Python provides a re module that supports the use of regex in Python. Its primary function is to offer a search, where it takes a regular expression and a string. Here, it either returns the first match or else none.
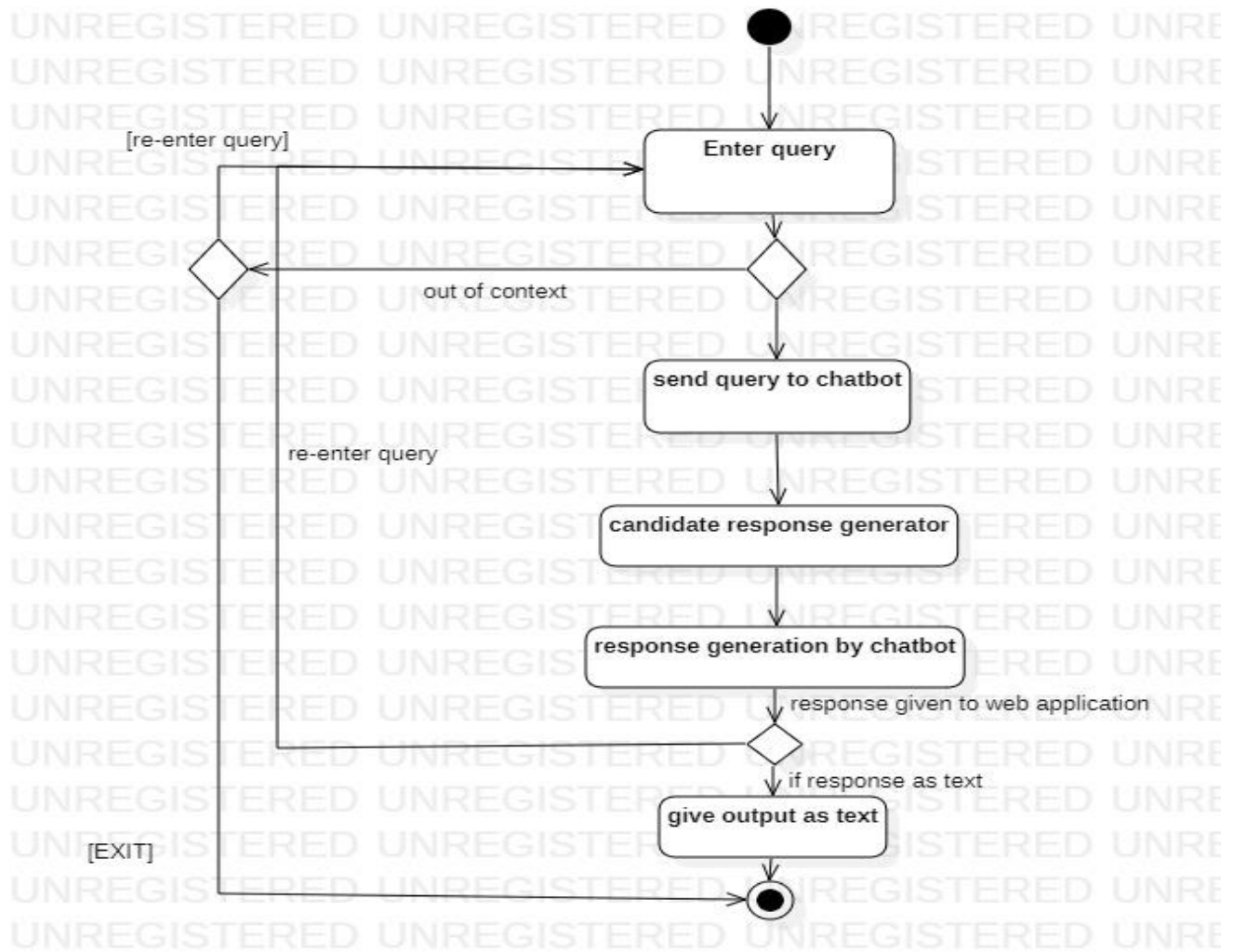
2.8 Activity diagram:

Fig. 2.1 Activity diagram

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Chapter – 3

System Requirements Specification

3.1 Functional Requirements:

Hardware Requirements
- Pentium Processor IV or Higher
- Min 10 GB HDD
- RAM 512 MB or Higher
- 2.4 GHz or faster Processor

Software Requirements
- Python + libraries
- JavaScript
- Chatterbot, a conversational built-in dialogue box
- Natural language processing

3.2 Non Functional Requirements:

Performance Requirements:
- The formats of the scanned copies should be in the standard format
- Should have a training error of as low as possible

Software Quality Attributes
- Robustness
- Reliability
- Better learning methods
- Acquiring good accuracy results

Chapter – 4

Methodology and Implementation

4.1 Methodology

4.1.1 We have trained a chatbot using Chatterbot. We have trained the bot to identify certain types of keywords in order to recognize the user's input. This information is then forwarded to the backend.

4.1.2 The chatbot is connected to the backend, libraries and technologies that allow you to build a web application. This chatbot can be used in web application, a blog, a wiki or go as big as a web-based calendar application or a commercial website. Every time the chatbot performs an action, it is done in the form of a request. All the requests managed by this application, which also handles the frontend.

4.1.3 As the web framework is the interface between the chatbot and the backend, the backbend's task is to translate it to an action in the database. Again, this part is performed using Python code.

4.2 Implementation

train.py – This file used to train the data. It uses the chatterbot trainer. All trained data are located in file named. It first check for the file and then update the contents of the file. The database is hosted using SQLite. This allows easy store and handling of the database. There are tables in the database, with an appropriate structure parallel to that in a disease and symptoms. All operations on the database is done using Python commands using a connector library

chat.py - A Chatbot is an Artificial Intelligence-based software developed to interact with humans in their natural languages. These chatbots are generally converse through auditory or textual methods, and they can effortlessly mimic human languages to communicate with human beings in a human-like way. A chatbot is considered one of the best applications of natural languages processing. When a user inserts a particular input in the chatbot (designed on ChatterBot), the bot saves the input and the response for any future usage. This information (of gathered experiences) allows the chatbot to generate automated responses every time a new input is fed into it. Over time, as the chatbot indulges in more communications, the precision of reply progresses.

Chapter – 5

Software Testing

5.1 Turing test

It is the most standard test which is being done in the chatbot. Even through most of the chatboats which are currently be seen now days can't pass the turning test completely but it gives the somewhat idea about the working and errors. Mostly it gives idea about its answers and patterns, how it is behaving, what type of in appropriate or wrong responses does it give. Most basic and common feature it test is humanity and intelligence.
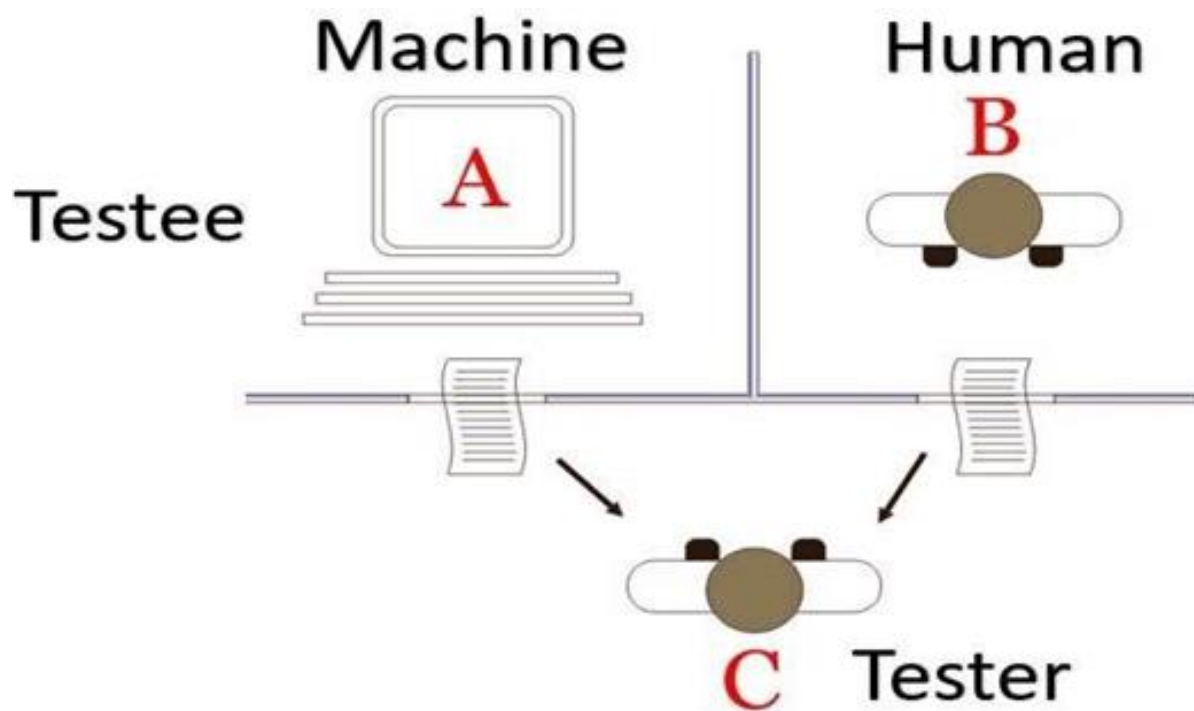

Fig. 5.1 Turing Test

Imagine a game of three players having two humans and one computer, an interrogator (as human) is isolated from other two players. The interrogator job is to try and figure out which one is human and which one is computer by asking questions from both of them. To make the things harder computer is trying to make the interrogator guess wrongly. In other words computer would try to indistinguishable from human as much as possible.
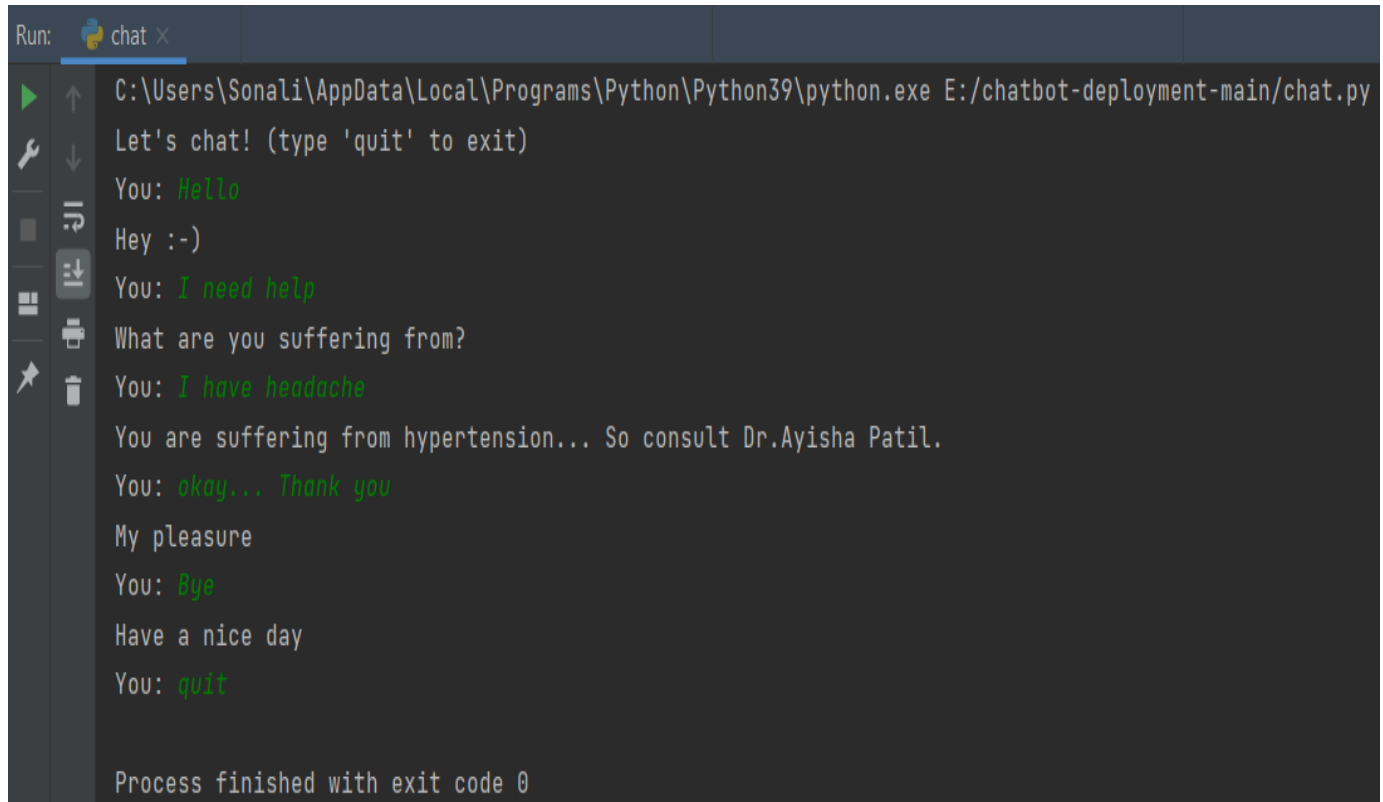


```
Run:    chat ×
    C:\Users\Sonali\AppData\Local\Programs\Python\Python39\python.exe E:/chatbot-deployment-main/chat.py
    Let's chat! (type 'quit' to exit)
    You: Hello
    Hey :-)
    You: I need help
    What are you suffering from?
    You: I have headache
    You are suffering from hypertension... So consult Dr.Ayisha Patil.
    You: okay... Thank you
    My pleasure
    You: Bye
    Have a nice day
    You: quit

    Process finished with exit code 0
```

Fig. 5.2 project demo

We have conducted Turing test for our chatbot as shown in above figure, the responses by our chatbot varies person to person how it interpret, respond and judge this chatbot.

If our chatbot doesn't know, it will deflect – change the subject, ask an unrelated question, give a canned or cagey response. Which, in real world, works decently well in human-human dialogue as well.

Chapter – 6

Code

https://colab.research.google.com/drive/1Rwsp_Go0UWpbYDFgzaKMd8jeKbIFozLn

Chapter – 7

Conclusion

Overall we feel that working on this project provided us with a great learning experience. our favourite part of this project was working on an area of computing that is really starting to grow and break into the mainstream market. With so many companies getting on board by creating their own chatbots, in a few years we will see it as an everyday thing. Regrettably, we feel that we did spend a lot of time working with chatterbot python library before I moved on to Bot Framework, we feel that if we had have been working with Bot Framework from the start, we would've achieved a lot more. In the future, we will remember to be realistic with the goals we set ourselves and to explore every available option to us before committing to one framework. Although this project was great to work on, we are disappointed that we did not get to implement any of the security features that we have learned about in my other modules completed in previously. We have learned a lot in the security aspect of computing from our other modules but it has been a learning experience developing this application as it touched on areas that we have never worked with before which gave me a challenging but beneficial experience.

References

[1]. Gillian Cameron, David Cameron, Gavin Megaw ,Raymond Bond,MauriceMulvenna ,Siobhan O'Neill, Cherie Armour, Michael McTear,"**Towards a chatbot for digital counselling**",*Journal of Medical Internet Research, 4(1), pp. e3.*

[2]. HameedullahKazi,B.S. Chowdhry,ZeeshaMemon, "**MedChatBot: An UMLS based Chatbot for Medical Students**", *International Journal of Computer Applications (0975 – 8887)Volume 55– No.17, October 2016.*

[3]. https://github.com/aryanveturekar/Health-Care-Chat-Bot

[4]. https://github.com/itachi9604/healthcare-chatbot

[5]. https://github.com/arvindsis11/HealthCare-Chatbot