

# **Online consultation and Disease Prediction Based on Symptoms**

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This Project Report Presented in Partial Fulfillment of the Requirement for the  
Degree of Bachelor of Computer Science and Engineering

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## **APPROVAL**

This Project titled “Online Care and Disease Prediction Based on Symptoms”, submitted by Rakib Hasan, ID No: 153-15-823 to the Department of Computer Science and Engineering, Daffodil International University has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of Bachelor of Science in Computer Science and Engineering and approved as to its style and contents. The presentation has been held on on 14 January, 2021.

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## **DECLARATION**

We thus announce that, this project paper has been finished by utilizing the utilization of us underneath the supervision of S.M. Aminul Haque, Associate professor & Associate Head Computer Science and Engineering Department, and Daffodil International University. We furthermore pronounce that neither this endeavor nor any piece of this crucial been presented some extraordinary region for grant of any confirmation of recognition.

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## ABSTRACT

Ordinary people face a problem to meet doctors because they do not recognize which illness

they have, it is difficult to predict the disease after all doctor's work is to find the problem first and then go for diagnosis. Even doctors diagnosis if that disease not in that doctors find they need to switch doctors that kills valuable times.

So we do serious research of disease and discover that with symptoms we can predict the disease. Though it 80% to 90% accurate with some machine learning algorithms but we think our works paid off because it can help people to identify their disease.

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# Chapter 1

## Introduction

### 1.1 Introduction

Time like these days people use to technology almost every sector, even in medical term people starting using technology. But there are very few apps that can lead people to suggest their disease and give a good suggestion to go to specific doctors. After doing lots of research we build a project where people can get the idea of there most possible disease and can find doctors. Every day more than a thousand people get harassment also spent their times because knowledge in medical science is impecunious. It is average for ordinary people who did not have that understanding also our works are the way to remove that harassment. Moreover, people who do not use technology also can help from it by going to any people who have a little bit knowledge about how to use a phone. That our goal to give everyone a system, where they save the time they get find doctors and most possible disease.

### 1.2 Motivation of the study

In the past people get sick still they don't want to meet with doctors with common symptoms moreover usual symptoms can lead to dangerous disease So that symptom checker can help to find what malady people might affect. People can meet with doctors if it dangerous or they can take home care. Most of all if anyone can understand what disease they will influence, they can build remedy to that disease. More people aware of illness more it fewer attacks that's our ultimate goal.

### **1.3 Objectives of the Study**

- Identify the closest disease they might affect.
- Category the disease so, understand the specialist they should meet.
- It will remove the confusion to find doctors and disease.
- provides Consultation with a specific Doctor by live chat.
- In the end, It could make a social connection between doctor and patient, with good habits of health.

### **1.4 Expected Out Come**

According to WHO, there are an estimated 3.05 physicians per 10,000 population and 1.07 nurses per 10,000 population (estimates based on MoHFW HRD 2011)[5]. And if doctors take half of his time to detect what is a disease and which doctors they should meet that takes so many times even every day that time can save for 20% of patients. So our works can reduce time both doctors and patients and WHO find out that low-quality healthcare is increasing the burden of illness and health costs globally[6].

So our projects can solve this as well. Also, can give healthcare to the next era. Everyone Can take Helth support from our project at their place.

### **1.5 Report Layout**

Pictorial presentation the task in an easy way with a parent that describes the total project, contents and more. The task file carries of 5 chapters. Outline of all the chapters with a short summary is mentioned beneath via demographic representation:

<p style="text-align: center;"><b>1.</b></p> <p style="text-align: center;"><b>Introduction</b></p>	<p style="text-align: center;"><b>2.</b></p> <p style="text-align: center;"><b>Background of the Study</b></p>	<p style="text-align: center;"><b>3.</b></p> <p style="text-align: center;"><b>Requirement Specification and Methodology</b></p>	<p style="text-align: center;"><b>4.</b></p> <p style="text-align: center;"><b>Design and Implement</b></p>	<p style="text-align: center;"><b>5.</b></p> <p style="text-align: center;"><b>Conclusion, Recommendation , Future study</b></p>
<p>About the project, Motivation, Objective, outcome, outline the Project</p>	<p>About the resource study, Related Work, Scope Of the problem, Challenges</p>	<p>Research Subject and Instrument, Architecture of the system, Advantage of this project, Future Scope</p>	<p>WorkFlow, Database and Dataset, Experimental Result</p>	<p>Summery of the Study, Conclusion,</p>

**Outline the project**

## **Chapter 2**

### **Background of the Study**

#### **2.1 Introduction**

From the past, people fear illness is common. Now the age of modern times the disease is not scary anymore, therefore, recently COVID-19 gives people another lesson that we need to upgrade our study more modern and technological way but it is depressing that our smart approach still not smart enough.

Researchers working on machine learning way to solve health issue even we still depend on doctors for little purpose like finding disease.

There is Google Health 1 and Microsoft HealthVault 2 such great technology example for wellness care even we need to study more than that after thinking of that side, our team come up with an approach where we use other research to implement a real project.

There is a machine learning approach for identifying disease-treatment relations in short texts[3] those using classification algorithms to cluster data like disease and their symptoms and then make decision tree to make a model then use test data to matching the train data so we follow their approach little bit also we do so extra investigation to find disease only based on symptoms and age and gender. After making a model use data from Kaggle[4] then train data, we test multiple illnesses so it can detect disease.

It's not complete work if you don't counsel with a real doctor. Also for taking treatment, we just need a real doctor. by focussing, on that part, we make a consult where the patient can live chat with the doctor and can be confirmed about his problem. Also, he can take a prescription from a doctor.

That's why this project needs an admin panel. whereby the patient's feedback admin can select a specialist doctor for a specific user at a specific time. When the patient can be consulted by the doctor.

This project takes a qualified doctor from whole earth. Which doctors are interested to make their publicity and wanna consult online. We take those doctors and try to give good health care by a web application.

#### **2.2 Related Works**

An AI-based medical assistant is still in development. It is the future of running medical science lots of research going on similar fields also there researched in disease prediction based

on symptoms. Almost all research in this field use supervised learning even we did the same. Identify multiple diseases is challengeable, like this one liver disease prediction by using different decision tree techniques[2] they use SPSS to test multiple tree structure in the decision tree. There Health Care Analysis using Data Mining[1] they do train data and make a model using health-related information then predict and give decision whether it good or bad for health. Also more but none of them converts into projects. What we do is make real-life projects were not only research but also implement the idea of identity peoples illness.

### **2.3 Scope of the Problem**

- The disease prediction system have 3 users such as doctor, patient and admin.
- Each user of the system are authenticated by the system.
- There is a role based access to the system.
- The system allows the patient to give symptoms and according to those symptoms, the system will predict a disease.
- The system suggests doctors for predicted diseases.
- The system allows online consultation for patients.
- The system helps the patients to consult the doctor at their convenience by sitting at home.
- Gain accuracy of disease as much as possible.
- Find the perfect algorithm to predict disease.
- Selected working area.
- Making the web user interface and apply the system in it.

### **2.4 Challenges**

Picking an appropriate platform typically goes down to the equipment based task creators experience and the sort of equipment based venture to be created. To create a model that can predict disease for multiple disorders is so problematic. Therefore, as the engineer has negligible or no involvement with supervised learning, the choice was taken to build up an independent venture.

## **Chapter 3**

### **Requirement Specification and Methodology**

#### **3.1 Introduction**

The research strategy is one of a kind philosophies or techniques used to perceive, select, process, and view information about a point. In an exploration paper, the philosophy quarter enables investigate to in a nonexclusive encounter study an assessment's predominant realness and reliability. Here, the technique portion:

- The data collected or generated Procedure
- Analyzation

#### **3.2 Project Research Subject and Instrument:**

This paper, for the most part, orchestrated direction of machine-learning clustering way to do find illness. This Project title "Disease Prediction Based on Symptoms Using Machine Learning" Good health effects to produce a batter outcome. Tho 60% of people in worlds don't get enough medications[5]. As a result, will power of our current world become slow and in medical science use of artificial intelligence is so light. So with multiple approaches, it can help to build something new that helps people understand easy way and use that they reduce the time of the average test.

Main reason of that works is to produce more healthy and aware people in third world countries. There is a positive relationship between income and health status both at national and household levels[4]. And that make people into class also technology makes everyone equal. So to make that we need to use some tools and so make our assignment we utilized Components:

Front end: HTML, CSS , Bootstrap, Javascript, JQuery, react.js

Back end: Django ( python based web framework )

Library : Numpy, Pandas, Scikit-learn, joblib, psycopg2, pillow,

matplotlib, seaborn

Database: PostgreSQL

Tools: pgAdmin4, Orange

### **3.2.1 React**

For creating user interfaces or UI modules, React is an open-source JavaScript library. Facebook and a group of individual developers and businesses are sustaining it. In the production of single-page or mobile applications, React can be used as a base.

It's open source and free.

It will be used in this project to construct a flawless user interface.

### **3.2.2: Django**

Django is a high-level Web platform for Python that promotes rapid growth and clean, pragmatic architecture. Built by seasoned developers, it takes care of much of the Web development hassle, so you can concentrate on writing your app without reinventing the wheel.

It's open-source and free.

### **3.2.3 Numpy**

The fundamental package in Python for scientific computing is NumPy. It is a Python library that offers a multidimensional array object, multiple derived objects (such as masked arrays and matrices), and a variety of quick array operation routines, including mathematical, logical, shape manipulation, sorting, selecting, I/O, discrete Fourier transformations, basic linear algebra, basic statistical operations, random simulation, and much more.

### **3.2.5: Pandas**

Pandas is an open-source Python library that utilizes its powerful data structures to provide high-performance data manipulation and analysis tools. The word Pandas derives from the term Panel Data-Multidimensional Data Econometrics.

Python had been primarily used for data munging and planning prior to Pandas. It had very little input for data processing. This problem was solved by pandas. Using Pandas, we can perform five typical steps in data processing and analysis, irrespective of the origin of data, loading, preparing, manipulating, modeling and analyzing.

Python with Pandas is used in a wide variety of areas, including banking, economics, mathematics, analytics, etc., including academic and commercial domains.

### **3.2.6: Scikit-learn**

Scikit-learn (Sklearn) is Python's most useful and stable machine learning library. It offers a range of powerful machine learning and statistical modeling methods, including classification, regression, clustering and reduction of dimensionality via a Python consistency interface. This library is based on NumPy, SciPy and Matplotlib, and is largely written in Python.

### **3.2.7: PostgreSQL**

PostgreSQL, developed at the University of California at Berkeley Computer Science Department, is an object-relational database management system (ORDBMS) based on POSTGRES, Version 4.2. POSTGRES pioneered several ideas which were only available much later in some commercial database systems.

### **3.2.8 pgAdmin4**

PgAdmin is a PostgreSQL and derivative relational database management platform such as the EDB Advanced Server of EnterpriseDB. Either as a web or desktop application, it can be run. Please see the Features and Screenshots pages for more information on the features offered.

Why doesn't pgAdmin use native dialogs for File Management?

This is primarily for a few reasons:

Since pgAdmin is a web application, only in ways permitted by modern web browsers can it communicate with the local filesystem. It restricts what is possible for defense.

### **3.2.9 Joblib**

Joblib is a collection of tools in Python to provide lightweight pipelining. Particularly:

1. Functional transparent disk-caching and lazy re-evaluation (memoize pattern)
2. Easy parallel computing with simplicity

In particular, Joblib is designed to be fast and robust on large data and has special optimizations for numpy arrays. They are BSD-licensed.

### **3.2.10 psycopg2**

The most popular PostgreSQL database adapter for the Python programming language is Psycopg. The full implementation of the Python DB API 2.0 specification and thread protection are its key features (several threads can share the same connection).

### **3.2.11 pillow**

The Python Imaging Library adds features to your Python interpreter for image processing.

This library offers robust support for the file format, effective internal representation, and reasonably powerful capabilities for image processing.

The core library of images is designed to easily access data stored in a few simple pixel formats. For a general image processing tool, it should provide a stable base.

### **3.2.12 matplotlib**

To build high-quality graphs, graphs, and figures, the matplotlib Python library, created by John Hunter and many other contributors, is used. The library is vast and capable of altering a figure's very minute details.

### **3.2.13 seaborn**

Seaborn is an excellent Python visualization library for plotting statistical graphics. To render statistical plots more appealing, it provides beautiful default styles and color palettes. It is built on top of the library of matplotlib and is also closely integrated with pandas' data structures.

### 3.3 Architecture of the System

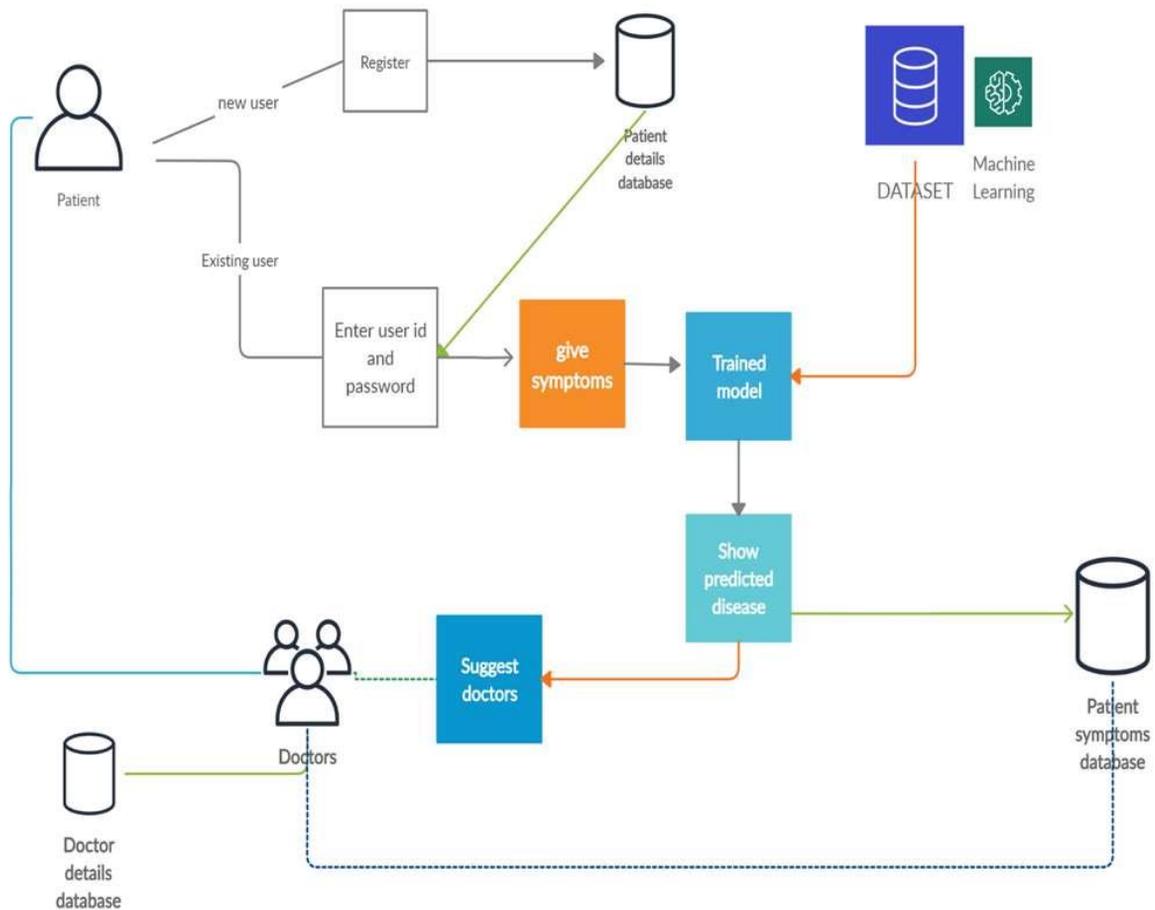


Fig3.6:Disease Prediction Based on Symptoms Using Machine Learning

### 3.4 Advantage of this project (Virtual Medical Assistant):

- Anyone can use that to test themselves anytime.
- Anyone can consult a doctor from anywhere.

### **3.5 Future Scope:**

- ◆ The plan is to include disease of higher fatality, like various cancers in future.
- ◆ Add lab test report analyser to predict more accurately.
- ◆ Bring almost 99% accuracy for predict disease.
- ◆ Not only predict but also give the diagnosis for that disease.
- ◆ Implement NLP in the user input section to communicate with people batter way.

## **Chapter 4**

### **Design and Implement**

#### **4.1 WorkFlow**

##### **4.1.1 work with the data-set**

Data-set preprocessed by Pandas.

Visual model outcome by matplotlib, seaborn

Implement different type of Algorithms (regression and classification) by Scikit-learn

Save train data to checksum or serialization by joblib

##### **4.1.2 work with the front end view**

Make the main structure of UI by HTML

customize UI by CSS, Bootstrap, Javascript

consultation happened by JQuery, react.js

image managed by pillow

##### **4.1.3 work with the back end view**

prediction diseases by pre-trained data which is checksum by joblib , django-templating.

save all data to PostgreSQL database by psycopg2

manage the database by pgAdmin4, Orange

full application execute by Django

## 4.2 Database and Dataset

### 4.2.1 Dataset

Data collection has been done from the internet to identify the disease here the real symptoms of the disease are collected i.e. no dummy values are entered.

The symptoms of the disease are health related websites. This csv file contain 5000 rows of record of the patients with their symptoms(132 types of different symptoms) and their corresponding disease(40 class of general disease).

Some rows of disease with their corresponding symptoms in the dataset are 3 Data collection has been done from the internet to identify the disease here the real symptoms of the disease are collected i.e. no dummy values are The symptoms of the disease are collected from kaggle.com and different health related websites.

This csv file contain 10466 rows of record of the patients with their symptoms(132 types of different symptoms) and their corresponding disease(40 class of general disease) .

ease with their corresponding symptoms in the dataset are

	A	B	C	D	E	F	G	H
1	Symptom_name	disease_name	cooccurs	tfidf_score	disease_id	symptom_id	doid_code	doid_name
2	Aging, Premature	Acquired Immunodeficiency Syndrome	3	10.393654	D000163	D019588	DOID:635	acquired immunodeficiency syn
3	Aging, Premature	Breast Neoplasms	1	3.4645515	D001943	D019588	DOID:1612	breast cancer
4	Aging, Premature	Colonic Neoplasms	1	3.4645515	D003110	D019588	DOID:219	colon cancer
5	Aging, Premature	Skin Neoplasms	3	10.393654	D012878	D019588	DOID:4159	skin cancer
6	Aging, Premature	Osteoporosis	10	34.645515	D010024	D019588	DOID:11476	osteoporosis
7	Aging, Premature	Arthritis, Rheumatoid	2	6.929103	D001172	D019588	DOID:7148	rheumatoid arthritis
8	Aging, Premature	Alzheimer Disease	4	13.858206	D000544	D019588	DOID:10652	Alzheimer's disease
9	Aging, Premature	Myocardial Ischemia	1	3.4645515	D017202	D019588	DOID:3393	coronary artery disease
10	Aging, Premature	Coronary Artery Disease	1	3.4645515	D003324	D019588	DOID:3393	coronary artery disease
11	Aging, Premature	Atherosclerosis	2	6.929103	D050197	D019588	DOID:1936	atherosclerosis
12	Aging, Premature	Hypertension	1	3.4645515	D006973	D019588	DOID:10763	hypertension
13	Aging, Premature	Scleroderma, Systemic	1	3.4645515	D012595	D019588	DOID:418	systemic scleroderma
14	Aging, Premature	Vitiligo	1	3.4645515	D014820	D019588	DOID:12306	vitiligo
15	Aging, Premature	Diabetes Mellitus, Type 2	2	6.929103	D003924	D019588	DOID:9352	type 2 diabetes mellitus
16	Aging, Premature	Metabolic Syndrome X	1	3.4645515	D024821	D019588	DOID:14221	metabolic syndrome X
17	Aging, Premature	Obesity	2	6.929103	D009765	D019588	DOID:9970	obesity
18	Fever	Acquired Immunodeficiency Syndrome	74	45.801385	D000163	D005334	DOID:635	acquired immunodeficiency syn
19	Fever	Breast Neoplasms	107	66.226327	D001943	D005334	DOID:1612	breast cancer
20	Fever	Colonic Neoplasms	27	16.711316	D003110	D005334	DOID:219	colon cancer
21	Fever	Skin Neoplasms	44	27.233256	D012878	D005334	DOID:4159	skin cancer
22	Fever	Osteoporosis	3	1.8568129	D010024	D005334	DOID:11476	osteoporosis
23	Fever	Arthritis, Rheumatoid	54	33.422632	D001172	D005334	DOID:7148	rheumatoid arthritis
24	Fever	Alzheimer Disease	10	6.1893763	D000544	D005334	DOID:10652	Alzheimer's disease
25	Fever	Myocardial Ischemia	10	6.1893763	D017202	D005334	DOID:3393	coronary artery disease
26	Fever	Coronary Artery Disease	23	14.235566	D003324	D005334	DOID:3393	coronary artery disease
27	Fever	Atherosclerosis	2	1.2378753	D050197	D005334	DOID:1936	atherosclerosis
28	Fever	Hypertension	30	18.568129	D006973	D005334	DOID:10763	hypertension
29	Fever	Scleroderma, Systemic	10	6.1893763	D012595	D005334	DOID:418	systemic scleroderma

### 4.2.1 Dataset

### 4.2.1 DataBase

In this project, PostgreSQL is used as DataBase.

created 5 tables as the main app portion like Consultations, Diseaseinfos, Doctors, Patients, Rating\_reviews

created 2 tables as the chats portion like Chats, feedbacks

created 2 tables as the AUTHENTICATION AND AUTHORIZATION portion like groups, users

Project's **Admin panel** and **pgAdmin4** Display total database are in all tables.

The screenshot displays the 'Virtual Doctor Admin' interface. At the top, there is a header with the logo and text 'Virtual Doctor Admin', and a navigation bar with links: 'WELCOME, ROOT', 'VIEW SITE', 'CHANGE PASSWORD', and 'LOG OUT'. Below the header, the page is titled 'Site administration'. The main content area is divided into three sections: 'AUTHENTICATION AND AUTHORIZATION', 'CHATS', and 'MAIN\_APP'. Each section contains a list of items with 'Add' and 'Change' buttons. The 'AUTHENTICATION AND AUTHORIZATION' section includes 'Groups' and 'Users'. The 'CHATS' section includes 'Chats' and 'Feedbacks'. The 'MAIN\_APP' section includes 'Consultations', 'Diseaseinfos', 'Doctors', 'Patients', and 'Rating\_reviews'. On the right side, there is a 'Recent actions' sidebar with a 'My actions' section listing various database objects and their counts, such as 'doctor object (4)', 'consultation object (1)', and 'rating\_review object (1)'.

AUTHENTICATION AND AUTHORIZATION	
Groups	+ Add    ✎ Change
Users	+ Add    ✎ Change

CHATS	
Chats	+ Add    ✎ Change
Feedbacks	+ Add    ✎ Change

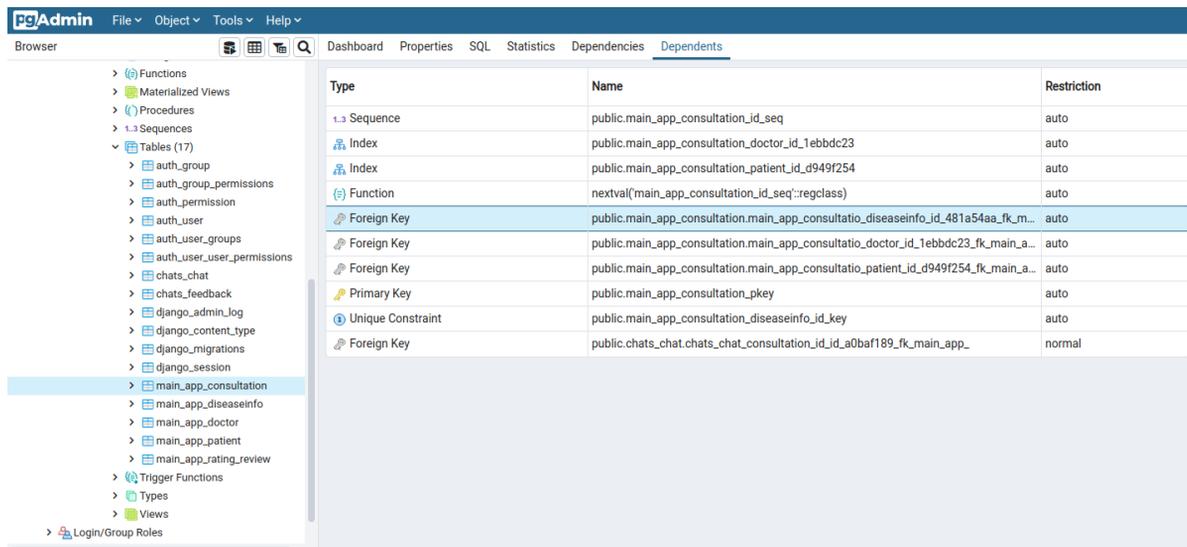
MAIN_APP	
Consultations	+ Add    ✎ Change
Diseaseinfos	+ Add    ✎ Change
Doctors	+ Add    ✎ Change
Patients	+ Add    ✎ Change
Rating_reviews	+ Add    ✎ Change

**Recent actions**

**My actions**

- ✎ doctor object (4)  
Doctor
- ✎ consultation object (1)  
Consultation
- ✎ consultation object (1)  
Consultation
- ✎ consultation object (1)  
Consultation
- + rating\_review object (1)  
Rating\_review
- + consultation object (1)  
Consultation
- + doctor object (3)  
Doctor
- + DocRakib  
User
- + patient object (2)  
Patient
- + rakib  
User

#### 4.2.1.1 Admin panel



#### 4.2.1.1 pgAdmin4 panel

### 4.3 Experimental Result

Project Name: Online consultation and Disease Prediction Based on Symptoms Using Machine Learning.

Classified main experimental results into two parts.

- (i) predicting Disease[4.3.1]
- (ii) patient consult with a doctor[4.3.2]

#### 4.3.1 predicting Disease

The user selects some symptoms from the dropdown which are happened from his present suffering then clicks to predict button. That gives predicted disease with a confidence score.

This project is extraordinarily beneficial for the ordinary person it gives search button that takes google search and makes auto search use the name of that disease for that disease so anyone can get more information and cure and specialised of it.

Test symptoms: Acidity,Chest pain,Anxiety,Belly pain

Target disease: Gastroesophageal reflux disease (GERD)

Time: 8<sup>th</sup> September 2020

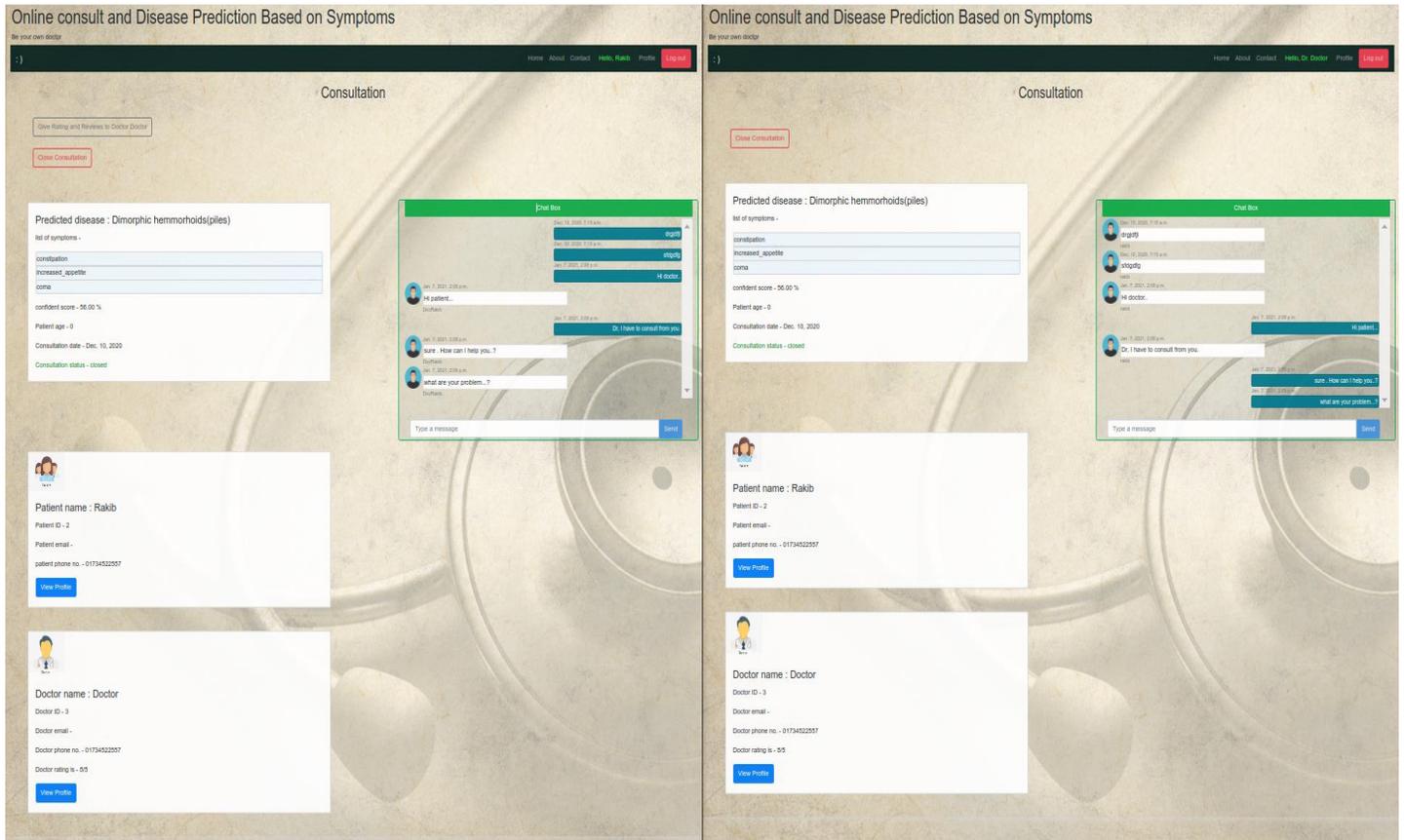
Result : GERD

The screenshot shows a web application titled "Online consult and Disease Prediction Based on Symptoms". The interface includes a navigation bar with "Home", "About", "Contact", "Hello, Rakib", "Profile", and "Log out". The main content area prompts the user to "Identify possible conditions and treatment related to your symptoms." and features an "Add symptoms" button. A modal window titled "Symptoms list -" displays four input fields containing "acidity", "chest\_pain", "anxiety", and "belly\_pain", with a "Predict" button below. The results section shows "Patient name : Rakib", "Age : 0", "predicted disease is : GERD", and a "confidence score of : 91%". A link "Click here to know more about GERD" is provided. A disclaimer states: "This tool does not provide medical advice. It is intended for informational purposes only. It is not a substitute for professional medical advice, diagnosis or treatment." A "Consult a Gastroenterologist doctor" button is at the bottom.

### 4.3.1 predicting Disease

### 4.3.2 patient consult with a doctor

Now if the user needs to take a consult then he gives feedback with a message. The admin takes the patient's feedback and selects a doctor who is a specialist in this type of disease. Admin gives a consult time when the patient can meet with a real doctor and can take advice. Below the consultation UI where the left side view is from the user's account and the right side view is from the doctor's account.



4.3.2 patient consult with a doctor

## Chapter 5

### Conclusion

In the end, this virtual medical assistant will help people to save times and their harassment to find proper doctors. Lots of researcher doing almost the same things also everyone has there own perspective. Our works focus on flexibility so people can understand the easy way to there illness. After we get success to predict almost 80% then we focus on the user-friendly interface so ordinary people can understand easily what they need to do and how to find disease. Making it to the web application is also challenge-able. We think our works help people to reduce their harassment and wasting times.

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