ROHINI

COLLEGE OF ENGINEERING AND TECHNOLOGY

Approved by AICTE and affiliated to Anna University,(An ISO Certified Institution)

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 relatedmedical 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 forecastheart 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. Adashboard 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

A quiet significant amount of works related to the diagnosis of Heart disease using Machine Learning algorithms have been made. An efficient heart disease prediction has been made by using various algorithms some of them include Logistic Regression, KNN, Random Forest Classifier etc. It can be seen in results that each algorithm has its strength to register thedefined objectives.

The model incorporating IHDPS had the ability to calculate the decision boundary using the previous and new model of machine learning and deep learning. It facilitated the important andthe most basic factors/knowledge such as family history connected with any heart disease. But the accuracy that was obtained in such IHDPS model was far more less than the new upcomingmodel such as detecting coronary heart disease using artificial neural network and other algorithms of machine and deep learning.

REFERENCES

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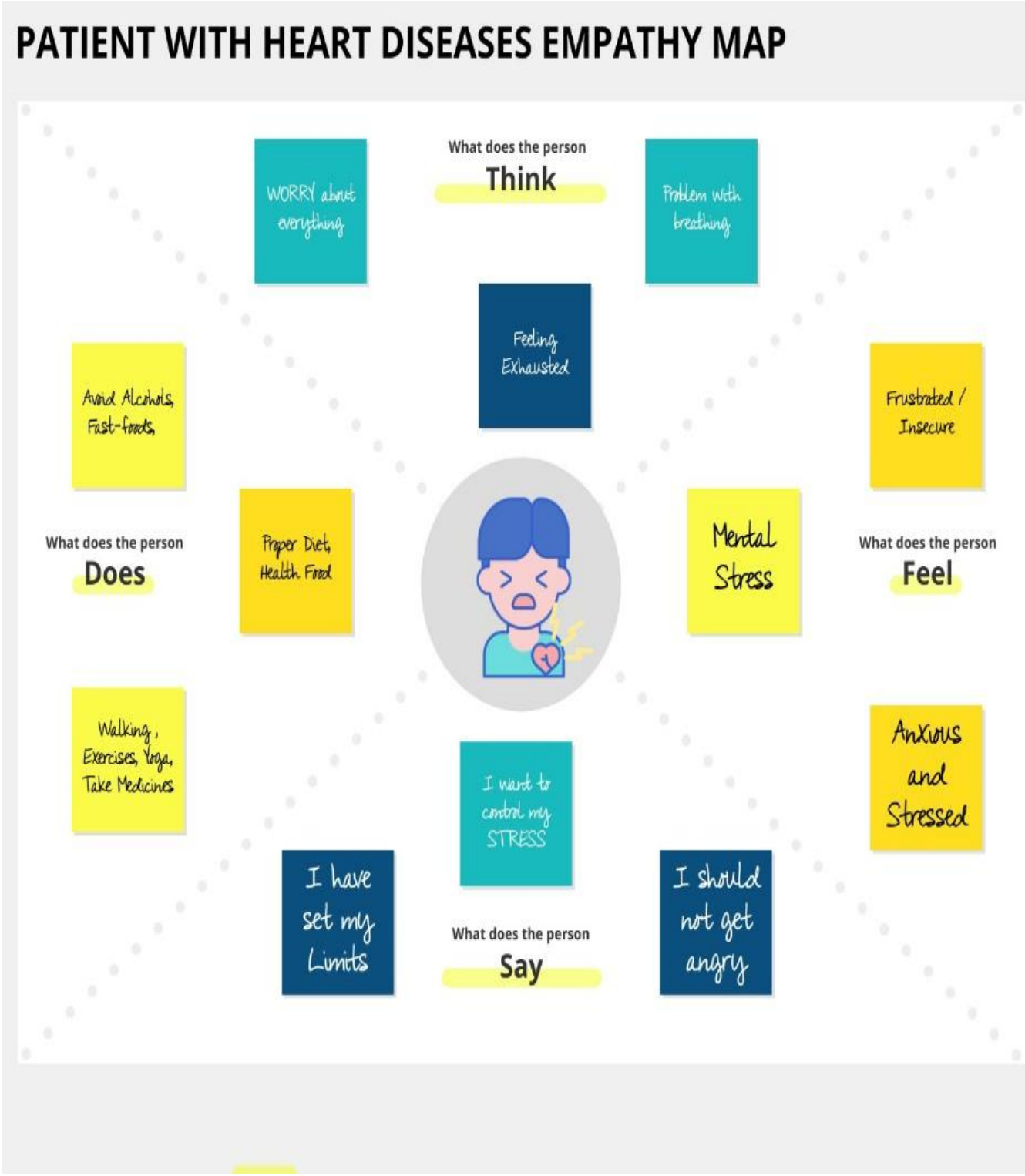
CHAPTER 3 IDEATION & PROPOSED SOLUTION

EMPATHY MAP CANVAS

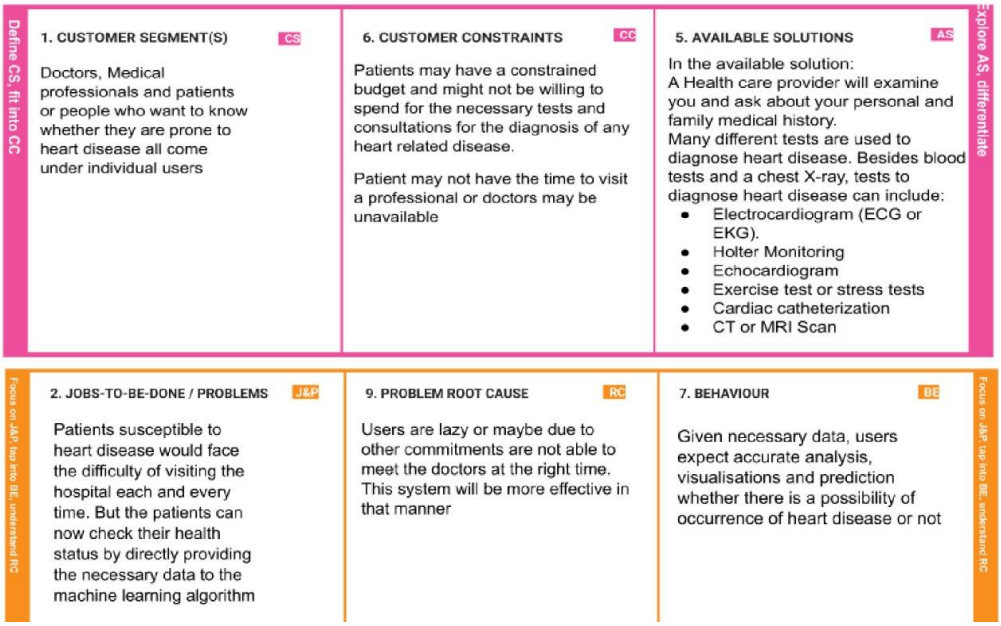


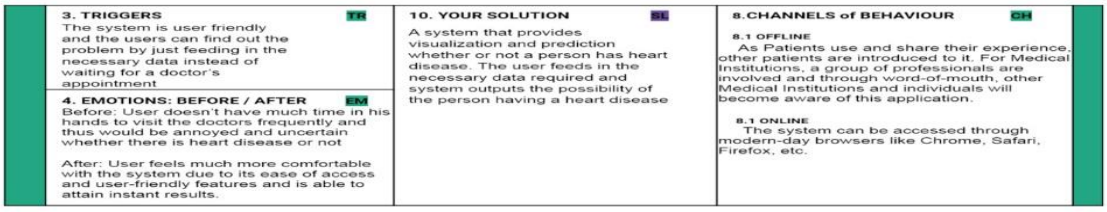
PROPOSED SOLUTION

S.No	Parameter	Description
1.	Problem Statement (Problem to besolved)	The leading cause of death in the developed world is heart diseases. Therefore ,there needsto be work done tohelp prevent the risks of having a heart.
2.	Idea / Solution description	It can be prevented by creating an interactive dashboard by data analytics .Bydoing this we can predict the forecoming dangerous events.
3.	Novelty / Uniqueness	It can give correct and accurate information
4.	Social Impact / Customer Satisfaction	In the point of social impact it has a greatinteractive dashboard forpredicting the diseases.
5.	Business Model (Revenue Model)	It has a huge revenue when it comes to themarket.
6.	Scalability of the Solution	It is has the easy manipulation of data.

PROBLEM SOLUTION FIT

The Problem-Solution Fit simply means that we have found a problem with our customerand 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 bytapping into existing mediums and channels of behaviour





CHAPTER 4

REQUIREMENT ANALYSIS

FUNCTIONAL REQUIREMENTS

- Users have to register.
- Function to view the homepage by the user.
- Function to display information related to heart diseases on the website.
- Function to provide textboxes to enter medical results.
- Function to predict heart disease using ML model.
- Function to display visualisations of the final results.
- Function to provide dashboard to user.

NON-FUNCTIONAL REQUIREMENTS

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The website will utilise better user interface for easy navigation. The process of finding out the results will be smooth and easy for the user.
NFR-2	**Security**	The website will be protected against SQL injection, DDoS attacks and SHA are used making the website very safe for use.
NFR-3	**Reliability**	The tool will give accurate and reliable results most of the time.
NFR-4	**Performance**	The website will be well optimized which includes fast rendering of the pages, providing a bug-free, smooth and hassle-free experience for the user.
NFR-5	**Availability**	The tool will be available for users most of the time.
NFR-6	**Scalability**	The system will be scalable enough to support a lot of users at the same time while maintaining optimal performance.

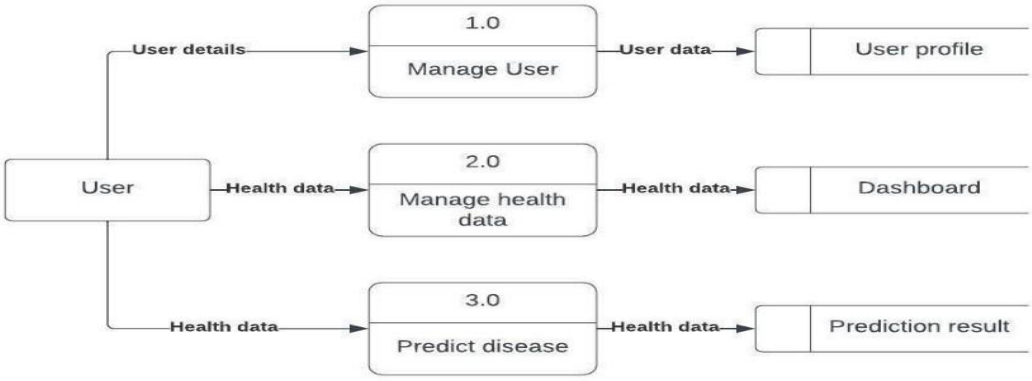
CHAPTER 5

PROJECT DESIGN

Data Flow Diagrams ,Solution & Technical Architecture

Data Flow Diagrams:

A Data Flow Diagram (DFD) is a graphical representation of the flow of data in 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.

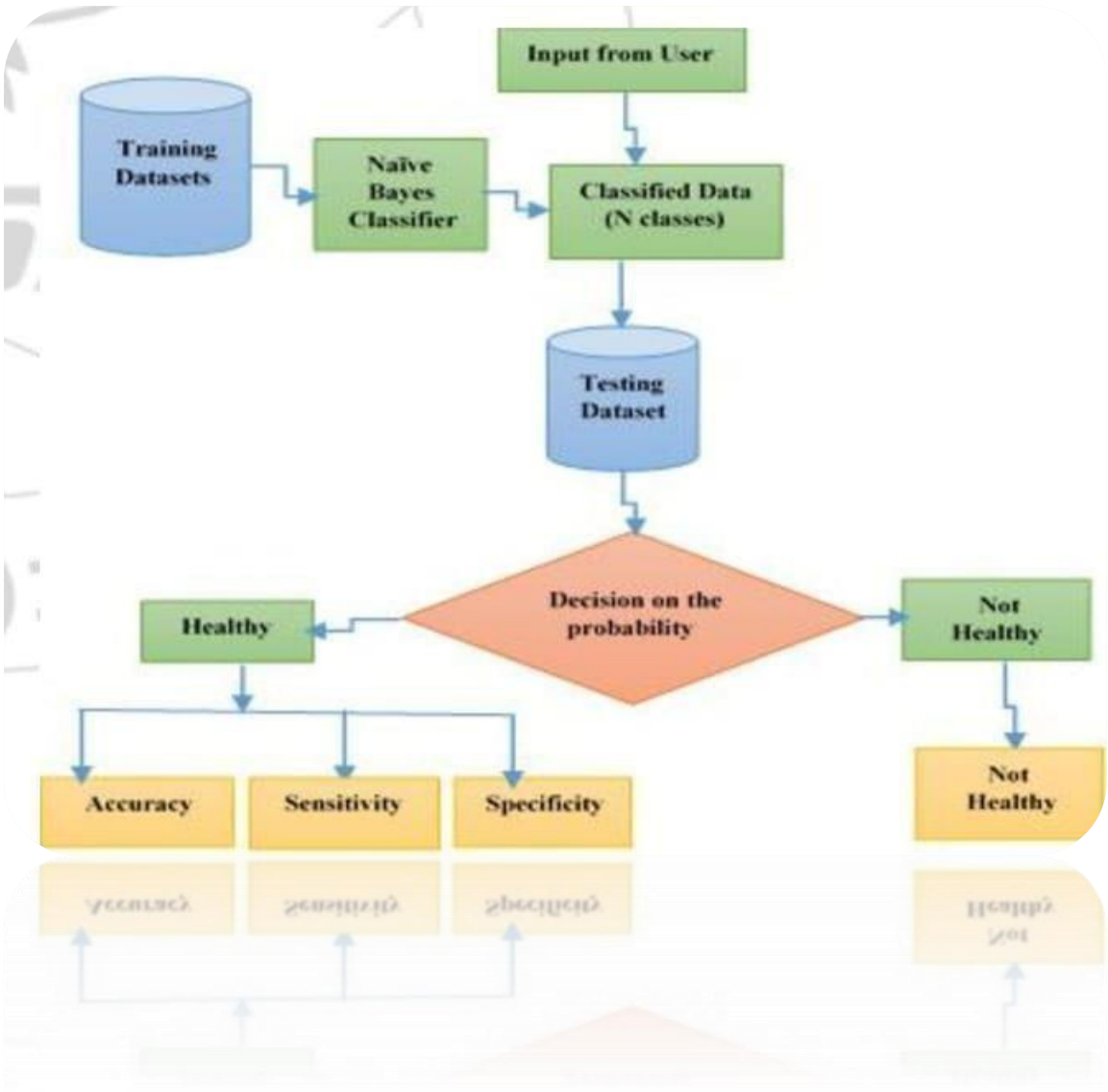


Solution and Architecture diagram:

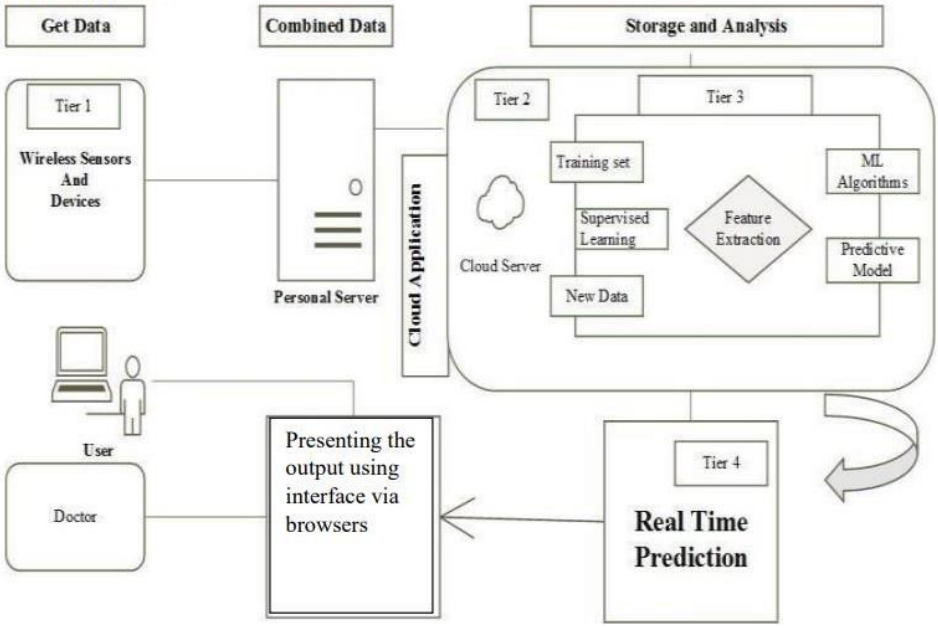
Solution Architecture:

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.



Architecture:



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 (Patient)	Registration	USN-1	As a user, I can register by entering my email,phone number ,Date of birth, password, and confirm password.	I can access my account / dashboard	High	Sprint-1
		USN-2	As a user, I will receive the confirmation message in my email once I have registered or OTP will be sent.	I receive confirmation email & click confirm. or by entering the OTP received	High	Sprint-1
		USN-3	As a user, I can register through Gmail		Medium	Sprint-1
	Login	USN-4	As a user, I can log in by entering email & password		High	Sprint-1
	Forgot Password	USN-5	As a user, if i forgot my password, by clicking forgot password an OTP is sent to my number or email,	By entering the OTP sent via phone number or email.	High	Sprint-1
	Data collection	USN-6	As a user, I can upload the input data set to diagnose.		High	Sprint-1
Admin	Login	USN-1	As an admin, I can login by using email id and password.		High	Sprint-1
	Data collection	USN-2	As an admin, I can upload the data set to train the machine.		High	Sprint-1

Project Planning Phase

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

Date	14 November 2022
Team ID	PNT2022TMID35064
Project Name	Project - Visualizing and Predicting Heart Diseases with an Interactive Dashboard
Maximum Marks	8 Marks

Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Datasets	USN-1	As an analyst,I will develop code for data preparation and data description.	5	High	BALA MATHEESHA S
Sprint-2	Cleaning, exploringdata and creating model	USN-2	As an Analyst I will develop code for dataexploration.	5	High	ANJU M
Sprint-3	Data visualization	USN-3	As an Analyst I can develop code for datavisualization.	5	High	NIBISHA VARSHINI M
Sprint-4	Data Prediction	USN-4	As a Data analyst, I will create code for different types of models in explored data	5	High	MANISHA M

Sprint Delivery Plan

Sprint	Total StoryPoints	Duration	Sprint Start Date	Sprint End Date(Plan
Sprint-1	10	4 Days	11 Nov 2022	14 Nov2022
Sprint-2	10	4 Days	11 Nov 2022	14 Nov 2022
Sprint-3	10	4 Days	11 Nov 2022	14 Nov 2022
Sprint-4	10	4 Days	11Nov 2022	14 Nov 2022

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Velocity:

Imagine we have a 05-day sprint duration, and the velocity of the team is10 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

AV=SprintDuration/Velocity=10/5=2

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 methodologiessuch as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

						S , Pooja T S , Elakkiya S
Sprint-4	Rating	USN-12	As a user, I can rate the app and give feedback	2	Low	Pooja T S
Sprint-4	User profile	USN-13	As an admin, I can update the health details of users.	5	High	Reethika S
Sprint-4		USN-14	As an admin, I can add or delete users.	3	High	Elakkiya S
Sprint-4		USN-15	As an admin, I can manage the user details.	3	High	Bharanidharan S

Project Tracker, Velocity & Burndown Chart: (4 Marks)

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	13	6 Days	24 Oct 2022	29 Oct 2022	13	29 Oct 2022
Sprint-2	13	6 Days	31 Oct 2022	05 Nov 2022	13	05 Nov 2022
Sprint-3	13	6 Days	07 Nov 2022	12 Nov 2022	13	12 Nov 2022
Sprint-4	13	6 Days	14 Nov 2022	19 Nov 2022	13	19 Nov 2022

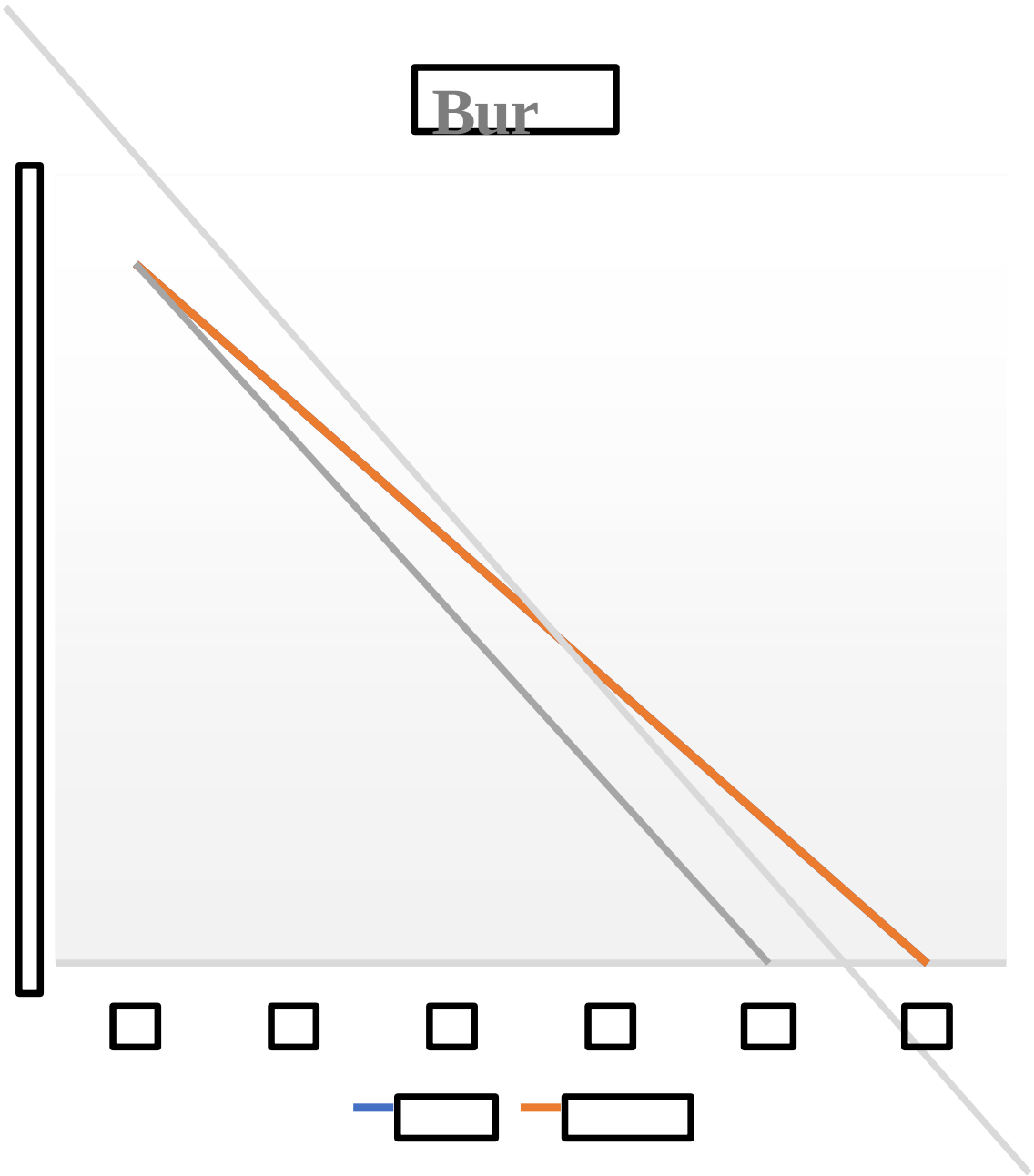
Velocity:
Imagine we have a 6-day sprint duration, and the velocity of the team is 13 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

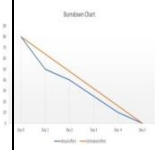
SPRINT DELIVERY SCHEDULE:

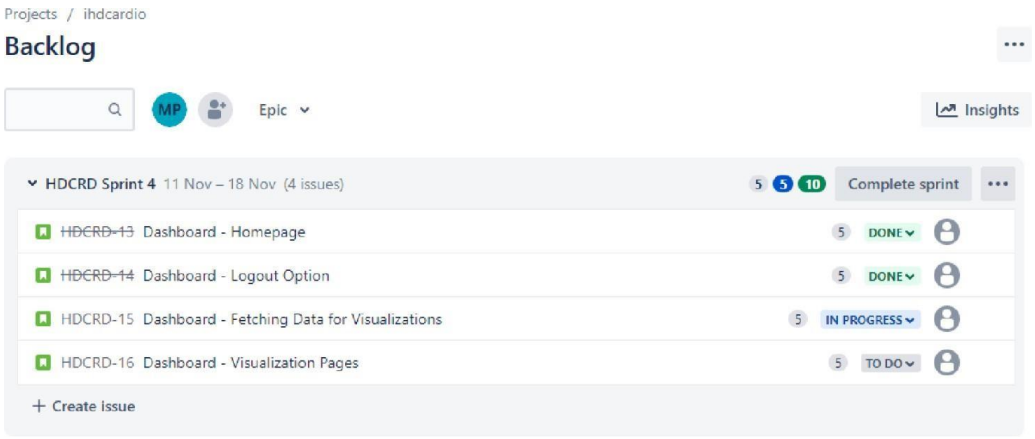
Project Tracker, Velocity & Burndown Chart: (4 Marks)

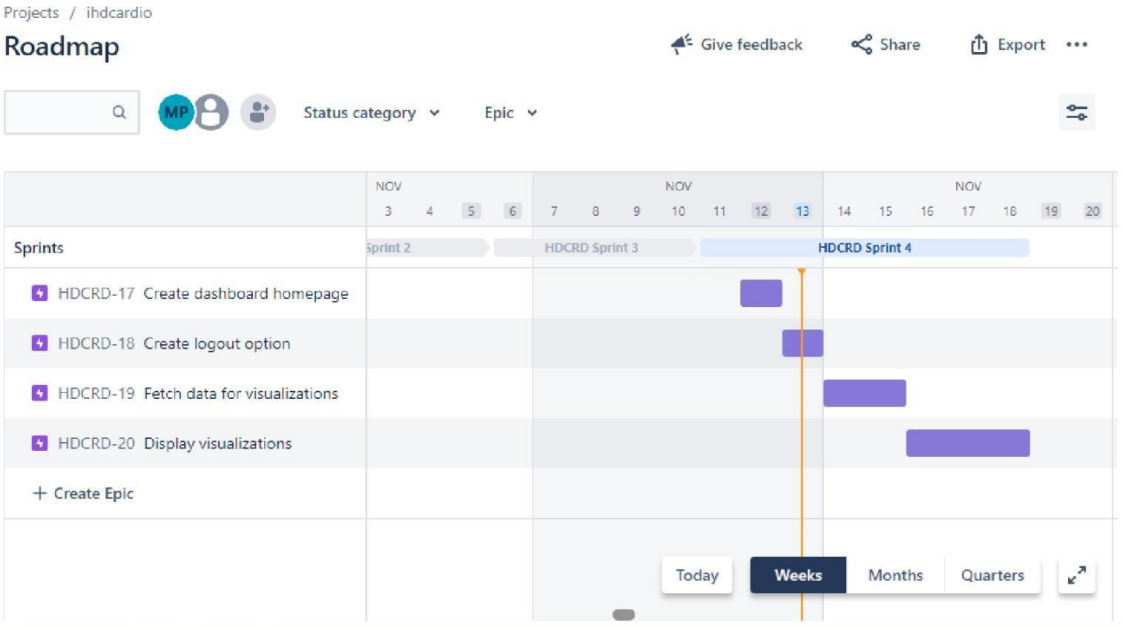
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	13	6 Days	24 Oct 2022	29 Oct 2022	13	29 Oct 2022
Sprint-2	13	6 Days	31 Oct 2022	05 Nov 2022	13	05 Nov 2022
Sprint-3	13	6 Days	07 Nov 2022	12 Nov 2022	13	12 Nov 2022
Sprint-4	13	6 Days	14 Nov 2022	19 Nov 2022	13	19 Nov 2022

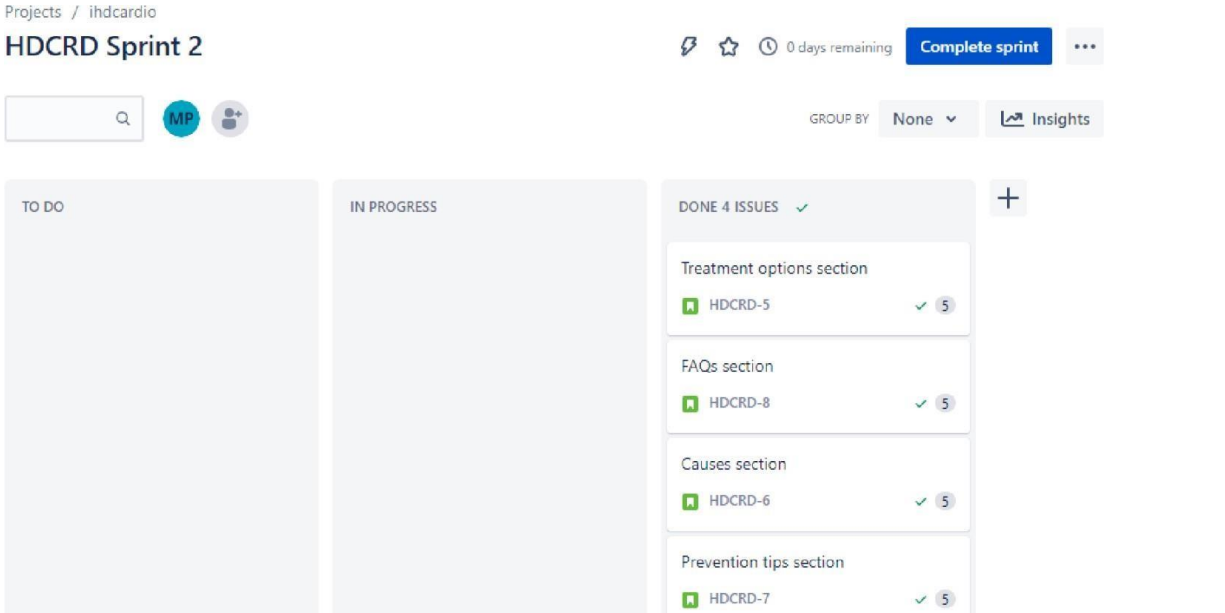
REPORTS FROM JIRA:






Projects / ihdcardio
Backlog
MP
Epic
Insights
HDCRD Sprint 4 11 Nov – 18 Nov (4 issues)
5 5 10
Complete sprint
HDCRD-13 Dashboard - Homepage
5 DONE
HDCRD-14 Dashboard - Logout Option
5 DONE
HDCRD-15 Dashboard - Fetching Data for Visualizations
5 IN PROGRESS
HDCRD-16 Dashboard - Visualization Pages
5 TO DO
Create issue


Projects / ihdcardio
Roadmap
Give feedback
Share
Export
MP
Status category
Epic
NOV
3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
Sprints
Sprint 2
HDCRD Sprint 3
HDCRD Sprint 4
HDCRD-17 Create dashboard homepage
HDCRD-18 Create logout option
HDCRD-19 Fetch data for visualizations
HDCRD-20 Display visualizations
Create Epic
Today
Weeks
Months
Quarters


Projects / ihdcardio
HDCRD Sprint 2
0 days remaining
Complete sprint
MP
GROUP BY
None
Insights
TO DO
IN PROGRESS
DONE 4 ISSUES
Treatment options section
HDCRD-5
5
FAQs section
HDCRD-8
5
Causes section
HDCRD-6
5
Prevention tips section
HDCRD-7
5

CHAPTER 7
CODING & SOLUTIONING

Feature 1: Log In
login.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">
  <link rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css
" integrity="sha384-
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per.min.js" integrity="sha384-
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CmYl" crossorigin="anonymous"></script>
  <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
  <title>Log in</title>
</head>
<body>
  <div class="login">
<form action="" method="post">
  <h3 class="topic">Login</h3>
      <label class="ll">Email: </label>
      <input type="email" name="email">
      <br>
```
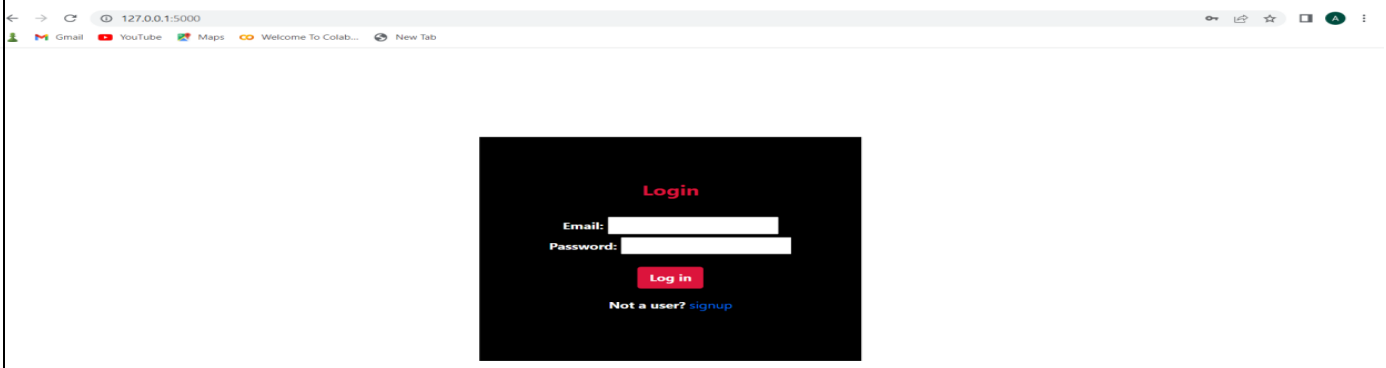

```
        <label class="ll">Password:</label>
        <input type="password" name="pwd">
        <br>
        <Button class="btn">Log in</Button>
        </form>
        <p class="ll">{{msg}}</p>

        <label class="ll">Not a user? </label>
        <a href="/signup">signup</a>
    </div>

</body>
</html>
```



Feature 2: Sign Up

```
<!DOCTYPEhtml>
    <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">
      <link                                                    rel="stylesheet"
    href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css
    " integrity="sha384-
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    W/dAiS6JXm"crossorigin="anonymous">
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      <script
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    a0b4Q" crossorigin="anonymous"></script>
      <script
                         src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstr
    ap.min.js" integrity="sha384-
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    CmYl" crossorigin="anonymous"></script>
      <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
      <title>Sign Up</title>
    </head>
    <body>
      <div class="login">
        <form action="" method="post">
          <h3 class="topic">Sign Up</h3>
          <label class="ll">Email: </labeln
          <input type="email" name="email">
          <br>
          <label class="ll">Password:</label>
          <input type="password" name="pwd">
```
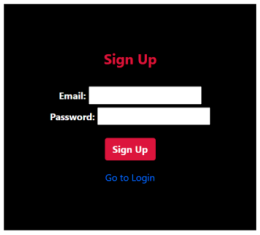

```
        <br>
        <Button class="btn">Sign Up</Button>
        </form>
        <p class="ll">{{msg}}</p>

        <a href="/">Go to Login</a>
    </div>

</body>
</html>
```



Feature 3: Home

Pagehome.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">
                                        <link                    rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css
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```

```
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  <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
  <title>Visualisation of heart disease</title>
</head>
<body>
  <section id="NavBar">
          <nav  class="navigation  navbar  navbar-expand-lg  navbar-light  sticky-top"style="background-color: #fff" ;>
      <div class="container-fluid">
       <a class="navbar-brand" href="/home">
         <img class="logo" src="{{url_for('static',filename='Logo.jpg')}}" alt="SSN-logo"width="100" height="100" />
       </a>
       <a class="topic" href="#">Visualising and Predicting Heart Disease</a>

       <div class="collapse navbar-collapse" id="navbarTogglerDemo02">
        <ul class="navbar-nav ml-auto">
         <li class="nav-item">
          <a class="nav-link" href="/home">Home Page</a>
         </li>
         <li class="nav-item">
          <a class="nav-link" href="/visualise">Visualisation</a>
         </li>
         <li class="nav-item">
          <a class="nav-link" href="/predict">Predict</a>
         </li>
         <li class="nav-item">
           <a class="nav-link" href="/logout">Log out</a>
         </li>
        </ul>
       </div>
       </div>
     </nav>
    </section>
    <div class="container">
     <section class="about">
```

```
        <h3 class="wel">Welcome to our Project</h3>
        <p>The leading cause of death in the developed world is Heart disease.
Therefore, thereneeds to be work done to help prevent the risks of having a
heart attack or stroke.
        The aim of this project to use a dataset to predict which patients are most
likely to sufferfrom a heart disease in the near future using the a set of features
given. The features include:
</p>
        <div class="list">
          <ul>
            <li>Age</li>
            <li>Sex</li>
            <li>Chest Pain Type</li>
            <li>Blood Pressure</li>
            <li>Cholesterol</li>
            <li>Fasting Blood Sugar(FBS) Over 120 or not</li>
            <li>Cholesterol</li>
            <li>EKG Results</li>
            <li>Maximum Heart Rate</li>
            <li>Exercise Angina</li>
            <li>ST Depression</li>
            <li>Slope of ST</li>
            <li>Number of vessels fluroscopy</li>
            <li>Thallium</li>
          </ul>
        </div>
        <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>
        <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>
```

Ideation Phase
Brainstorm&Idea PrioritizationTemplate

Date	11 November 2022
Team ID	PNT2022TMID35064
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 Select the Problem Statement

Template

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 →

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.

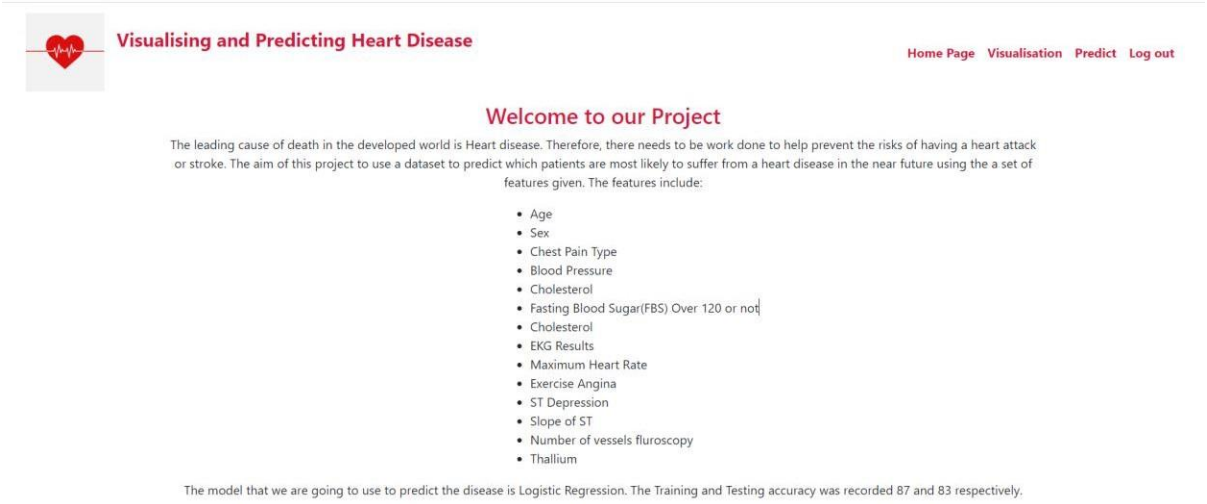
Key rules of brainstorming

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.

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.
</section>

</body>
</html>



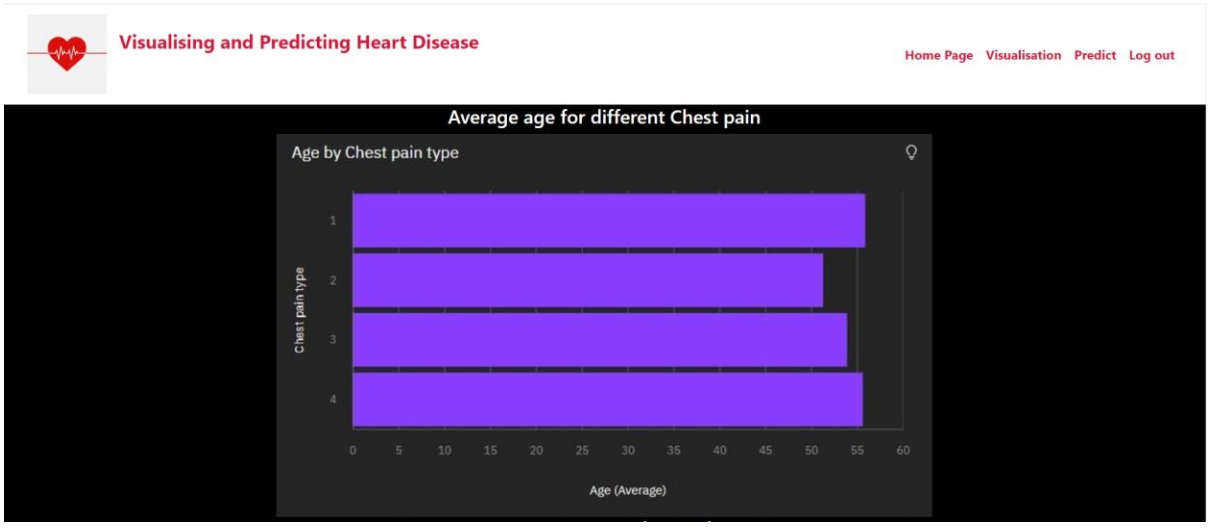
Feature 4:
Visualisations
visual.html

<!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">
<link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
<link rel="stylesheet" href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css" integrity="sha384-Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"crossorigin="anonymous">

```
        <script   src="https://code.jquery.com/jquery-3.2.1.slim.min.js"
                  integrity="sha384-
KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93
hXpG5KkN" crossorigin="anonymous"></script>
        <script
                  src="https://cdn.jsdelivr.net/npm/popper.js@1.12.9/dist/umd/pop
per.min.js"integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvf
a0b4Q" crossorigin="anonymous"></script>
         <script
                   src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstr
ap.min.js" integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PV
CmYl" crossorigin="anonymous"></script>
   <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
 <title>Visualisations</title>
</head>
<body>
 <div class="visual">
  <section id="NavBar">
          <nav  class="navigation          navbar          navbar-expand-lg
                  navbar-light       sticky-top"style="background-color: #fff" ;>
     <div class="container-fluid">
      <a class="navbar-brand" href="/home">
         <img  class="logo"  src="{{url_for('static',filename='Logo.jpg')}}"
alt="SSN-logo"width="100" height="100" />
       </a>
       <a class="topic" href="#">Visualising and Predicting Heart Disease</a>
            <button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#navbarTogglerDemo02"
           aria-controls="navbarTogglerDemo02"  aria-expanded="false"  aria-
label="Togglenavigation">
        <span class="navbar-toggler-icon"></span>
       </button>

       <div class="collapse navbar-collapse" id="navbarTogglerDemo02">
        <ul class="navbar-nav ml-auto">
         <li class="nav-item">
          <a class="nav-link" href="/home">Home Page</a>
         </li>
```

```
        <li class="nav-item">
          <a class="nav-link" href="/visualise">Visualisation</a>
        </li>
        <li class="nav-item">
          <a class="nav-link" href="/predict">Predict</a>
        </li>
        <li class="nav-item">
          <a class="nav-link" href="/logout">Log out</a>
        </li>
      </ul>
    </div>
    </div>
</nav>
```

```
</section>
<h3 class="title">Average age for different Chest pain</h3>
<img class="imgg" src="{{url_for('static',filename='AgePain.jpeg')}}" alt="">

<h3 class="title">Average exercise angina during chest pain</h3>
<img class="imgg" src="{{url_for('static',filename='Aginapain.jpeg')}}" alt="">

<h3 class="title">Bp variation with respect to age</h3>
<img class="imgg" src="{{url_for('static',filename='BPAge.jpeg')}}" alt="">

<h3 class="title">Effect of heart disease on Average of Exercise angina</h3>
<img class="imgg" src="{{url_for('static',filename='ExericeAngina.jpeg')}}" alt="">

<h3 class="title">Average age for different types of heart pain in existing heart
disease</h3>
<img class="imgg" src="{{url_for('static',filename='Agechestheart.jpeg')}}" alt="">

<h3 class="title">Maximum heart rate in existing heart disease by exercise
angina</h3>
<img class="imgg" src="{{url_for('static',filename='hranginaheart.jpeg')}}" alt="">

<h3 class="title">Serum cholesterol vs age</h3>
<img class="imgg" src="{{url_for('static',filename='cholesage.jpeg')}}" alt="">
</div>

</body>
</html>
```



Feature 5:
Prediction
predict.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">
```

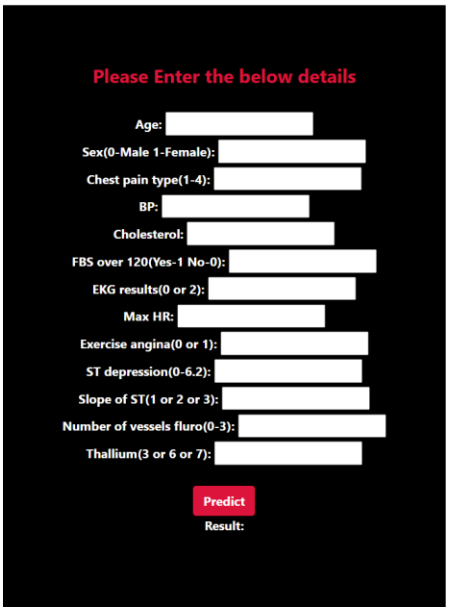
```
                                        <link                    rel="stylesheet"
href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css
" integrity="sha384-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFA
W/dAiS6JXm"crossorigin="anonymous">
        <script  src="https://code.jquery.com/jquery-3.2.1.slim.min.js"
                 integrity="sha384-
KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93
hXpG5KkN" crossorigin="anonymous"></script>
        <script
                 src="https://cdn.jsdelivr.net/npm/popper.js@1.12.9/dist/umd/pop
per.min.js" integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvf
a0b4Q" crossorigin="anonymous"></script>
         <script
                  src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstr
ap.min.js" integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PV
CmYl" crossorigin="anonymous"></script>
  <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
  <title>Prediction</title>
</head>
<body>

  <section id="NavBar">
           <nav  class="navigation          navbar          navbar-expand-lg
                 navbar-light       sticky-top"style="background-color: #fff" ;>
      <div class="container-fluid">
       <a class="navbar-brand" href="/home">
          <img class="logo" src="{{url_for('static',filename='Logo.jpg')}}"
alt="SSN-logo"width="100" height="100" />
        </a>
        <a class="topic" href="#">Visualising and Predicting Heart Disease</a>
             <button class="navbar-toggler" type="button" data-toggle="collapse" data-
target="#navbarTogglerDemo02"
          aria-controls="navbarTogglerDemo02" aria-expanded="false" aria-
label="Togglenavigation">
         <span class="navbar-toggler-icon"></span>
        </button>
```

```
<div class="collapse navbar-collapse" id="navbarTogglerDemo02">
 <ul class="navbar-nav ml-auto">
  <li class="nav-item">
   <a class="nav-link" href="/home">Home Page</a>
  </li>
  <li class="nav-item">
   <a class="nav-link" href="/visualise">Visualisation</a>
  </li>
  <li class="nav-item">
   <a class="nav-link" href="/predict">Predict</a>
  </li>
  <li class="nav-item">
     <a class="nav-link" href="/logout">Log out</a>
```

```
          </li>
        </ul>
      </div>
      </div>
  </nav>
</section>
<div class="login ag">
  <h3 class="topic">Please Enter the below details</h3>
  <form action="/predict" method="post">
      <label class="ll">Age: </label>
      <input type="text" name="n1">
      <br>
      <label class="ll">Sex(0-Male 1-Female): </label>
      <input type="text" name="n2">
      <br>
      <label class="ll">Chest pain type(1-4): </label>
      <input type="text" name="n3">
      <br>
      <label class="ll">BP: </label>
      <input type="text" name="n4">
      <br>
      <label class="ll">Cholesterol: </label>
      <input type="text" name="n5">
      <br>
      <label class="ll">FBS over 120(Yes-1 No-0): </label>
      <input type="text" name="n6">
      <br>
      <label class="ll">EKG results(0 or 2): </label>
      <input type="text" name="n7">
      <br>
      <label class="ll">Max HR: </label>
      <input type="text" name="n8">
      <br>
      <label class="ll">Exercise angina(0 or 1): </label>
      <input type="text" name="n9">
      <br>
      <label class="ll">ST depression(0-6.2): </label>
      <input type="text" name="n10">
      <br>
      <label class="ll">Slope of ST(1 or 2 or 3): </label>
      <input type="text" name="n11">
```

```
    <br>
    <label class="ll">Number of vessels fluro(0-3): </label>
    <input type="text" name="n12">
    <br>
    <label class="ll">Thallium(3 or 6 or 7): </label>
    <input type="text" name="n13">
    <br>
    <button class="btn">Predict</button>
</form>
```

```
      <p class="ll">Result:  {{result}}</p>
    </div>

</body>
</html>
```



Integration:

app.py

```
from flask import Flask,
request,session,redirect,render_template,url_forimport numpy
as np
import pandas as pd
from sklearn.model_selection import
train_test_split from sklearn.linear_model
import LogisticRegressionfrom
sklearn.metrics import accuracy_score
import warnings
warnings.filterwarnings("ign
ore")import sqlite3

app=Flask(__name__)

#
conn=sqlite3.connect("signup.
```

```
db")# c=conn.cursor()
# arr=c.execute("SELECT *FROM
person").fetchall()# conn.commit()
#
conn.close()
# print(arr)
```

```
@app.route("/",methods=['GET','P
OST'])def main():
   msg=""
   if(request.method=="PO
   ST"):
      email=request.form["email"]
      passwd=request.form["pwd"]
      conn=sqlite3.connect("signup
      .db")c=conn.cursor()
               c.execute("SELECT    *          FROM  person     WHERE
                                    email='"+email+"'andpwd='"+passwd+"'")
      r=c.fetchal
      l()print(r)
      for i in r:
         if(email==i[0] and
            passwd==i[1]):return
            redirect(url_for("home"))
      else:
         msg="Please enter valid username and
   password"return
   render_template("login.html",msg=msg)

@app.route("/signup",methods=['GET','PO
ST'])def signup():
   msg=""
   if(request.method=="PO
   ST"):
      if(request.form["email"]!="" and
         request.form["pwd"]!=""):
         email=request.form["email"]
         passwd=request.form["pwd"]
         conn=sqlite3.connect("signup.db")
         c=conn.cursor()
         c.execute("INSERT INTO person
         VALUES('"+email+"','"+passwd+"')")msg="Account created"
         arr=c.execute("SELECT *FROM
         person").fetchall()print(arr)
         conn.commi
         t()
         conn.close()
      else:
```

```
            msg="Input fields are empty"
    return render_template("signup.html",msg=msg)

@app.route("/hom
e")def home():
    return render_template("home.html")

@app.route("/logo
ut")def logout():
    return redirect(url_for("main"))

@app.route("/visuali
se")def visualise():
    return render_template("visual.html")
```

```
@app.route("/predict",methods=["GET","P
OST"])def predict():
   res=""
   if(request.method=="PO
   ST"):
                                                    heart_data =
pd.read_csv(r"C:\Users\abira\Desktop\IBM\venv\Heart_Disease_Predi
      ction.csv") X = heart_data.drop(columns='Heart Disease', axis=1)
      Y = heart_data['Heart Disease']
        X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2,
stratify=Y,random_state=2)
      model =
      LogisticRegression()
      model.fit(X_train,
      Y_train)

      n1=request.form['n1'
      ]
      n2=request.form['n2'
      ]
      n3=request.form['n3'
      ]
      n4=request.form['n4'
      ]
      n5=request.form['n5'
      ]
      n6=request.form['n6'
      ]
      n7=request.form['n7'
      ]
      n8=request.form['n8'
      ]
      n9=request.form['n9'
      ]
      n10=request.form['n
      10']
      n11=request.form['n
      11']
      n12=request.form['n
      12']
      n13=request.form['n
```

```
13']

    if(n1!="" and n2!="" and n3!="" and n4!="" and n5!="" and n6!="" and
n7!="" and n8!=""and n9!="" and n10!="" and n11!="" and n12!="" and
n13!=""):
        t1=(float)(n1)
        t2=(float)(n2)
        t3=(float)(n3)
        t4=(float)(n4)
        t5=(float)(n5)
        t6=(float)(n6)
        t7=(float)(n7)
        t8=(float)(n8)
        t9=(float)(n9)
        t10=(float)(n
        10)
        t11=(float)(n
        11)
        t12=(float)(n
        12)
        t13=(float)(n
        13)
        input_data=(t1,t2,t3,t4,t5,t6,t7,t8,t9,t10,t11,t12,t13)
        input_data_as_numpy_array= np.asarray(input_data)
        input_data_reshaped =
        input_data_as_numpy_array.reshape(1,-1)prediction =
        model.predict(input_data_reshaped)
        if(prediction==["Absence"]):
          res="Yayy! The Probability that you may get a heart disease
        is Low :)"else:
          res="Oh no! The Probability that you may get a heart disease is High :("
```

```
        else:
            res="Please enter values in all the
    fields" return
    render_template("predict.html",result=res
    )

if __name_=="_
    main__":
    app.run(debug=
    True)
```

Styleshe
et
styles,cs
s

```
.visual{
    text-align: center;
    background-color:
    #000;
}
.topic{
    text-decoration:
    none;font-size:
    1.5em; color:
    crimson;
    font-weight:
    bolder; margin-
    bottom: 32px;
}
.topic:hover{
    color:
    crimson;
    text-decoration: none;
}
.navbar-light .navbar-nav .nav-item
    .nav-link{color:crimson;
    font-weight: bold;
}
.navbar-light .navbar-nav .nav-item .nav-
```

```
   link:hover{color:black;
}
.about{
   text-align: center;
}
.list{
   text-align:
   justify;margin-
   left: 38%;
}
.wel{
   color: crimson;
}
.login{
   text-align: center;
   margin-top: 10%;
   background-color:
   black;margin-left:
   35%;
   padding: 5%;
   width: fit-
   content;
}
```

```
.ll{
   color: #fff;
   font-weight: bold;
}
.btn{
   margin-top: 16px;
   background-color:
   crimson;color: #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	PNT2022TMID35064
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

Date	18 November 2022
Team ID	PNT2022TMID35064
Project Name	Visualizing and Predicting Heart Diseaseswith an Interactive Dash Board
Maximum Marks	4 Marks

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

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 RESULTS

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.