HOSPITAL MANAGEMENT SYSTEM WITH CHATBOT

Nitta Sree Himaja (MCA Scholar), B V Raju College, Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh, India, 534202.

V. Sri Valli Devi, B V Raju College, Vishnupur, Bhimavaram, West Godavari District, Andhra Pradesh, India, 534202.

Abstract

Healthcare is very important to lead a good life. However, it is very difficult to obtain the consultation with the doctor for every health problem. The idea is to create a medical chatbot using Artificial Intelligence that can diagnose the disease and provide basic details about the disease before consulting a doctor. This will help to reduce healthcare costs and improve accessibility to medical knowledge through medical chatbot. The chatbots are computer programs that use natural language to interact with users. The chatbot stores the data in the database to identify the sentence keywords and to make a query decision and answer the question. Ranking and sentence similarity calculation is performed using n-gram, TFIDF and cosine similarity. The score will be obtained for each sentence from the given input sentence and more similar sentences will be obtained for the query given. The third party, the expert program, handles the question presented to the bot that is not understood or is not present in the database.

Keywords:-Chatbot, Healthcare, Artificial Intelligence, Virtual Assistance, TFID, N-gram

1. INTRODUCTION

An AI chatbot is a computer program that simulates human communication. It is a piece of software that interacts with a human through written language. It is often embedded in web pages or other digital applications to answer customer inquiries without the need for human agents, thus providing affordable effortless customer service. Chatbots based on Machine Learning make an AI chatbot that is very capable of having an organic conversation with the user and answering their queries. Chatbots make use of the data given to them and using different training algorithms they can answer the queries in the best way possible. In our proposed system we create a conversational chatbot that is integrated into a hospital website. It is trained using Machine Learning algorithms and acts as a very efficient interface between the user and the application. There is no predefined format for the users to ask their queries in, the chatbot manages to answer the query in the best possible way. Users have the flexibility to raise a query both in text and speech format. With this chatbot, users have access to hospital information, doctor availability, diagnostics, and other related data. They are navigated to different pages according to their requests which makes it easier and faster for them to explore. They can book appointments, and identify the problem by specifying symptoms to try to know about it beforehand, doing this they can take any required precautionary measures and book an appointment with the doctor as soon as possible.

2. LITERATURE REVIEW

A literature gives overview of previous related works in the current domain. With the Literature review, it can bring focus on area of research and broaden your knowledge of the domain. In the paper by Mamta Mittal [1], Algorithms such as Gradient descent method, Natural Language Processing (NLP), and feed-forward neural network (FNN) are used to create the chatbot. Gradient Descent (GD) is a cost-minimization echnique that examines the coefficients of a function (f). It is a key optimisation approach for determining the minimal cost function. The model may be conveniently stored in memory with little noise using the GD technique. Computational linguistic rule-based human language modeling is combined with statistical, deep learning models and machine learning in NLP. These technologies work together to allow computers to analyze human language in the form of text or speech data and comprehend its entire meaning, including the speaker's or writer's purpose and mood. This chatbot answers questions about hospital information, such as specialist availability, OPD hours, room registration, bed capacity, doctor availability and emergency information, among other things. The suggested chatbot acts as if it were a genuine hospital receptionist, assisting users. It offers consumers complete medical support 24/7. In the paper by Rohit Binu Mathew [2], KNN (K-nearest neighbor algorithm) and NLP (Natural Language Processing) algorithms are used to create the chatbot. The K-Nearest neighbor method is one of

the Supervised Learning techniques and is one of the most popular Machine Learning algorithms. KNN works by classifying new data into most similar class label. The created chatbot application is an android application in which the user may tell the chatbot about their symptoms, and the chatbot will then tell them what health measures they should take. In the paper by Harsh Mendapara [3], the backend of the chatbot is written in Python, while the user interface is created using HTML, CSS, and JavaScript. Chatterbot, a natural processing library, is used to communicate between the user and the system. Text analysis is used to apply natural language processing. The application is hosted on a localhost server, which responds to user inquiries with relevant information. On the localhost server, the healthcare assistant's frontend interface is presented, and it is ready to address patient symptoms based on a certain ailment. The health assistant will collect certain personal information from the user at first, which will be saved in the database. User queries are entered into illnesses such as headaches, coughs, and colds. A separate data file is prepared for a doctor's appointment. The chatbot will next ask the user a question in which the user is expected to address health-related issues. If the patient has a high temperature, high bp (blood pressure) or low bp then the chatbot will prescribe the necessary medicine. In the paper by Siddhi Pardeshi [4], Long Short-Term Memory (LSTM), Natural Language Processing (NLP), Hybrid Emotion Inference Model (HEIM), Pattern Matching Algorithm and Naive Bayes Algorithm are

some of the chatbot design techniques covered. Natural language processing allows machines to take in input, break it down, retrieve its meaning, determine suitable action, and respond to users in natural language. Long Short-Term Memory (LSTM) is a Artificial Recurrent Neural Network (RNN). LSTMs are useful not just for processing single data inputs such as photos, but also for processing full sequences of data such as voice or video. The LSTM algorithm's primary tasks are handwriting identification and speech recognition. The most popularly used algorithm in chatbots is pattern matching algorithm. This Algorithm is basically a database that contains questions and corresponding answers. Patterns are like the names to the questions, whereas templates identify responses/answers. The response to this query is made up of Artificial Intelligence Mark-up Language (AIML) tags. Patterns (questions) and templates (answers) are stored in a tree structure. Questions are on the branches, and responses are at the nodes, thus anytime a user asks a question, the query is first searched for an answer term by term, and then the specific answer is fetched from the node. Another most popular algorithm used in chatbots is Naive Bayes. Tokenization comes first in this process, followed by stemming. Tokenization is the process of breaking down a phrase into individual words called tokens. The stems are then added to each token. For example, the sentence "it is a giant lion" is tokenized and then stemmed as "it" ,"is" , "a", "giant" and "lion". The following step is to provide

training data. This information is saved in the form of lists or dictionaries, with class and sentence as properties in the dictionary. In the paper by Lekha Athota [5], N-gram, which is a series of N words, is used to construct the chatbot application. So, for example, "Final demo" is a 2-gram (a bigram), "This is a final demo" is a 4-gram, and "Good to go" is a 3-gram (trigram). The TF-IDF (Term Frequency-Inverse Document Frequency) which works by examining whether the word belongs to a document in a large collection of documents. This can be examined by multiplying two metrics: the word's inverse document frequency over a collection of documents and the number of times a word occurs in a document. It's used to get the keyword out of the user query. To get the best response for the inquiry, each term is weighted down. The Web-interface is designed for users to enter their query. The programme is enhanced with security and effectiveness modifications that ensure user protection and integrity when getting answers to queries. This chatbot assists users with basic health information. When a person initially visits the website, they must register before asking the questions to chatbot. If the answer is not available in the database, the system employs an expert system to respond to the queries. In the paper by Dammavalam Srinivasa Rao [6], an AI chatbot for college activities is developed using Deep Neural networks. The data regarding college activities is being collected in the JSON format and Bag of word technique is used in preprocessing of data. Gradient Descent is used for optimizing the model to process the patterns

and give best possible response to the question asked by the user. pyttsx3 python library is used for speech recognition to enable users to give input questions using voice. The model accuracy is found to be around 93 percentage for 1200 epochs of training the model.

3. EXISTING SYSTEM

In all the existing systems, the scope is divided and they provide very few features at a time. Few chatbots only provide appointment booking functionality only and also may not include voice inputs from the users. Some bots provide disease diagnosis but can't provide medication and navigation through a complex hospital website. There are smaller number of chatbots integrated to hospital website that provides all the necessary contents and features.

4. PROPOSED SYSTEM

The proposed system focuses on integrating all basic features in one place in an application and powering it with an AI chat bot further adds new functionalities like easy navigation, access to data on doctors, diagnostics information, symptom analysis, precautionary or instant medication suggestions and appointment booking, all these in a single application. Further, considering people who cannot write fluently, those with special needs and those in emergency situations, both voice and text input formats are accepted by the chatbot. We are building the website using Flask, which contains Login and registration page, dashboard of website, appointment booking and viewing pages and also the animated chatbot button at the end of every page of the website. Speech enabled chatbots

provide higher level of interactivity and usability. User can either give their input using text or speech and similarly chatbot is able to give its response by either text or voice. In our project, this process of conversion between text and speech is done by using speech_recognition and pyttsx3 python modules. a) Voice Input by User (Speech to Text): Using systems inbuilt microphone live audio input can be transcribed using Google's Web Speech API (recognize_google()).By using adjust for ambient noise function we can set the engine to listen to ambient noise for some time period(here 2 seconds) and adjust energy threshold accordingly. If speech Recognizer unable to detect the speech correctly, respective error messages will be given as response. b) Voice Output by Bot (Text to Speech): Pyttsx3 is a Text to Speech Conversion Python Library. Using pyttsx3.init() an engine instance will be created for which we can set various properties like voice rate, volume level and also voices (male or female). We can directly pass the text that need to be converted to voice to this engine and output will be voice saying the text accordingly. User gives a question to interact with the chatbot. After that, a model developed with LSTM analyses the user query. LSTMs are a kind of recurrent neural network that, as opposed to just passing its result into the following section of the network, plays out a progression of math tasks to work on its memory. There are four "gates" in an LSTM. They are forget gate, remember gate, learn gate, and output gate.

5. SYSTEM DESIGN

Doctor Patient Portal

In this project as per your requirements we have developed 3 modules

1) Admin module: admin can login to system by using username and password as 'admin' and 'admin'. After login admin can add Doctor Details and give login data to doctor. Admin can view doctor details, appointments, organ donor details, feedback and patient details

2) Patient Module: patient can signup with the application and then login to application. Patient can view their own details, book and cancel appointments, view appointments, donate or search organs and can give feedback

3) Doctor Module: doctor can login to system by using login details given by admin and then can view won profile, view appointments and generate prescription.

Each doctor will work in 3 hours slot and in 3 hour 6 patients can be taken and after 6 appointments system will display 'Already Booked' message.
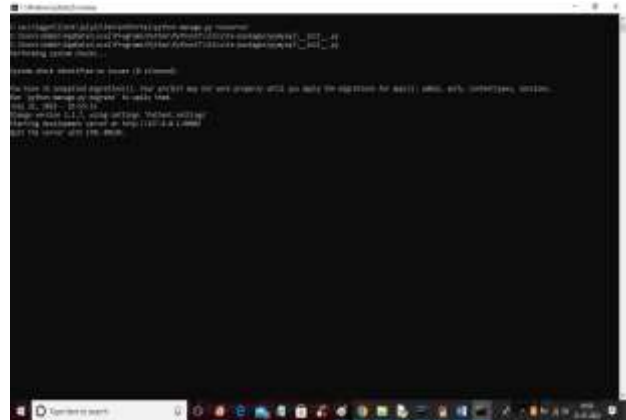
To run code follow below steps

Install python 3.7.0 and then open command prompt and install packages using below commands

pip install PyMySQL==0.9.3

pip installDjango==2.1.7

Now double click on 'runServer.bat' to start DJANGO server and get below screen
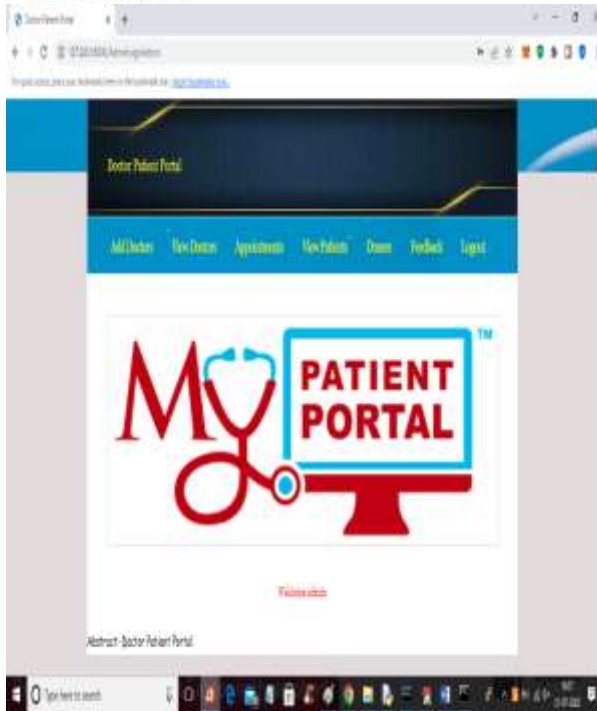

In above screen server is started and now open browser and enter URL as 'http://127.0.0.1:8000/index.html' and press enter key to get below screen

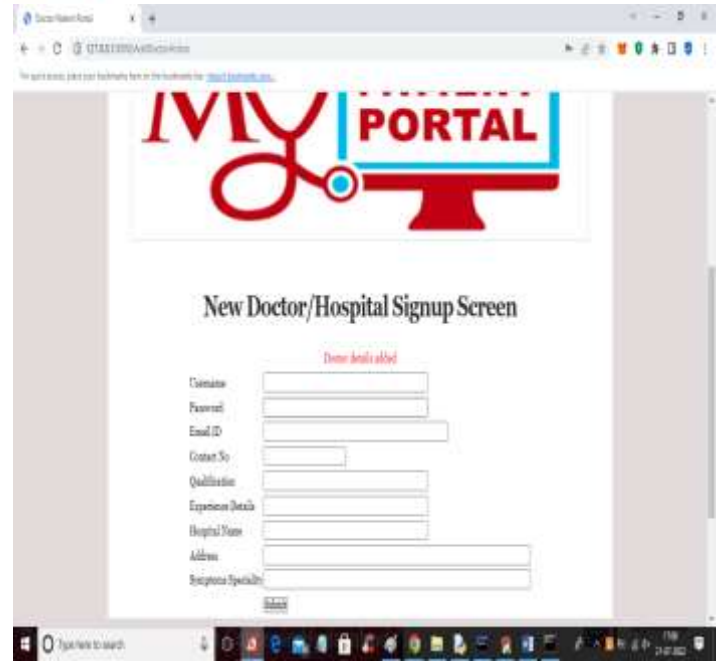In above screen click on 'Admin' link to get below login screen

In above screen admin is login and after login will get below admin home screen
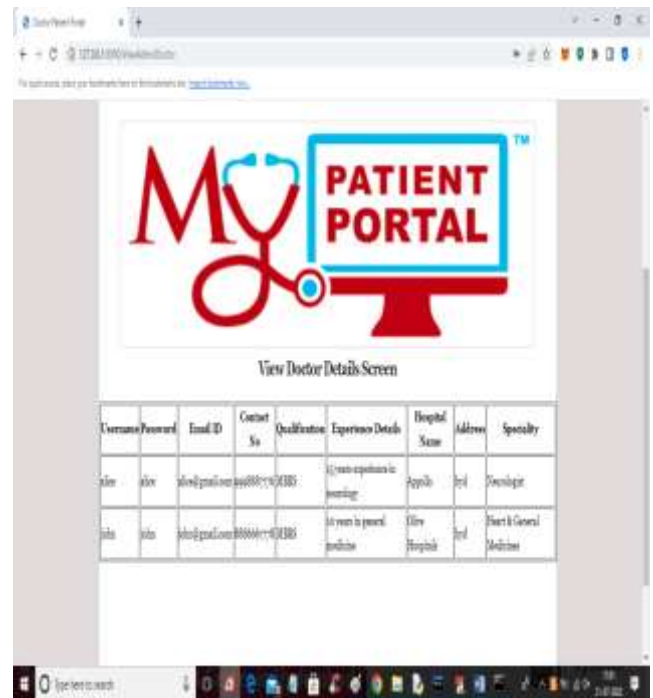
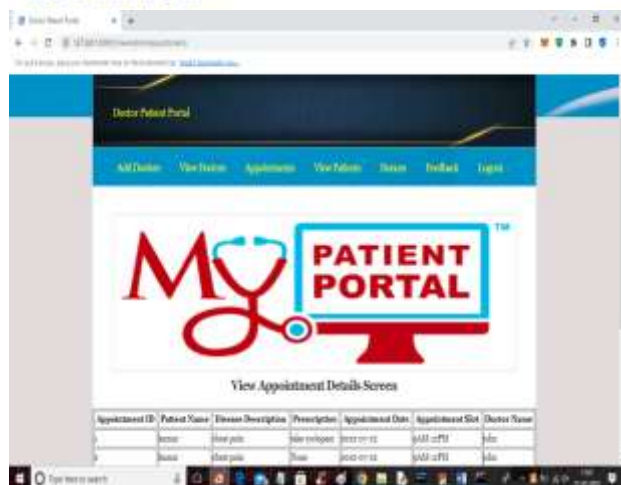In above screen admin can click on 'Add Doctor' link to get below screen

In above screen admin is adding doctor details and then press button to get below output

In above screen doctor details added and now admin can click on 'View Doctors' link to view all available doctor details

In above screen admin can see all doctor details and now click on 'Appointments' link to view all appointments

View Appointment Details Screen

In above screen admin can see appintments details and if prescription not given by doctor yet then it will display message as 'None' else display given prescription. Now click on 'View Patients' link to view all patients details

6. CONCLUSION

The main objective of our hospital management system chatbot is to automate repeated tasks in a user-friendly manner such that it will provide hospital employees to focus on important tasks and also to enable fast response for customer instead of waiting for employee to solve their queries as user can interact with bot anytime. Enabling Speech recognition in our chatbot also helps customers to have a simple and fast conversation. The user interactive UI provides better navigation through the website. We have tested our application by trying various kinds of profiles. The results were satisfactory.

7. REFERENCES

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