Visualizing and Predicting Heart Diseases With an Interactivate Dashboard

Submitted By

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Project Report

CHAPTER 1

INTRODUCTION

PROJECT OVERVIEW:

The terms **"heart disease"** and **"cardiovascular disease"** are frequently used interchangeably. Heart disease is a general term that covers a wide range of heart related medical conditions. The irregular health state that directly affects the heart and all of its components is characterized by these medical conditions.

In order to forecast cardiac disease, this study discusses various data mining, big data, and machine learning techniques. Building an important model for the medical system to forecast heart disease or cardiovascular illness requires the use of data mining and machine learning. Our application helps the user in finding out if they have heart disease or not.

They can find out by entering details such as their heart rate, cholesterol, blood pressure etc. A dashboard is also attached along with the results for better understanding where they can compare their blood pressure and similar metrics with other users. This project focuses on Random Forest Classifier. The accuracy of our project is 87% for which is better than most other systems in terms of achieving accuracy quickly.

PURPOSE:

This project's goal is to determine, depending on the patient's medical characteristics such as gender, age, chest pain, fasting blood sugar level, etc…whether they are likely to be diagnosed with any cardiovascular heart illnesses. The leading cause of death in the developed world is heart disease. Heart disease cases are rising quickly every day, thus it's crucial and worrisome to predict any potential illnesses in advance. This diagnosis is a challenging task that requires accuracy and efficiency.

Therefore, there needs to be work done to help prevent the risks of having a heart attack or stroke. It is the main factor in adult deaths. By using a person's medical history, our initiative can identify those who are most likely to be diagnosed with

a cardiac condition. It can assist in identifying disease with less medical tests and effective therapies, so that patients can be treatedappropriately. It can identify anyone who is experiencing any heart disease symptoms, such as chest pain or high blood pressure.

Around the world, machine learning is applied in many different fields. There is no exception inthe healthcare sector. Machine learning may be crucial in determining whether locomotor disorders, heart illnesses, and other conditions are present or absent. If foreseen well in advance, such information can offer valuable insights to doctors, who can then customise their diagnosis and course of care for each patient.

CHAPTER 2

LITERATURE SURVEY

EXISTING PROBLEM

The diagnosis of heart disease in most cases depends on a complex combination of clinical and pathological data. Because of this complexity,
there exists a significant amount of interest among clinical professionals and researchers regarding the efficient and accurate prediction of heart disease. In this paper, develop a heart disease predict system that can assist medical professionals in predicting heart disease status based on the clinical data of patients. These approaches include three steps. Firstly, select 13 important clinical features, i.e., age, sex, chest pain type, trestbps, cholesterol, fasting blood sugar, resting ecg, max heart rate, exercise induced angina, old peak, slope, number of vessels colored, and thal. Secondly, develop an artificial neural network algorithm for classifying heart disease based on these clinical features. The accuracy of prediction is near 80%. Finally, develop a user-friendly heart disease predict system (HDPS). The HDPS system will be consisted of multiple features, including input clinical data section, ROC curve display section, and prediction performance display section (execute time, accuracy, sensitivity, specificity, and predict result). Our approaches are effective in predicting the heart disease of a patient. The HDPS system developed in this study is a novel approach that can be used in the classification of heart disease.

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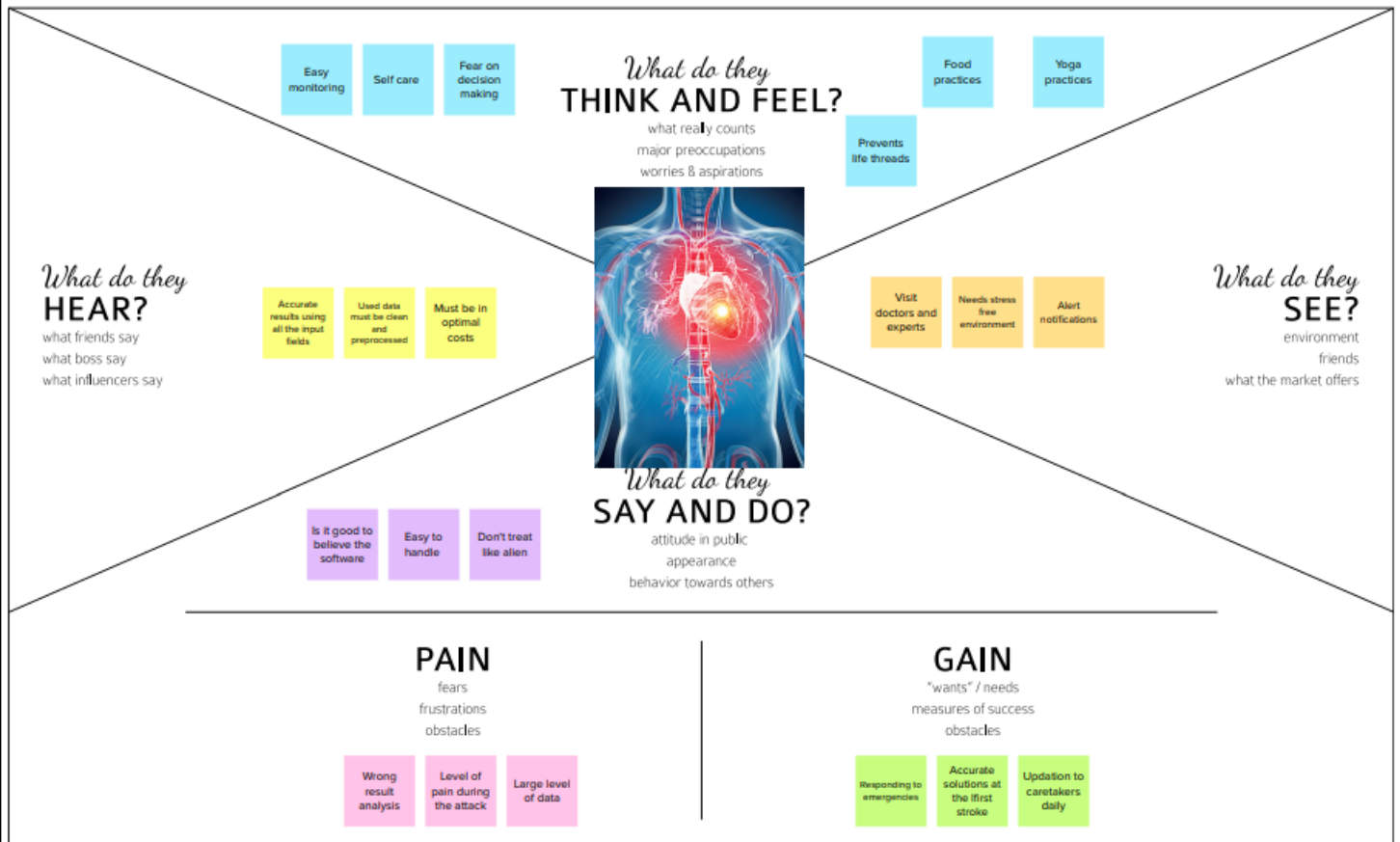
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CHAPTER 3
IDEATION & PROPOSED SOLUTION
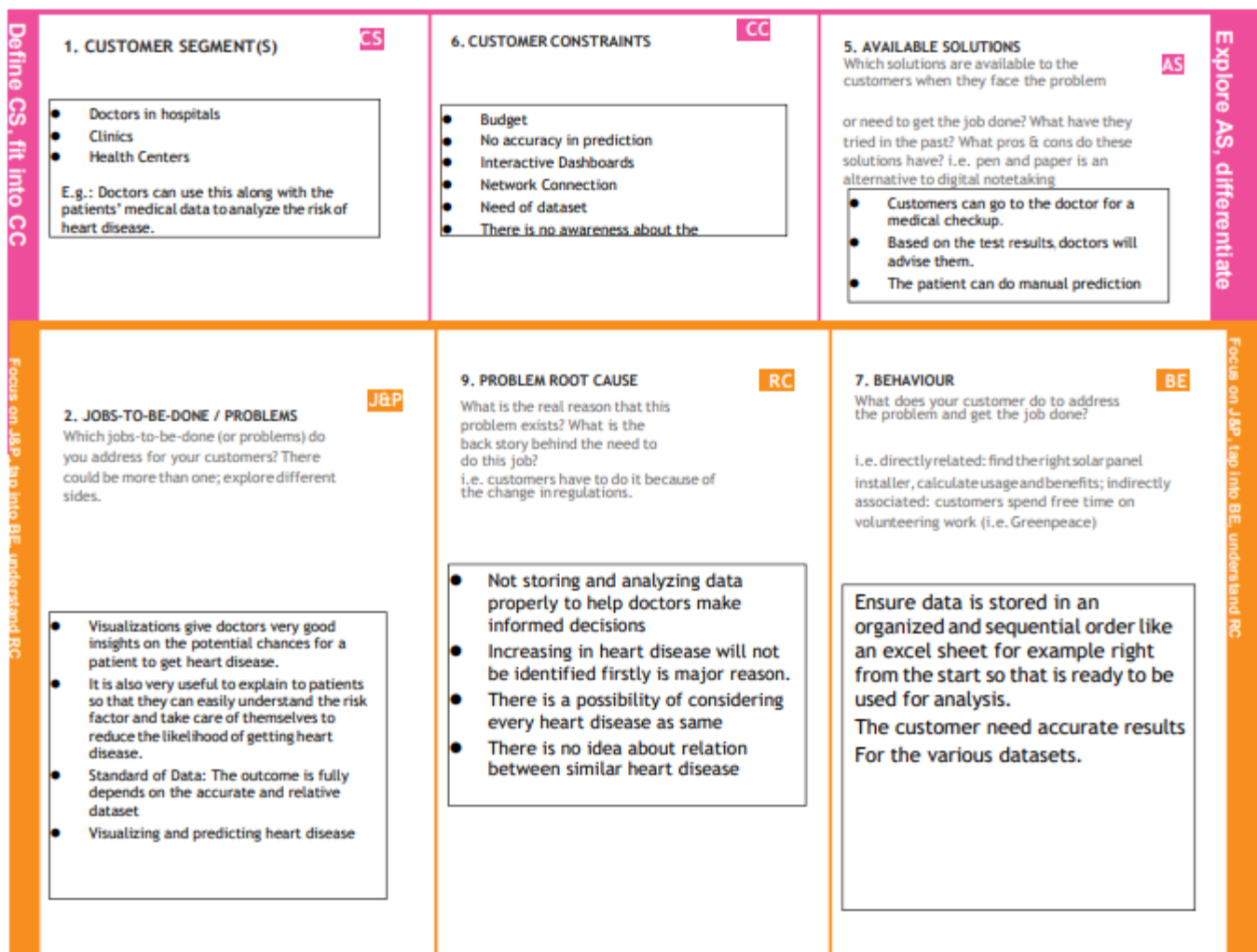
EMPATHY MAP CANVAS

PROPOSED SOLUTION

S.No	Parameter	Description
1.	Problem Statement (Problem to be solved)	To analyse which patients are most likely to suffer from heart disease based on givenparameters.It can provide visualization dashboards and uses this information to easily visualize and predict the patient details
2.	Idea / Solution description	Parameters in data set helps hospitals toidentify the patient heart condition andtheir health condition.A dashboard using cognitive analysis can be created to present the data and utilize it for future use
3.	Novelty / Uniqueness	Many tests are taken by doctors to detect presence of heart disease. The parameters used are often understood only by medical professional.Time can be saved.To providea significant contribution in computingstrength scores with significant predictors inHeart disease prediction
4.	Social Impact / Customer Satisfaction	Reduces the patient's risk level Reduces the medical cost Save human lives.Handy Interactive dashboard It will make the hospital to work efficiently It help the hospitals to knowthe healthrecords of the heart patientλ
5.	Business Model (Revenue Model)	Awareness can be created amongthepatients through ads

		Updates will be updated accordingto the necessity for the patients No complexity Data security This project can be converted to ansoftware kit, webpage or even an application which users can interact with.
6.	Scalability of the Solution	Maintains best user experiences Disease Easy prediction of the patient details with heart Adding new characteristics Scalable dataset Machine learning λ

PROBLEM SOLUTION FIT

The Problem-Solution Fit simply means that we have found a problem with our customer and that the solution we have realized for it actually solves the customer's problem. It helps entrepreneurs, marketers and corporate innovators identify behavioral patterns and recognize what would work and why. The purpose is to solve complex problems in a way that fits the state of your customers and succeed faster and increase your solution adoption by tapping into existing mediums and channels of behaviour

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) — CS

- Doctors in hospitals
- Clinics
- Health Centers

E.g.: Doctors can use this along with the patients' medical data to analyze the risk of heart disease.

6. CUSTOMER CONSTRAINTS — CC

- Budget
- No accuracy in prediction
- Interactive Dashboards
- Network Connection
- Need of dataset
- There is no awareness about the

5. AVAILABLE SOLUTIONS — AS

Which solutions are available to the customers when they face the problem

or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking

- Customers can go to the doctor for a medical checkup.
- Based on the test results, doctors will advise them.
- The patient can do manual prediction

Explore AS, differentiate

Focus on J&P, tap into BE, understand RC

2. JOBS-TO-BE-DONE / PROBLEMS — J&P

Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.

- Visualizations give doctors very good insights on the potential chances for a patient to get heart disease.
- It is also very useful to explain to patients so that they can easily understand the risk factor and take care of themselves to reduce the likelihood of getting heart disease.
- Standard of Data: The outcome is fully depends on the accurate and relative dataset
- Visualizing and predicting heart disease

9. PROBLEM ROOT CAUSE — RC

What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations.

- Not storing and analyzing data properly to help doctors make informed decisions
- Increasing in heart disease will not be identified firstly is major reason.
- There is a possibility of considering every heart disease as same
- There is no idea about relation between similar heart disease

7. BEHAVIOUR — BE

What does your customer do to address the problem and get the job done?

i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)

Ensure data is stored in an organized and sequential order like an excel sheet for example right from the start so that is ready to be used for analysis.
The customer need accurate results For the various datasets.

Focus on J&P, tap into BE, understand RC

CHAPTER 4

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Facebook Registration through Gmail Registration through google
FR-2	Account creation	User fill Gmail and password for account creation
FR-3	User Confirmation	Confirmation via Email Confirmation via OTP
FR-4	Personal details for account	Apart from the basic details, user need to enter details such as name, age, sex, height, weight, previous medical records, etc
FR-5	Regular medical condition updation in app	Entry present medical records, symptoms, etc
FR-6	Doctor consultation	Expert doctor consultation through app

NON-FUNCTIONAL REQUIREMENTS

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	As usability is a prerequisite for success of health and wellness mobile apps, our proposed solution aims to provide insights and suggestions for improving usability experience of the mobile health app by exploring the degree of alignment between app insiders and users.
NFR-2	Security	Our proposed solution can empower patients, streamline communication, and provide real-time monitoring and self-management of medical conditions by building a secure app that puts security, privacy and compliance by considering authentication, privilege management, secure data storage and communication, compliance and testing and installation.

|		
NFR-3	Reliability	Measuring reliability can improve the quality and value of health care apps. Our proposed solution will provide accurate prediction of disease with a lower risk of errors that cause harm to user and reduces the death rate. Our solution provides Safety to user's data with lot of benefits simply in home which is Efficient without wasting equipment, supplies, ideas, and energy.
NFR-4	Performance	The performance of this project is to reduce heart disease death rate by earlier accurate disease prediction. Our solution offers services such as disease prevention, diagnosis and treatment, and rehabilitation.
NFR-5	Availability	Availability is important because, while there are often shortages in human resources, deployed providers are frequently inappropriately absent or, when present, are not actively delivering health care because they are engaged in other duties. Our proposed solution provides immediate access to care anytime anywhere

CHAPTER 5

PROJECT

DESIGN

Data Flow Diagrams ,Solution & Technical Architecture

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a graphical representation of the flow of datain a business information system. It describes the processes that are involved in a system to transfer data from the input to the file storage and reports generation. It shows how data enters and leaves the system, what changes the information, and where data is stored.
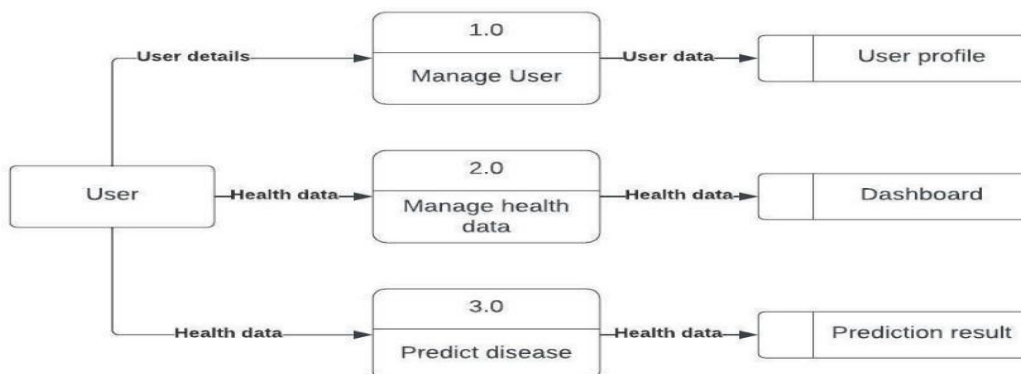
Solution and Architecture diagram:

Solution Architecture:

Solution architecture is a complex process with many sub-processes that bridges the gap between business problems and technology solutions. Its goals are to:

 Find the best tech solution to solve existing business problems.

 Describe the structure, characteristics, behavior, and other aspects of the software to projectstakeholders.

 Define features, development phases, and solution requirements.

 Provide specifications according to which the solution is defined, managed, and delivered.

USER OR PATIENTS

PATIENT DATASET

DOCTORS

DATA IMPORT

DATA CLEAN

DATA EXPLORATION

IBM CLOUD

DATA STORY CARD

DATA EXPLORED AND DEPLOYMENT

User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Mobile user)	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation email once I have registered for the application.	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook.	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Gmail.		Medium	Sprint-1
Customer (Web user)	Login	USN-5	As a user, I can log into the application by entering email & password		High	Sprint-1
	Dashboard	USN-6	User can able to view only his medical records.	I can view it in Dashboard	High	Sprint-2
		USN-7	User can able to view the possibilities of occurrence of heart disease.	I can view it in the analysis reports.	High	Sprint-2
Customer Care Executive	Helpdesk	USN-8	Able to view the queries	I can able to post queries on dashboard	Medium	Sprint-3
		USN-9	Able to answer queries	I can able to view the answers for those queries	High	Sprint-3
Administrator	User Profile	USN-10	Able to update the users medical records	I can view my updated health details.	High	Sprint-4
		USN-11	Able to add or delete users	I can access my accounts when logged in.	High	Sprint-4
		USN-12	Able to manage the user details	I can view the organized data of myself.	High	Sprint-4

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

| Date	14 November 2022
Team ID	PNT2022TMID51005
Project Name	Project - Visualizing and Predicting Heart Diseases with an Interactive Dashboard
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, andEstimation(4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	1
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	2
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	4
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	3
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	2
Sprint-2	Dashboard	USN-6	Able to view only his medical records	2	High	4
Sprint-2		USN-7	View the possibilities of occurrence of heart disease	1	High	2
Sprint-3	Helpdesk	USN-8	Admin be able to view queries	2	High	4

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development   methodologies such as Scrum. However, burn down chartscan be applied to any project containing measurable progressover time.

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)
Sprint-1	20	6 Days	24 Oct 2022	29 Oct 2022	20
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	18
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	19
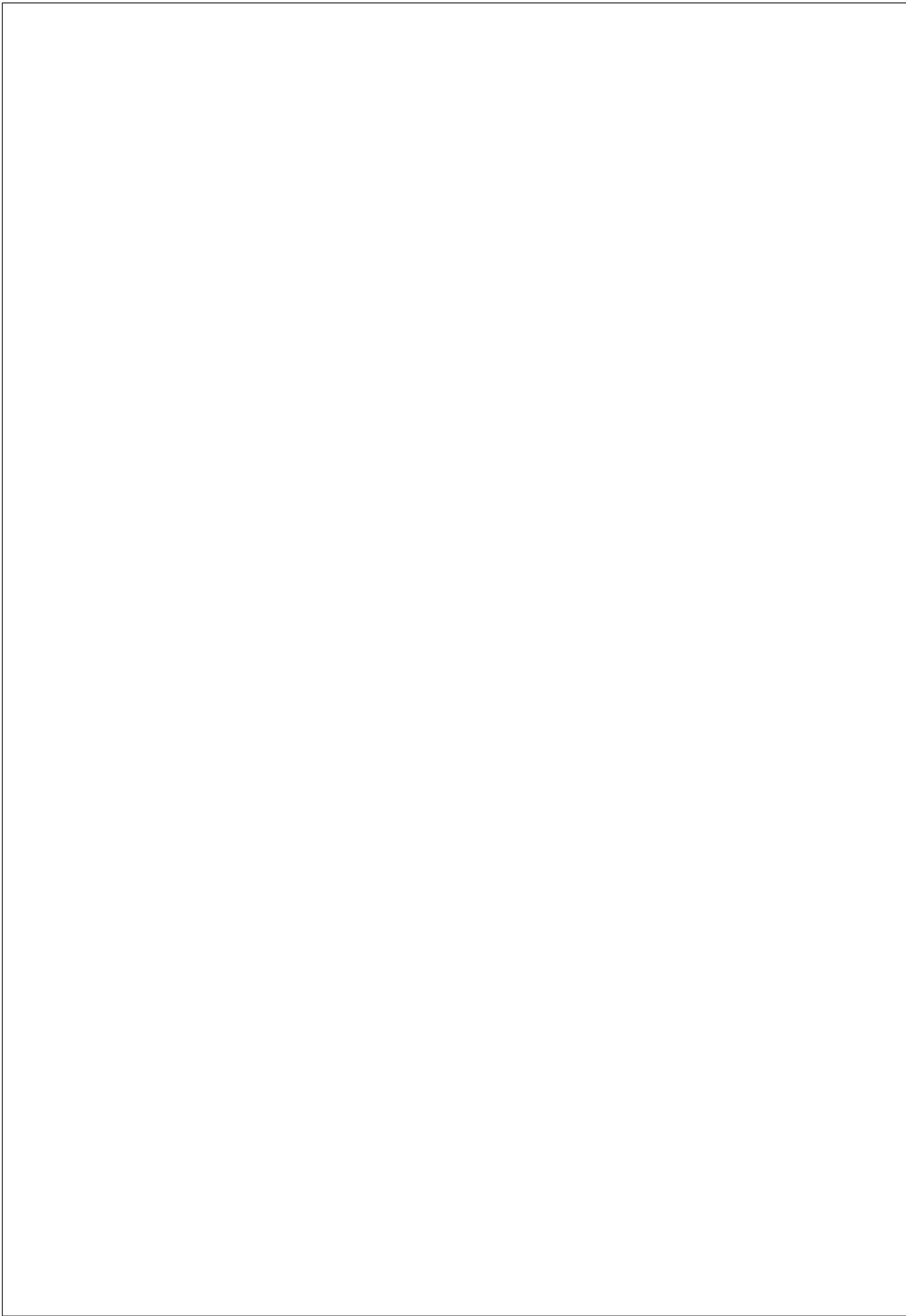
CHAPTER 7
CODING &
SOLUTIONING

Feature 1:
Log In
index.html
:

```
{%extends home.html}
{% block title %}
   {{title}}
{% endblock title %}
{% block content %}
  {% if succ %}

    <div class="hero">
     <p class="alert alert-success" role="alert" style="z-index:1;">{{ succ }}
     </p>
     <br>

     <h1>Heart Disease Prediction</h1>
     </div>

  {% else %}
    <div class="hero">
     <div class="container-n">
     <p class = "para" >Cardiovascular diseases (CVDs) are the leading cause of death globally, taking an estimated
 17.9 million lives each year. CVDs are a group of disorders of the heart and blood vessels and include coronary heart
disease, cerebrovascular disease, rheumatic heart disease and other conditions. More than four out of five CVD deaths
 are due to heart attacks and strokes, and one third of these deaths occur prematurely in people under 70 years of age.

        The most important behavioural risk factors of heart disease and stroke are unhealthy diet, physical inactivity,
 tobacco use and harmful use of alcohol. The effects of behavioural risk factors may show up in individuals as raised
blood pressure, raised blood glucose, raised blood lipids, and overweight and obesity. These "intermediate risks
 factors" can be measured in primary care facilities and indicate an increased risk of heart attack, stroke,
 heart failure and other complications. </p>
       <br>
     </div>
    </div>

  {% endif %}
{% endblock content %}
```

Feature 2: Sign Up

```
{% extends 'home.html' %}

{% endblock title %}
{% block content %}

<body>

  <div class="main">


    <section class="signup">
      <div class="container">
        <div class="signup-content">
          <div class="signup-form">
            <h2 class="form-title">Sign up</h2>
            <form method="POST" class="register-form" id="register-form">
              <div class="form-group">
                <label for="name"><i class="zmdi zmdi-account material-icons-name"></i></label>
                <input type="text" name="name" id="name" placeholder="Your Name"/>
              </div>
              <div class="form-group">
                <label for="email"><i class="zmdi zmdi-email"></i></label>
                <input type="email" name="email" id="email" placeholder="Your Email"/>
              </div>
              <div class="form-group">
                <label for="pass"><i class="zmdi zmdi-lock"></i></label>
                <input type="password" name="password" id="pass" placeholder="Password"/>
              </div>
              <div class="form-group">
                <label for="re-pass"><i class="zmdi zmdi-lock-outline"></i></label>
                <input type="password" name="re_pass" id="re_pass" placeholder="Repeat your password"/>
              </div>
              <div class="form-group">
                <input type="checkbox" name="agree-term" id="agree-term" class="agree-term" />
                <label for="agree-term" class="label-agree-term"><span><span></span></span>I agree all
statements in  <a href="#" class="term-service">Terms of service</a></label>
              </div>
              <div class="form-group form-button">
                <input type="submit" name="signup" id="signup" class="form-submit" value="Register"/>
              </div>
            </form>
          </div>
          <div class="signup-image">
            <figure><img src="../static/heart1.jpg" alt="sing up image"></figure>
            <a href="/signin" class="signup-image-link">I am already member</a>
          </div>
        </div>
      </div>
    </section>



  </div>

</body>

{% endblock content %}
```
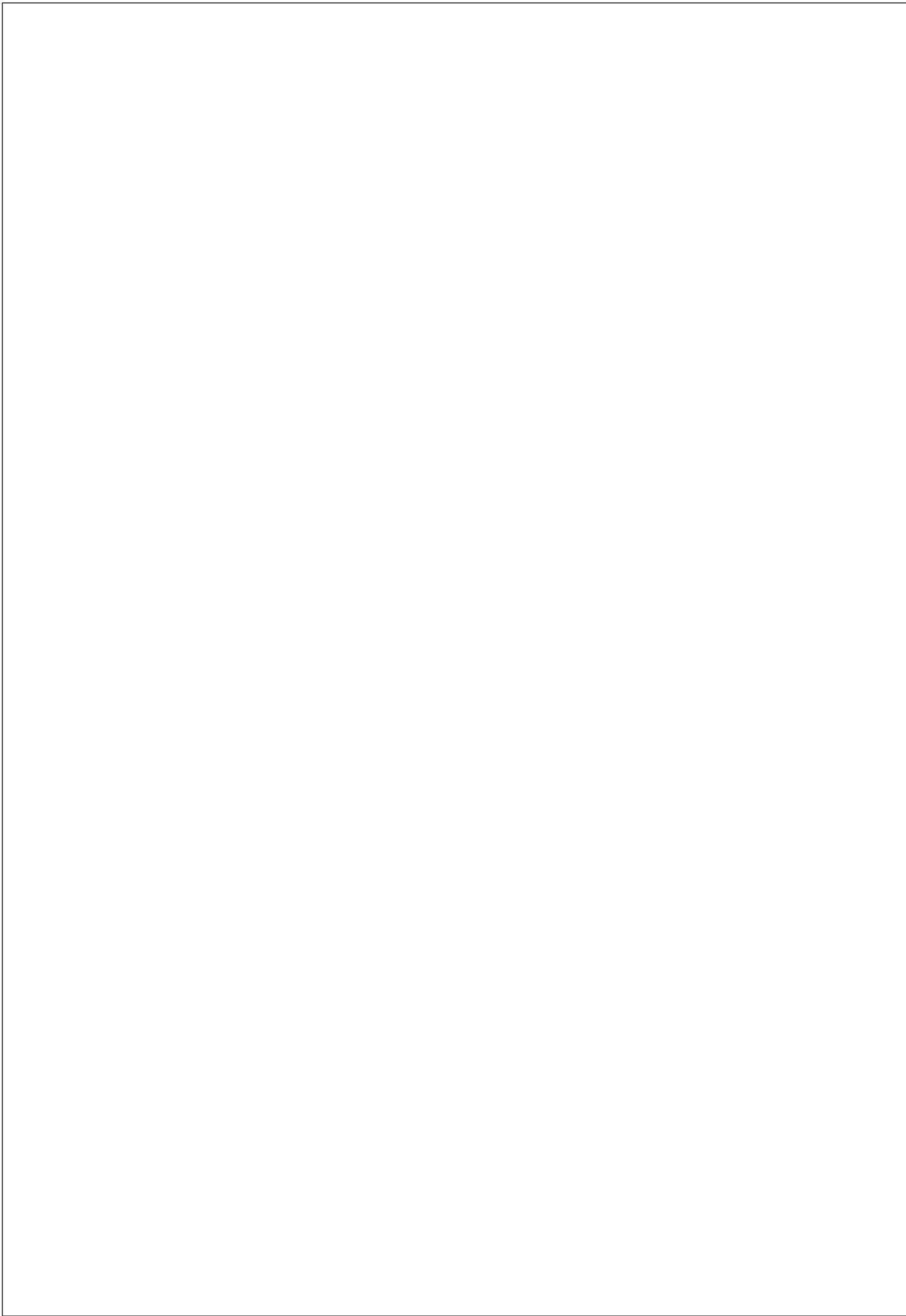
Feature 3: Home Pagehome. html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>{% block title %}{% endblock title %}</title>
    <link rel="stylesheet" href="/static/style.css">
    <link href="https://cdn.jsdelivr.net/npm/bootstrap@5.2.1/dist/css/bootstrap.min.css"
rel="stylesheet" integrity="sha384-iYQeCzEYFbKjA/T2uDLTpkwGzCiq6soy8tYaI1GyVh/UjpbCx/TYkiZhlZB6+f
     crossorigin="anonymous">
</head>
<body>
    <div id="content">
        <nav class="navbar navbar-dark navbar-expand-lg bg-dark">
            <div class="container-fluid">
              <button class="navbar-toggler" type="button" data-bs-toggle="collapse" data-bs-
target="#navbarNavAltMarkup" aria-controls="navbarNavAltMarkup" aria-expanded="false" aria-
label="Toggle navigation">
                <span class="navbar-toggler-icon"></span>
              </button>
              <div class="collapse navbar-collapse" id="navbarNavAltMarkup">
                <div class="navbar-nav">
                  <a class="nav-link active" aria-current="page" href="/">Home</a>
                  <a class="nav-link" href="signin">Sign In</a>
                  <a class="nav-link" href="signup">Sign Up</a>
                  <a class="nav-link" href="Heart_Disease_Classifier">Heart_Disease_Classifier</a>
                </div>
              </div>
            </div>
          </nav>
        {% block content %}
        {% endblock content %}
    </div>
    <script src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.1/dist/js/bootstrap.bundle.min.js"
integrity="sha384-u1OknCvxWvY5kfmNBILK2hRnQC3Pr17a+RTT6rIHI7NnikvbZlHgTPOOmMi466C8"
crossorigin="anonymous"></script>
</body>
</html>
```

Ideation Phase
Brainstorm&Idea
PrioritizationTemplate

Date	11 November 2022
Team ID	PNT2022TMID51005
Project Name	Visualizing and predicting heart diseases withan interactive dashborad
Maximum Marks	4 Marks

Brainstorm & Idea Prioritization Template:

Brainstorming provides a free and open environment that encourages everyone withina team to participate in the creative thinking process that leads to problem solving. Prioritizing volume over value, out-of-the-box ideas are welcome and built upon, and all participants are encouraged to collaborate, helping each other develop a rich amountof creative solutions.

Use this template in your own brainstorming sessions so your team can unleash theirimagination and start shaping concepts even if you're not sitting in the same room.

Step-1: Team Gathering, Collaboration and Selectthe Problem Statement

Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

- 🕐 **10 minutes** to prepare
- 🖥 **1 hour** to collaborate
- 👤 **2-8 people** recommended

Share template feedback

➜ Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

🕐 10 minutes

A **Team gathering**
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B **Set the goal**
Think about the problem you'll be focusing on solving in the brainstorming session.

C **Learn how to use the facilitation tools**
Use the Facilitation Superpowers to run a happy and productive session.

Open article →

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① Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

🕐 5 minutes

PROBLEM
To find out the effective and predictive analysis about the heart diseases.

Key rules of brainstorming
To run an smooth and productive session

- Stay in topic.
- Encourage wild ideas.
- Defer judgment.
- Listen to others.
- Go for volume.
- If possible, be visual.

```
<p>The model that we are going to use to predict the disease is Logistic Regression.
    The Training and Testing accuracy was recorded 87 and 83 respectively.</p>
        </section>
      </div>


    </body>
    </html>
```

Feature 4:
Visualisatio
ns
visual.html

```html
<html>
<head>
    <!-- Bootstrap CSS -->
        <link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/css/bootstrap.min.css" integrity="sha384-
JcKb8q3iqJ61gNV9KGb8thSsNjpSL0n8PARn9HuZOnIxN0hoP+VmmDGMN5t9UJ0Z" crossorigin="anonymous">
        <script src="https://code.jquery.com/jquery-3.5.1.slim.min.js" integrity="sha384-
DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+OrCXaRkfj" crossorigin="anonymous"></script
        <script src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"
integrity="sha384-9/reFTGAW83EW2RDu2S0VKaIzap3H66lZH81PoYlFhbGU+6BZp6G7niu735Sk7lN"
crossorigin="anonymous"></script>
        <script src="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"
integrity="sha384-B4gt1jrGC7Jh4AgTPSdUtOBvfO8shuf57BaghqFfPlYxofvL8/KUEfYiJOMMV+rV"
crossorigin="anonymous"></script>
        <title>Heart Disease Test</title>
    </head>
    <body>
    <!-- Java Script -->
        <script src="https://code.jquery.com/jquery-3.5.1.slim.min.js" integrity="sha384-
DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+OrCXaRkfj" crossorigin="anonymous"></script
        <script src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"
integrity="sha384-9/reFTGAW83EW2RDu2S0VKaIzap3H66lZH81PoYlFhbGU+6BZp6G7niu735Sk7lN"
crossorigin="anonymous"></script>
        <script src="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"
integrity="sha384-B4gt1jrGC7Jh4AgTPSdUtOBvfO8shuf57BaghqFfPlYxofvL8/KUEfYiJOMMV+rV"
crossorigin="anonymous"></script>


        <!-- Navbar-->
        <nav class="navbar navbar-dark" style="background-color: rgb(13, 102, 87);">
            <span class="navbar-brand mb-0 h1">Heart Disease Test</span>
        </nav>
```

```html
<div class="container">
    <br>
    <!--Form-->
    <form action = "{{url_for('predict')}}" method ="POST" >
        <fieldset>
        <legend style="color: rgb(41, 15, 134);"><b>Heart Disease Test
Form</b></legend><br>
            <div class="card card-body" style="background-color:
rgb(194 245 236 / 56%);">
                <div class="form-group  row">
                    <div class="col-sm-3">
                        <label for="age">Age</label>
                        <input type="number" class="form-control" id="age"
name="age" required>
                    </div>
                    <div class="col-sm-3">
                        <label for="sex">Sex</label>
                        <select class="form-control" id="sex"  name="sex"
required>
                          <option disabled selected value> -- Select an
Option -- </option>
                          <option value = "0">Female</option>
                          <option value = "1">Male</option>
                        </select>
                    </div>
                </div>
                <br>
                <div class="form-group  row">
                    <div class="col-sm">
                        <label for="cp">Chest Pain Type</label>
                        <select class="form-control" id="cp"
 name = "cp" required>
                          <option disabled selected value> -- Select an
Option -- </option>
                          <option value = "1">Typical Angina</option>
                          <option value = "2">Atypical Angina</option>
                          <option value = "3">Non-anginal Pain</option>
                          <option value = "4">Asymptomatic</option>
                        </select>
                    </div>
                    <div class="col-sm">
                        <label for="trestbps">Resting Blood Pressure in mm
Hg</label>
                        <input type="number" class="form-control"
id="trestbps" name="trestbps"  required>
                    </div>
                    <div class="col-sm">
                        <label for="chol">Serum Cholestoral in mg/dl</label>
                        <input type="number" class="form-control" id="chol"
name="chol" required>
```

```html
                                                </div>
                                                <div class="col-sm">
                                                    <label for="fbs">Fasting Blood Sugar > 120
mg/dl</label>

                                                    <select class="form-control" id="fbs"
 name="fbs" required>

                                                      <option disabled selected value> -- Select an
Option -- </option>

                                                      <option value = "0">False</option>
                                                      <option value = "1">True</option>
                                                    </select>
                                                </div>
                                            </div>

                                            <br>
                                            <div class="form-group row">
                                                    <div class="col-sm">
                                                        <label for="restecg">Resting ECG Results
 </label>

                                                        <select class="form-control" id="restecg"
name="restecg" required>

                                                          <option disabled selected value> -- Select
Option -- </option>

                                                          <option value = "0">Normal  </option>
                                                          <option value = "1">
Having ST-T wave abnormality  </option>

                                                          <option value = "2">Probable or definite l
ventricular hypertrophy</option>

                                                        </select>
                                                    </div>
                                                    <div class="col-sm">
                                                        <label for="thalach">Maximum Heart Rate</lab
                                                        <input type="number" class="form-control"
id="thalach" name="thalach" required>

                                                    </div>
                                                    <div class="col-sm">
                                                        <label for="exang">Exercise Induced Angina
 </label>

                                                        <select class="form-control" id="exang"
name="exang" required>

                                                          <option disabled selected value> -- Select
Option -- </option>

                                                          <option value = "0">No</option>
                                                          <option value = "1">Yes</option>
                                                        </select>
                                                    </div>
                                                    <div class="col-sm">
                                                        <label for="oldpeak">ST Depression Induced
</label>

                                                        <input type="number" step="any" class="form-
```

```html
control" id="oldpeak" name="oldpeak" required>
                                    </div>
                                </div>
                                <br>
                                <div class="form-group  row">
                                <div class="col-sm">
                                    <label for="slope">Slope of the Peak Exercise
 ST Segment </label>
                                    <select class="form-control" id="slope" name="slope
required>
                                      <option disabled selected value> -- Select an
Option -- </option>
                                      <option value = "1">Upsloping</option>
                                      <option value = "2">Flat</option>
                                      <option value = "3">Downsloping</option>
                                    </select>
                                </div>
                                <div class="col-sm">
                                    <label for="ca">Number of Vessels Colored by
Flourosopy</label>
                                    <select class="form-control" id="ca" name = "ca"
required>
                                      <option disabled selected value> -- Select an
Option -- </option>
                                      <option value = "0">0</option>
                                      <option value = "1">1</option>
                                      <option value = "2">2</option>
                                      <option value = "3">3</option>
                                    </select>
                                </div>
                                <div class="col-sm">
                                    <label for="thal">Thalassemia</label>
                                    <select class="form-control" id="thal" name = "thal
required>
                                      <option disabled selected value> -- Select an
Option -- </option>
                                      <option value = "3">Normal</option>
                                      <option value = "6">Fixed defect</option>
                                      <option value = "7">Reversable defect</option>
                                    </select>
                                </div>
                            </div>
                            <br>
                            <div class="form-group">
                                <input class="btn btn-primary" type="submit" value="Result
                            </div>

                            <!--Prediction Result-->
                            <div id ="result">
                                    <strong style="color:red">{{result}}</strong>
```

```html
                              </div>
                          </div>
                    </fieldset>
                  </form>

              </div>

          </body>
      </html>
```

Integration:

app.py

```python
Import numpy as np
import pickle
import sklearn
from flask import Flask, render_template, request, redirect, url_for, flash
import sqlite3
model = pickle.load(open('models.pkl', 'rb'))
app = Flask(__name__)
app.secret_key = "7847541"

def get_db():
    conn = sqlite3.connect('user_details.db')
    conn.row_factory = sqlite3.Row
    return conn
@app.route('/')
def index():
    return render_template('index.html', title='Home')



@app.route('/about')
def about():
    return render_template('about.html', title='About')



@app.route('/signin', methods=('GET', 'POST'))
def signin():
    error = None
    if request.method == 'POST':
        name = request.form['name']
        password = request.form['password']
        db = get_db()
        user = db.execute(
            'SELECT name FROM user_details WHERE password = ?', (password, )
        ).fetchone()

        if user is None:
            error = 'Incorrect Username/Password.'



        if error is None:
            return render_template('index.html', title="Home", succ="login successfull!")
        flash(error)
        db.close()
```

```python
    return render_template('signin.html', title='Sign In', error=error)


@app.route('/signup', methods=('POST', 'GET'))
def signup():
    if request.method == 'POST':
        name = request.form['name']
        email = request.form['email']
        password = request.form['password']
        db = get_db()
        curr = db.cursor()
        curr.execute(
            'INSERT INTO user_details (name, email, password) VALUES (?, ?, ? );',
 (name, email, password )
        )
        db.commit()
        curr.close()
        db.close()
        return render_template('index.html', title="Home", succ="Registration Successfull!")
    return render_template('signup.html', title='Sign Up')



@app.route('/Heart_Disease_Classifier')
def Heart_Disease_Classifier():
        return render_template('Heart_Disease_Classifier.html')

@app.route('/predict', methods =['POST'])
def predict():

  features = [float(i) for i in request.form.values()]
  #Convert features to array
  array_features = [np.array(features)]
  #Predict features
  prediction = model.predict(array_features)
  output = prediction
  if output == 1:
    return render_template('Heart_Disease_Classifier.html', result = 'The patient is not likely
     to have heart disease!')
  else:
    return render_template('Heart_Disease_Classifier.html', result = 'The patient is likely to ha
heart disease!')

if __name__ == '__main__':
    debug(True)


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```css
.visual{
  text-align:
  center;
  background
  -color:
  #000;
}
.topic{
  text-
  decoratio
  n:
  none;font
  -size:
  1.5em;
  color:
  crimson;
  font-
  weight:
  bolder;
  margin-
  bottom:
  32px;
}
.
  topic
  :hov
  er{ c
  olor:
  crim
  son;
  text-decoration: none;
}
.navbar-light .navbar-nav .nav-item
```

```css
    .nav-
    link{color:crimso
    n; font-weight:
    bold;
}
.navbar-light .navbar-nav .nav-item .nav-
```

```css
   link:hover{color:black;
}
.about{
   text-align: center;
}
.list{
   text-
   align:
   justify;m
   argin-
   left:
   38%;
}
.wel{
   color: crimson;
}
.login{
   text-align:
   center;
   margin-top:
   10%;
   background
   -color:
   black;margi
   n-left: 35%;
   paddin
   g: 5%;
   width:
   fit-
   conten
   t;
}
```

```css
.ll{
  color: #fff;
  font-weight: bold;
}
.btn{
  margin-top:
  16px;
  background-
  color:
  crimson;colo
  r: #fff; font-
  weight: bold;
}

.title{
  font-
  size:
  1.5em
  ;color:
  #fff;
}
.ag{
  margin-top: 0;
}
```

CHAPTER 8

TESTING

Project

Development

PhaseModel

Performance Test

Date	18 November 2022
Team ID	PNT2022TMID51005
Project Name	Visualizing and Predicting Heart Diseases with an Interactive Dash Board
Maximum Marks	10 Marks

Model Performance Testing:

Project team shall fill the following information in model performance testing template.

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visulizations / Graphs - 10
2.	Data Responsiveness	Good
3.	Amount Data to Rendered (DB2 Metrics)	-
4.	Utilization of Data Filters	Yes for filtering out visualisations concerning people with existing heart disease
5.	Effective User Story	No of Scene Added - 8
6.	Descriptive Reports	No of Visulizations / Graphs - 7

Acceptance Testing

UAT Execution & Report Submission

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and op n issues of the [ProductName] project at the time of the release to Us   er Acceptance Testing (UAT).

2. Defect Analysis

This report shows the number of resolved or closed bugs at each severity level, and how they were resolved

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	10	4	2	3	20
Duplicate	1	0	3	0	4
External	2	3	0	1	6
Fixed	11	2	4	20	37
Not Reproduced	0	0	1	0	1
Skipped	0	0	1	1	2
Won't Fix	0	5	2	1	8

Totals	24	14	13	26	77

Date	18 November 2022
Team ID	PNT2022TMID51005
Project Name	Visualizing and Predicting Heart Diseaseswith an Interactive Dash Board
Maximum Marks	4 Marks

3. Test Case Analysis

This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	7	0	0	7
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

5 RESULT

S Performance

Metrics

1. Hours worked: 50 hours

2. Stick to Timelines: 100%

3. Stay within budget: 100%

4. Consistency of the product: 85%

5. Efficiency of the product: 85%

6. Quality of the product: 85%

6 ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

- Smooth User Interface
- Accuracy is achieved quickly

DISADVANTAGES:

Random forest can be used for both classification and regression tasks, butit is not more suitable for Regression tasks

7   CONCLUSION:

This overview of the project conveys the idea that numerous methods have been investigated for diagnosing cardiovascular disease. Big data,machine learning, and data mining can be used to great success to analyse the prediction model with the highest degree of accuracy. The primary goal of this project is to diagnose cardiovascular disease or heart disease utilizing a variety oftechniques and procedures to obtain a prognosis.

8   FUTURE SCOPE

A future update shall comprise of section for viewing renowned cardiologists and scan centres in their city. The obtained output can be further processed and sent to smart devices to provide necessary assistance. Constant monitoring can provide necessary data to recommend to consult a doctor in caseof an emergency.