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Intelligent Chatbot for Healthcare Portal

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ABSTRACT: The search engine is one of the tools where people entered many texts and get results back in the lists. After getting a list user needs to search the specified results in that. So the best option is the chatbot. A chatbot is connected to every individual people and gives the specified answer using Natural Language Processing. Medical chatbots have a broad future ahead because the future era is of messaging and conversational applications. People will send more messages to others if they how far people are, they can have this medical conversation. Whenever a patient strikes up a conversation with a medical representative who may sound human, but underneath is an intelligent conversational machine - we see a healthcare chatbot in the medical field in action. Web portals with integrated chatbots are being popular day by day. Chatbots have already gained a grip in retail, news media, social media, banking, and customer service. Many people involved with chatbots every single day on their smartphones without even perceive. In the current situation of covid-19 people needs an end-to-end application where they can easily get disease prediction at home with good accuracy this can be done by using machine learning algorithms, also they can book an appointment with the specified doctor as well. Because in these tough times people most people prefer to do most of the things from home and were scared to go to the hospital for normal checkups. So our proposed system contains a healthcare web portal with an integrated chatbot which provides facilities like symptom based disease prediction using SVM algorithm and book appointment. A web portal is available for the patients as well as doctors where a patient can register himself to book an appointment through chatbot and doctors can register themselves to confirm or cancel patients appointment. Web portal is developed by using various web technologies. We used the conversational text agent that helps the patients with their health issues.

KEYWORDS: Natural Language Processing, Machine Learning Algorithm, SVM algorithm, Web technology, Conversational agent.

I. INTRODUCTION

In recent times, Most of healthcare organizations, hospitals and clinics have a passive relationship to their clients when it comes to communication. The user means patient searches the website to find information and it is difficult to navigate to reach the accurate information they want. So the organizations, including hospitals and medical sector, have done some changes in their communications systems for user satisfaction. It includes a question and answer page on a website or portal. This FAQ section have very limiting answers and patients are not that much satisfied with the results. Our goal is to overcome these limitations with a Healthcare Chatbot for web portal, where the conversation goes in two side, allowing the user to navigate towards information they want with good accuracy. Using a Healthcare Chatbot the user not only get quick and easy access to health related information but also an user friendly platform that is more engaging and personal. Healthcare Chatbot acts as an information provider which works in real time, answering the questions on the spot. The architecture of proposed system consists a healthcare portal with an integrated chatbot. System will effectively guide the concerned patients by understanding and assessing their symptoms by using machine learning algorithms. Healthcare portal provides registration and login option for patients as well as doctors. Patient can register himself to the portal for booking the appointment and by using the chatbot patient can access to symptom based disease prediction. By choosing Disease prediction option patient have to enter various symptoms, based upon the symptoms disease will be predicted using SVM model of machine learning. Chatbots help to improve the patient experience. Additionally, they can help in setting up an appointment with the available doctors on the portal. Doctor can register themselves on healthcare portal by uploading their personal details and degree certificate. After the registration doctor can login to their account to confirm or cancel the patients appointment. Natural Language Processing plays vital role in development of chatbot. User queries are processed by using Retrieval Based Model of

NLP. Patients can use the chatbot to get the answers to their queries, by using this web-based system at any point of time.

Paper is organized as follows. Section II describes methodology of symptom based disease prediction using SVM algorithm, book appointment and system working. The block diagram represents the step of the algorithm. Implementation for disease prediction and its configuration with algorithm description for each module is given in Section III. Section IV represents conclusion and future work is represented in Section V.

II. METHODOLOGY

The proposed system is chatbot for healthcare portal which includes modules like login, registration, symptom based disease prediction and appointment booking. For Symptom based disease prediction we used the dataset which is referred from Kaggle <https://www.kaggle.com/neelima98/disease-prediction-using-machine-learning>. This database contains 133 attributes. The "prognosis" field refers to the presence of disease in the patient based upon the symptoms. It is integer valued from 0 (no presence) to 1. The dataset consists of 4920 individual's data. There are 133 columns in the dataset. Here, attribute_value = 1 implies that the person is having particular symptom and attribute_value = 0 implies the person is not having the symptom. 133 columns have been provided with 132 of them being symptoms experienced by patient and last column in prognosis for the same. Training dataset consists of 42 different diseases.

Training dataset = 4920 rows and 133 columns.

Testing dataset = 41 rows and 133 columns.

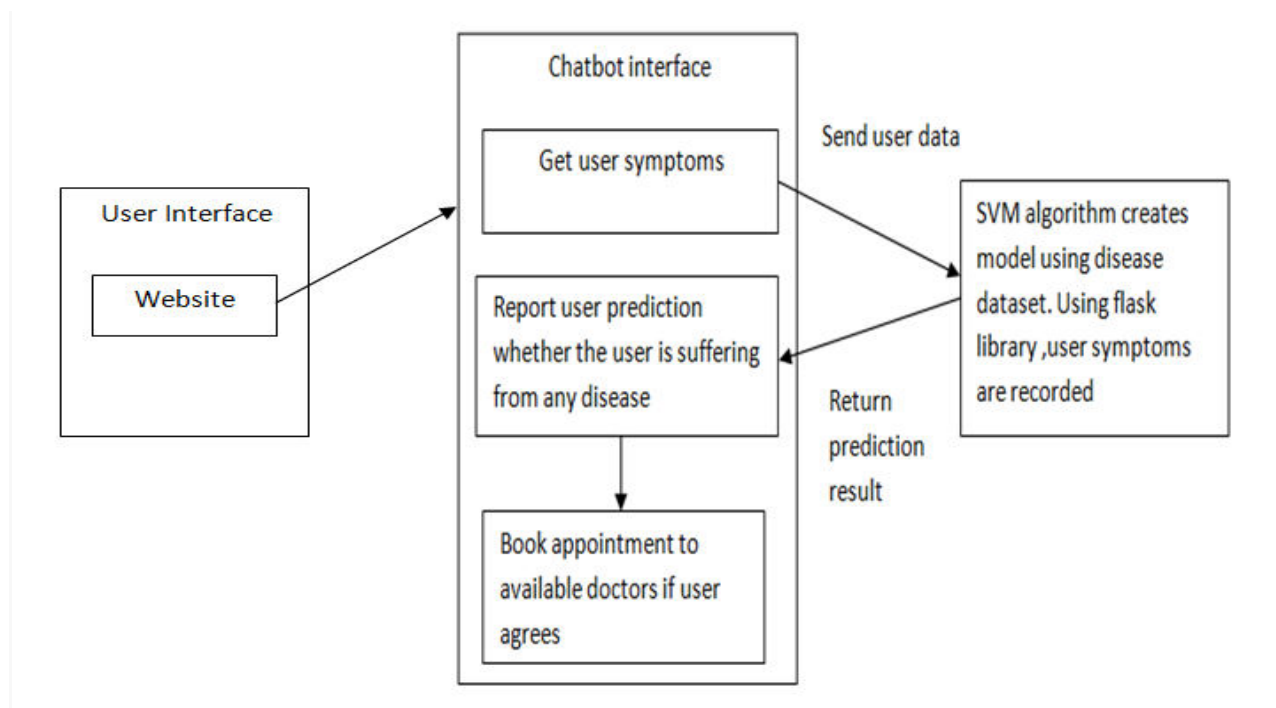


Figure 1. Block Diagram

The System Working for this Project is as follows:

Step 1: User will start interacting with the Chatbot using the user interface web portal.

Step 2: After that if user click on symptom based prediction where the user have to select the symptoms.

Step 3: Once the symptoms are selected by patient, it is sent via Dialogflow's Fulfillment Webhook feature to the python code (on local machine) using ngrok (with public link) and python's Flask library (using port 5000 on localhost).

Step 4: The SVM Algorithm (in python) creates a model using Disease Prediction Dataset, and predicts the disease according to the selected symptoms.

Step 5: This response is sent back to Dialogflow. These are called dynamic responses of the intents.

Step 6: When user gets its prediction results , the chatbot asks the user whether he wants to book appointment to related available doctors.

Step 7: If user agrees, he supplies date and time with selected doctor and the appointment can be booked.

In the proposed system doctor have to register on healthcare portal ,all the personal details of doctor and degree certificate will be saved to database .Uploaded Certificate will get verified by admin and verification message is sent to the doctor. After the verification doctor is able to view patients who booked the appointment to them. Doctor have facility to confirm or cancel the appointment. The message of appointment confirmation and cancellation is sent to the patient.

III. IMPLEMENTATION

Chatbot for healthcare portal is mainly designed for the user who want different facilities like disease prediction and book appointment at their hand. Healthcare portal where patient and doctor can register themselves to access the facilities and chatbot is the interface which provides conversational system to access the features of healthcare portal.

Disease Prediction

app.py

```
import csv
from flask import Flask, render_template, request, redirect, url_for
import diseaseprediction

app = Flask(__name__)
with open('templates/Testing.csv', newline='') as f:
    reader = csv.reader(f)
    symptoms = next(reader)
    symptoms = symptoms[:len(symptoms)-1]

@app.route('/', methods=['GET'])
def dropdown():
    return render_template('predict.html', symptoms=symptoms)

@app.route('/disease_predict', methods=['POST'])
def disease_predict():
    selected_symptoms = []
    if(request.form['Symptom1']!="") and (request.form['Symptom1'] not in selected_symptoms):
        selected_symptoms.append(request.form['Symptom1'])
    if(request.form['Symptom2']!="") and (request.form['Symptom2'] not in selected_symptoms):
        selected_symptoms.append(request.form['Symptom2'])
    if(request.form['Symptom3']!="") and (request.form['Symptom3'] not in selected_symptoms):
        selected_symptoms.append(request.form['Symptom3'])
    if(request.form['Symptom4']!="") and (request.form['Symptom4'] not in selected_symptoms):
        selected_symptoms.append(request.form['Symptom4'])
    if(request.form['Symptom5']!="") and (request.form['Symptom5'] not in selected_symptoms):
        selected_symptoms.append(request.form['Symptom5'])

    disease = diseaseprediction.dosomething(selected_symptoms)

    return render_template('predict.html', disease=disease[0])
@app.route('/find_doctor', methods=['POST'])
```



```
def get_location():
    location = request.form['doctor']
    return render_template('find_doctor.html', location=location, symptoms=symptoms)

@app.route('/drug', methods=['POST'])
def drugs():
    medicine = request.form['medicine']
    return render_template('homepage.html', medicine=medicine, symptoms=symptoms)

if __name__ == '__main__':
    app.run(host='0.0.0.0', port=5000)
```

app.py file is used to run the flask app on port 5000. The '/' URL presents a web page with a form i.e predict.html. The data populated is published to the '/disease_predict' URL that triggered the disease_predict() function. This template dynamically renders an HTML table of form data.

Diseaseprediction.py

```
from sklearn.svm import SVC
from sklearn.model_selection import train_test_split
import csv, numpy as np, pandas as pd
import os

data = pd.read_csv(os.path.join("templates", "Training.csv"))
df = pd.DataFrame(data)
cols = df.columns
cols = cols[:-1]
x = df[cols]
y = df['prognosis']
x_train, x_test, y_train, y_test = train_test_split(x, y, test_size=0.33, random_state=42)

print ("SVM")
dt = SVC(kernel="linear")
clf_dt=dt.fit(x_train,y_train)
print("Accuracy: ", clf_dt.score(x_test,y_test))

indices = [i for i in range(132)]
symptoms = df.columns.values[:-1]

dictionary = dict(zip(symptoms,indices))

def dosomething(symptom):
    user_input_symptoms = symptom
    user_input_label = [0 for i in range(132)]
    for i in user_input_symptoms:
        idx = dictionary[i]
        user_input_label[idx] = 1

user_input_label = np.array(user_input_label)
```

```
user_input_label = user_input_label.reshape((-1,1)).transpose()
return(dt.predict(user_input_label))
```

diseaseprediction.py is used for symptom based disease prediction. In this we have used SVM supervised learning algorithm.

```
dt = SVC(kernel="linear")
```

Here we use SVC with linear kernel which denotes decision boundary should be a straight line.

SVM model is trained with dataset which contains 4920 records and the test_size will be 33%.

Implementation of Book Appointment for patient :

Step 1: User have to register to a portal through web interface.

Step 2: If user is already registered then he can use chatbot to book doctors appointment .

Step 3: Choose book appointment option from chatbot.

Step 4: Patient will be redirected to book appointment page where he/she able to see list of available doctors.

Step 5: Patient can choose particular doctor according to the disease they have and click on book appointment.

Step 6: Patient will choose date and available slot for the appointment.

Step 7: After that appointment details will stored at the database and it is visible to doctors and admin.

Implementation of Appointment Confirmation/Cancellation by doctor :

Step 1: Doctor have to register to a portal through web interface.

Step 2: After that doctor will be verified by admin and doctor will receive message of approval.

Step 3: After approval doctor can view patients who booked the appointment to them.

Step 4: If doctor is available to appoint the patient then they can confirm the appointment otherwise cancel the appointment.

Step 5: Confirmation or cancellation message is sent to the particular patient.

Implementation of Admin Module:

Step 1 : Admin can login to web portal by using the username and password.

Step 2: After login admin can view registered patients and doctors.

Step 3: View doctors and verify the doctor by checking their degree certificate.

Step 4: After the verification , approval message is sent to the patient.

IV. CONCLUSION

At the end it is concluded that ,the use of Conversational chatbot is user friendly and it can be used by any person who knows how to type the messages in their own language in mobile application or desktop application. The main aim of this system is to collect the symptoms & predict the disease with the best possible accuracy and speed which are considered as important characteristics of this project.

From the algorithm comparison and the surveys conducted on various machine learning algorithms like KNN, SVM, Bayes, Decision tree etc., various tests were conducted on the same dataset to check for accuracy of each algorithm. From the survey point of view, it was found that Support Vector Machine algorithm on a Disease Prediction Dataset gives the best possible accuracy in competition with Bayes, Decision tree, KNN and more.

By the Use of above Technology , the aim is to build a Healthcare Portal with Intelligent Chatbot which will be able to get the patient information for registration , after registration patient able to access facilities like symptom based disease prediction ,book appointment and virtual BMI checker which can available through the integrated chatbot. The process will be done in a conversational manner using Dialogflow Platform. It also helps to get early diagnosis.



V. FUTURE WORK

In the future scope of this project, we can include voice-based queries in addition to text-based inputs. The users will have to give voice input and the system can generate either a text output or even a voice-based output. Since the system is Scalable, each module can be upgraded by adding more functionalities and increasing the information content in the knowledge base. The future era is the era of messaging apps because people going to spend more time on messaging apps than any other apps. Thus, the medical chatbot has wide and vast future scope. No matter how far people are, they can have this medical conversation. The only requirement they need is a simple desktop or smart phone with an internet connection. The efficiency of the chatbot can be improved by adding more combinations of words and increasing the use of a database so that the medical chatbot could handle all types of diseases. Even voice conversation can be added to the system to make it easier to use.

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