VISUALIZING AND PREDICTING HEART DISEASES WITH

AN INTERACTIVE DASHBOARD

***Team ID* – PNT2022TMID53162**

- Submitted by

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CHAPTER 1 INTRODUCTION:

1.1 : 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.

1.2 : 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 treated appropriately. 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 in the 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

2.1 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 the defined 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 and the 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 upcoming model such as detecting coronary heart disease using artificial neural network and other algorithms of machine and deep learning.

2.2 REFERENCES

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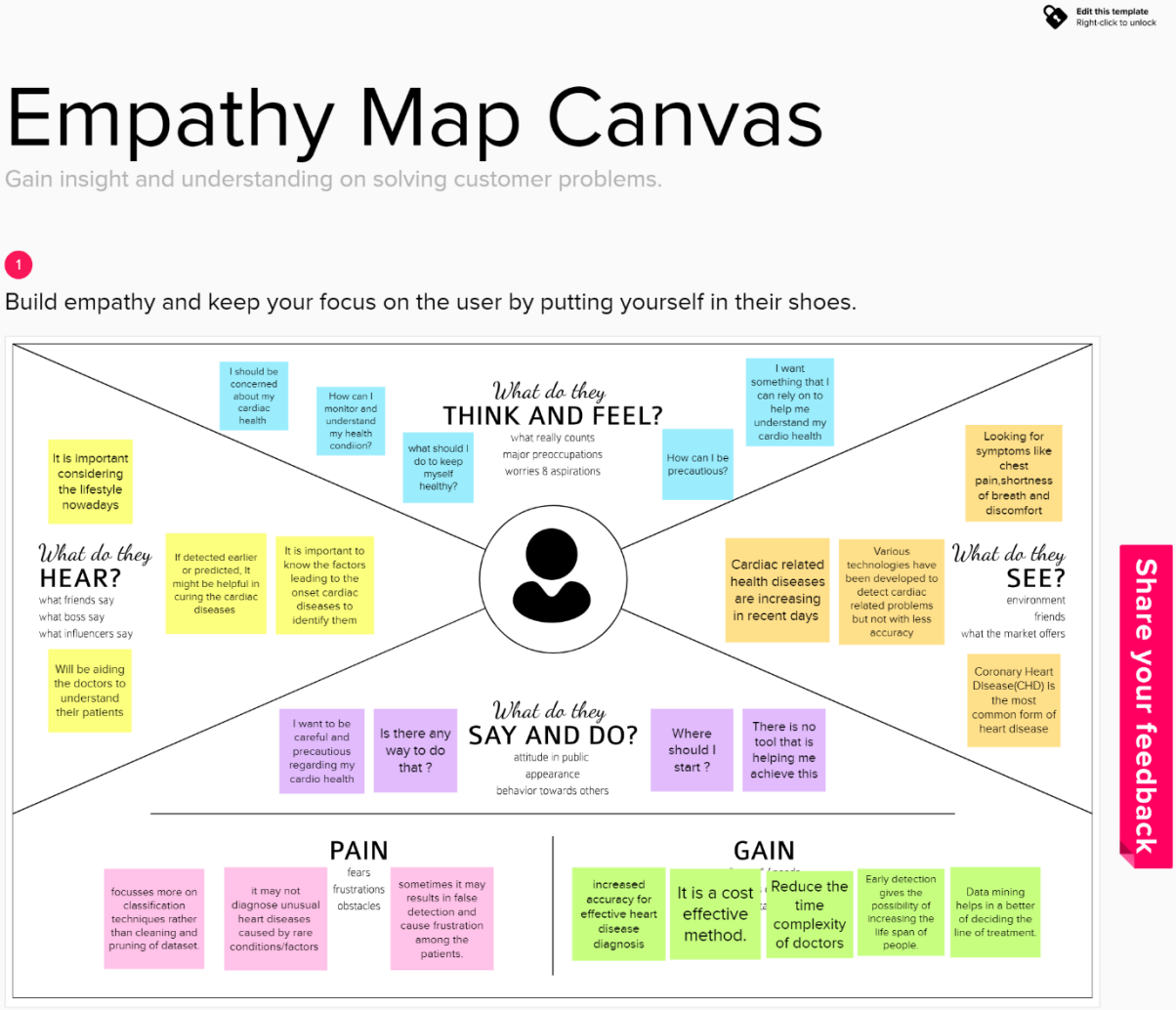
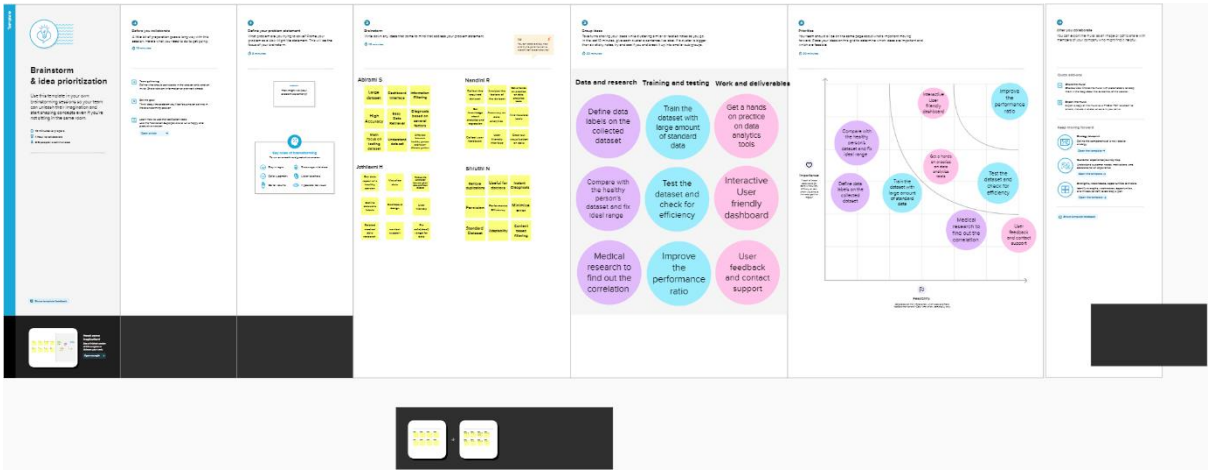
CHAPTER 3 IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTORMING



3.1 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	To predict whether the patient has heart disease or not.
2.	Idea / Solution description	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.
3.	Novelty / Uniqueness	Our application has one of the smoothest user interfaces on the internet making it easy for the user to find their needs quickly and efficiently. And the tool utilizes best machine learning algorithms for better prediction. There's separate sections for viewing treatment options, warning signs of cardiac arrest, risk factors and causes of various types of heart diseases.
4.	Social Impact / Customer Satisfaction	Users can find out if they have heart diseases very easily hence minimising death rate around the world.
5.	Business Model (Revenue Model)	Not for profit model.
6.	Scalability of the Solution	A future update shall comprise of section for viewing renowned cardiologists and scan centres in their city.

3.1PROBLEM 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 behavioural 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

Project Design Phase-I - Solution Fit Template

Project Title: Visualizing and Predicting Heart Diseases with an Interactive Dash Board

Team ID : PNT2022TMID53162

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Doctors, Medical professionals and patients or people who want to know whether they are prone to heart disease all come under individual users.

6. CUSTOMER CONSTRAINTS CC

1. Expenses in treating heart diseases.
2. Patient may not have time to visit a professional doctor
3. Doctors may be unavailable

5. AVAILABLE SOLUTIONS AS

Many different test are used to diagnose heart disease.

i. ECG
ii. Holter monitoring
iii. Echocardiogram
iv. Exercise test or stress tests
v. CT or MRI scan
vi. Cardiac catheterization

Explore AS, differentiate

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

2. JOBS-TO-BE-DONE / PROBLEMS J&P

The jobs to be done are,

1. Upload the dataset
2. Preprocess the dataset.
3. Exploring the dataset
4. Perform metrics and rules.
5. Visualizing the data

The problems are,

1. Wrong input
2. Data latency
3. Poor network standard

9. PROBLEM ROOT CAUSE RC

i. Unhealthy lifestyle of people.
ii. Testing of disease in the later stage.
iii. Expensive treatment for treating it.
iv. High death ratio due to heart disease.

7. BEHAVIOUR BE

The behavior includes,

i. Can easily visualize changes according to the data given.
ii. Easy to use.
iii. Customizable according to user preferences.

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

3. TRIGGERS TR

The triggers of the solution are,

1. Diagnosing heart disease at end stage.
2. Increased death ratio due to heart diseases.

4. EMOTIONS: BEFORE / AFTER EM

Before: Not following a healthy lifestyle and testing for heart disease only after getting some symptoms.

After: Gets to know about the chance of having heart disease in future and lead a healthy lifestyle accordingly.

10. YOUR SOLUTION

A system that provides visualization and prediction whether or not a person has heart disease. The user feeds in the necessary data required and system outputs the possibility of the person having a heart disease

8. CHANNELS of BEHAVIOUR CH

8.1 OFFLINE

As Patients use and share their experience, other patients are introduced to it. For Medical Institutions, a group of professionals are involved and through word-of-mouth, other Medical Institutions and individuals will become aware of this application.

8.2 ONLINE

The system can be accessed through modern-day browsers like Chrome, Safari, Firefox, etc.

CHAPTER 4 REQUIREMENT ANALYSIS

4.1 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.

4.2 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

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	03 October 2022
Team ID	PNT2022TMID53162
Project Name	Project - Visualising and Prediction of heart disease dashboard
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User SignUp	SignUp through Form SignUp through Gmail
FR-2	Credential Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User Login	Login through Form
FR-4	Forgot password	OTP via email
FR-5	Data collection	User(patient) uploads the data Admin uploads the data to train the machine.

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	**Reliability**	The structure must be reliable and strong in giving the functionalities. The progressions made by the Programmer must be Project pioneer and in addition the Test designer.
NFR-2	**Maintainability**	The system watching and upkeep should be fundamental and focus in its approach. There should not be an excess of occupations running on diverse machines to avoid lapsing.
NFR-3	**Performance**	The structure should not capitulate when various users would use everything the while.

CHAPTER 6 PROJECT PLANNING & SCHEDULING

SPRINT PLANNING & ESTIMATION:

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

Date	22 October 2022
Team ID	PNT2022TMID53162
Project Name	Project - Visualizing and predicting heart disease 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	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	5	High	Abirami , Shruthi
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	3	High	Nandini , Jothilaxmi
Sprint-1		USN-3	As a user, I can register for the application through Facebook	2	Low	Abirami
Sprint-1		USN-4	As a user, I can register for the application through Google	2	Medium	Jothilaxmi, Nandini
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	3	High	Shruthi
Sprint-2	Dashboard	USN-6	As a User, I can view my complete medical analysis & accuracy and prediction of heart disease in a dashboard	5	High	Abirami , Jothilaxmi , Nandini , Shruthi
Sprint-2	User entry	USN-7	As a User, I can enter my personal details for analysis	3	High	Abirami
Sprint-2		USN-8	As a User, I can entry my medical records & symptoms	3	High	Jothilaxmi
Sprint-3	User profile	USN-9	As a user, I can update the health details of users.	5	High	Nandhini
Sprint-3	Helpdesk	USN-10	As a user, I can post my queries & view the frequently asked question (FAQ)	5	High	Shruthi
Sprint-3		USN-11	As an admin, I can view the user queries	3	High	Abirami , Jothilaxmi , Nandini , Shruthi

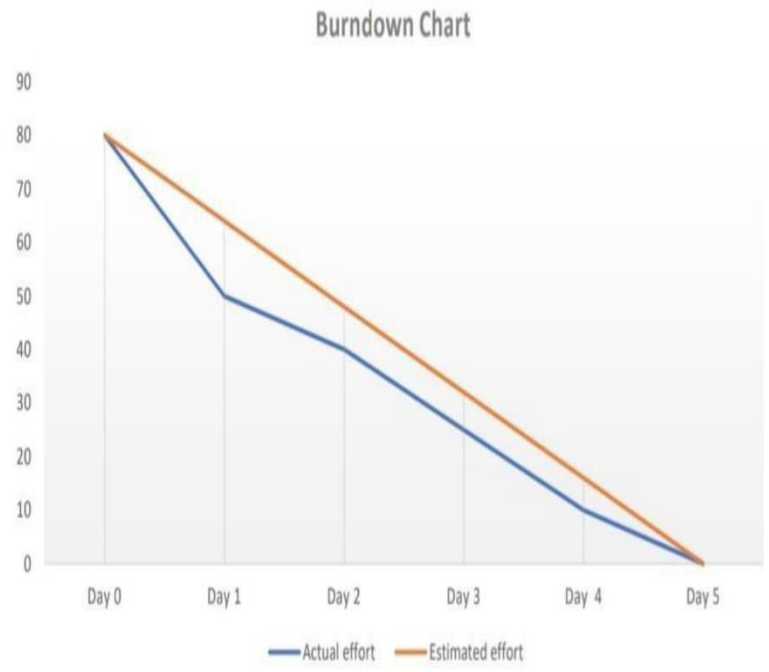
Sprint-4	Rating	USN-12	As a user, I can rate the app and give feedback	2	Low	Nandini
Sprint-4	User profile	USN-13	As an admin, I can update the health details of users.	5	High	Abirami
Sprint-4		USN-14	As an admin, I can add or delete users.	3	High	Shruthi
Sprint-4		USN-15	As an admin, I can manage the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

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

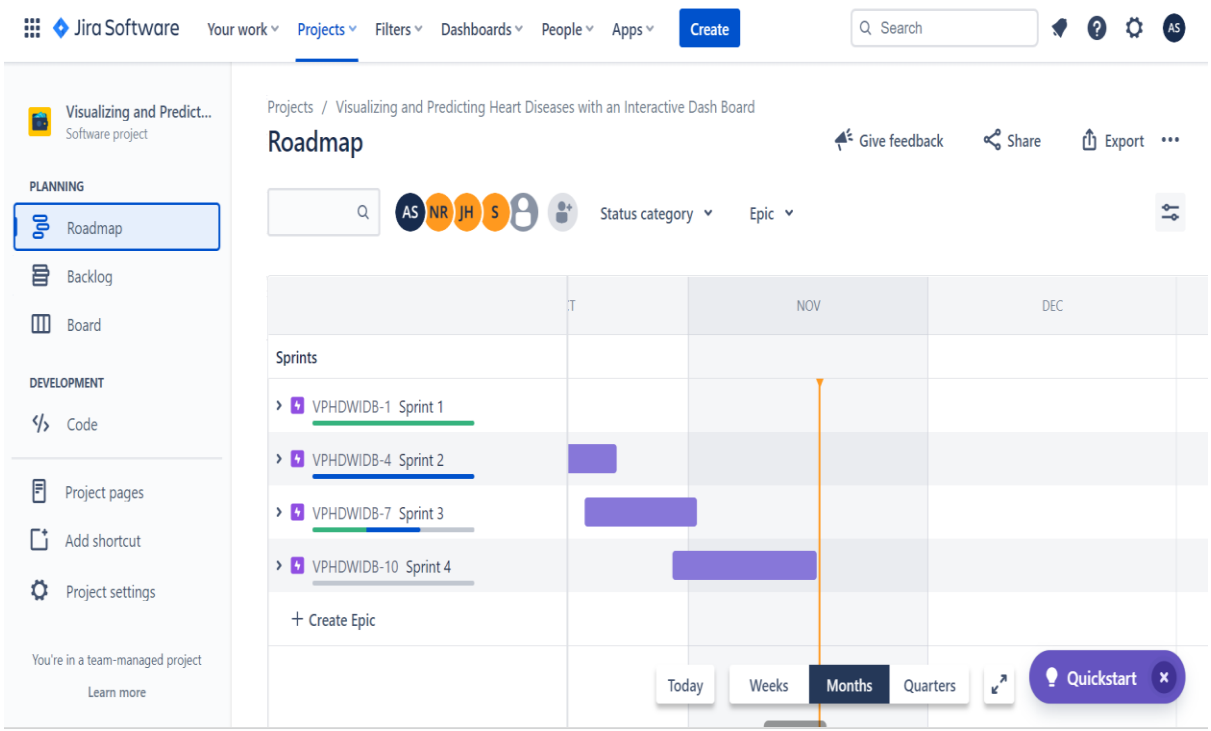
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	13	6 Days	24 Oct 2022	29 Oct 2022	13	29 Oct 2022
Sprint-2	13	6 Days	31 Oct 2022	05 Nov 2022	13	05 Nov 2022
Sprint-3	13	6 Days	07 Nov 2022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

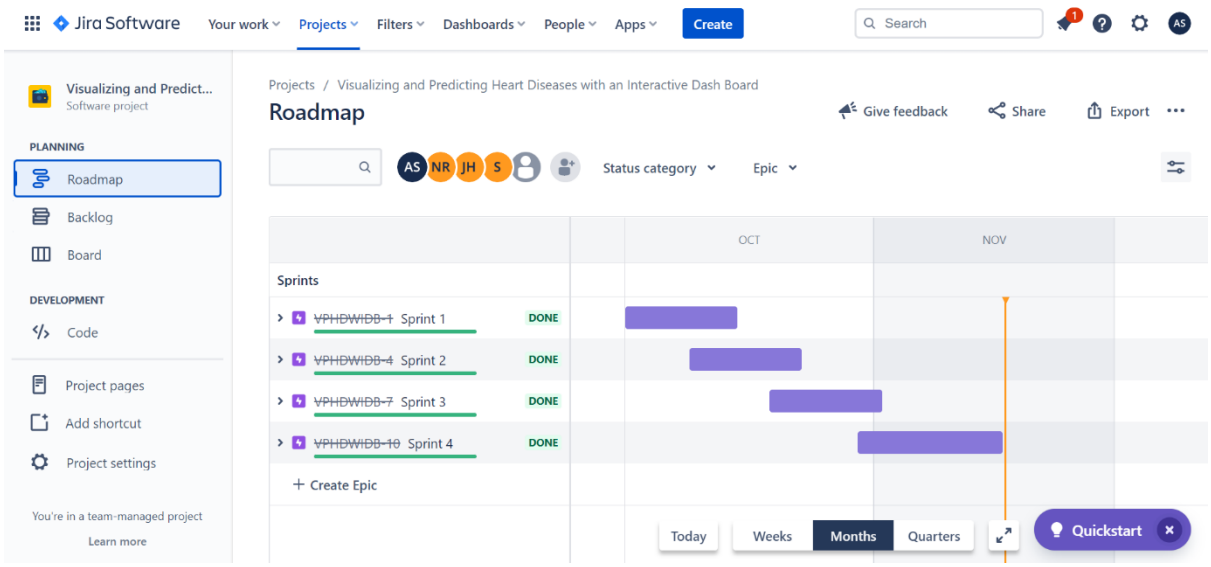
Velocity:

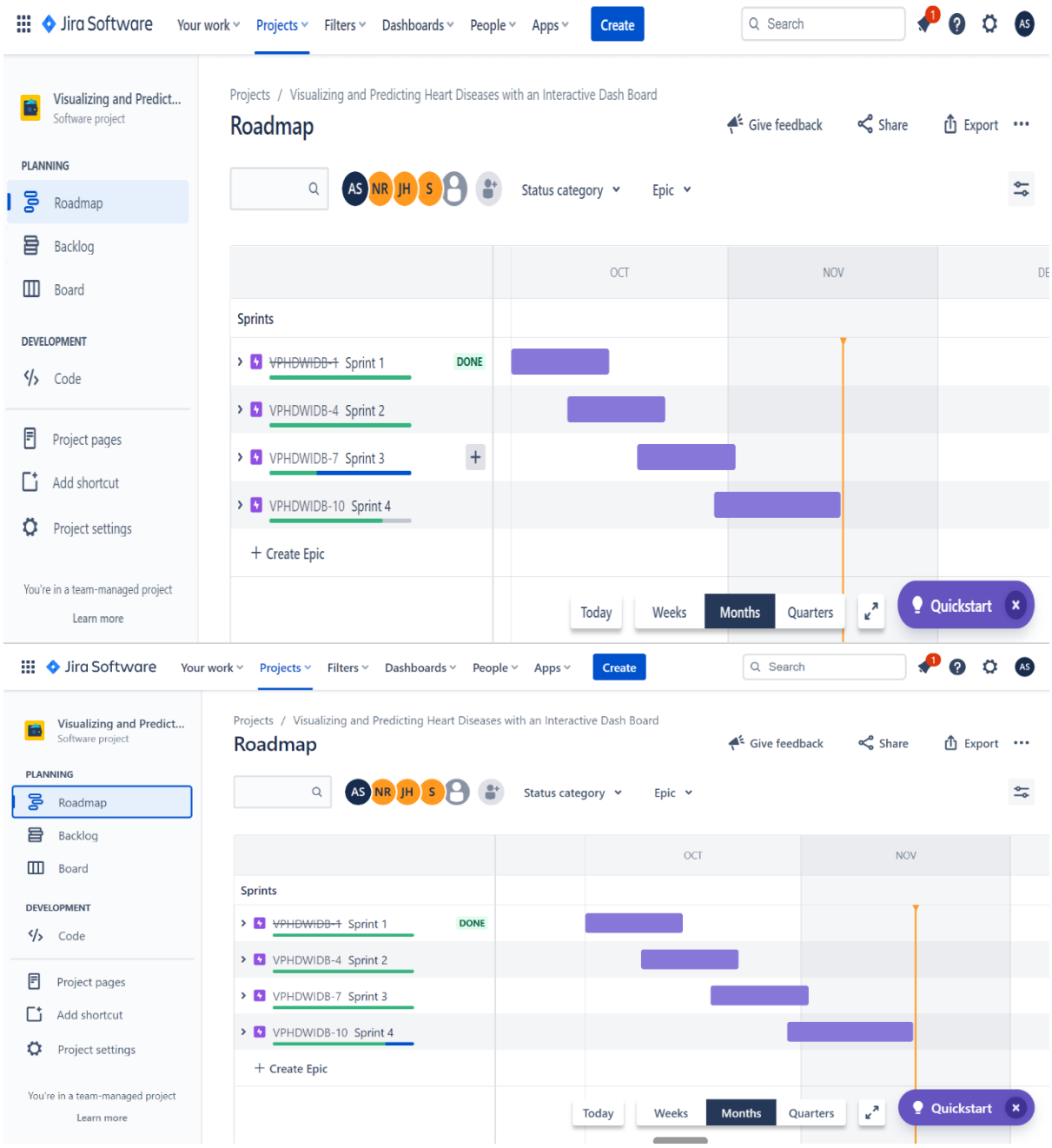
Imagine we have a 6-day sprint duration, and the velocity of the team is 13 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)



REPORTS FROM JIRA:







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Projects
Filters
Dashboards
People
Apps
Create
Search
Visualizing and Predict...
Software project
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Roadmap
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Code
Project pages
Add shortcut
Project settings
You're in a team-managed project
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Share
Export
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Epic
OCT
NOV
Sprints
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DONE
VPHDWIDB-4 Sprint 2
VPHDWIDB-7 Sprint 3
VPHDWIDB-10 Sprint 4
Create Epic
Today
Weeks
Months
Quarters
Quickstart

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-
Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">
   <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-
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crossorigin="anonymous"></script>
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crossorigin="anonymous"></script>
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integrity="sha384-
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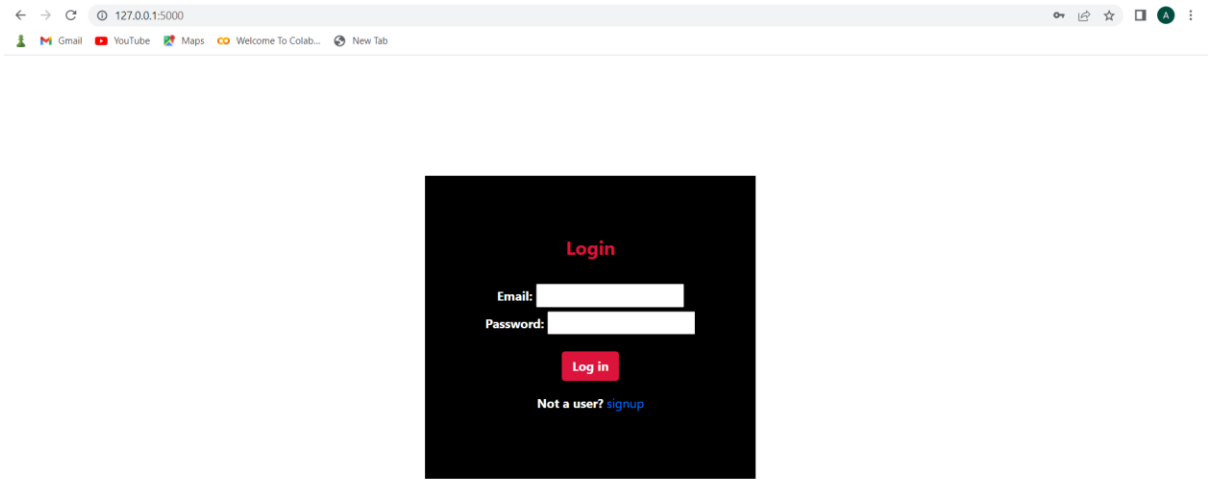
crossorigin="anonymous"></script>
   <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
   <title>Log in</title>
</head>
<body>
   <div class="login">
      <form action="" method="post">
         <h3 class="topic">Login</h3>
         <label class="ll">Email: </label>
         <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
signup.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+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">
    <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-
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crossorigin="anonymous"></script>
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crossorigin="anonymous"></script>
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integrity="sha384-
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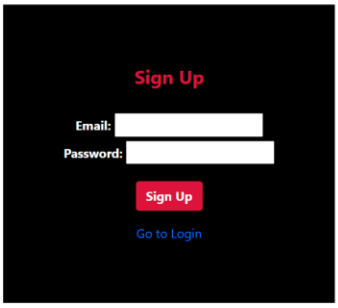
crossorigin="anonymous"></script>
    <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
    <title>Sign Up</title>
</head>
<body>
    <div class="login">
        <form action="" method="post">
            <h3 class="topic">Sign Up</h3>
            <label class="ll">Email: </label>
```

```
        <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 Page

home.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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crossorigin="anonymous">
        <script    src="https://code.jquery.com/jquery-3.2.1.slim.min.js"    integrity="sha384-
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```
        <script src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstrap.min.js"
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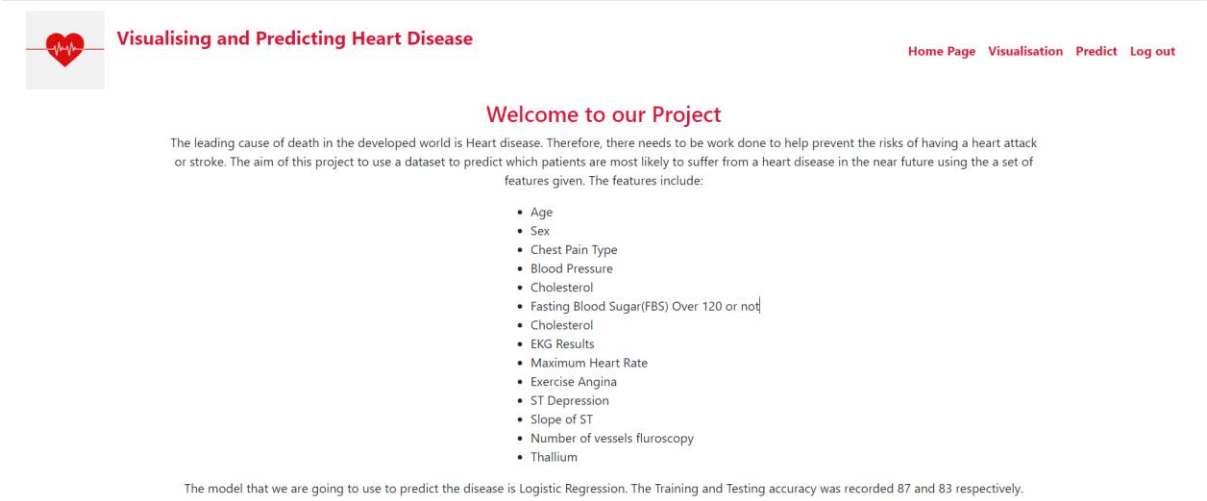
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl"
crossorigin="anonymous"></script>
   <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
   <title>Visualisation of heart disease</title>
</head>
<body>
   <section id="NavBar">
            <nav class="navigation 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, there
needs 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 suffer
from 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>

</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/GpGFF93hXpG5KkN" crossorigin="anonymous"></script>
        <script src="https://cdn.jsdelivr.net/npm/popper.js@1.12.9/dist/umd/popper.min.js" integrity="sha384-ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q" crossorigin="anonymous"></script>
        <script src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstrap.min.js" integrity="sha384-JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl" 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="Toggle navigation">
          <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="">

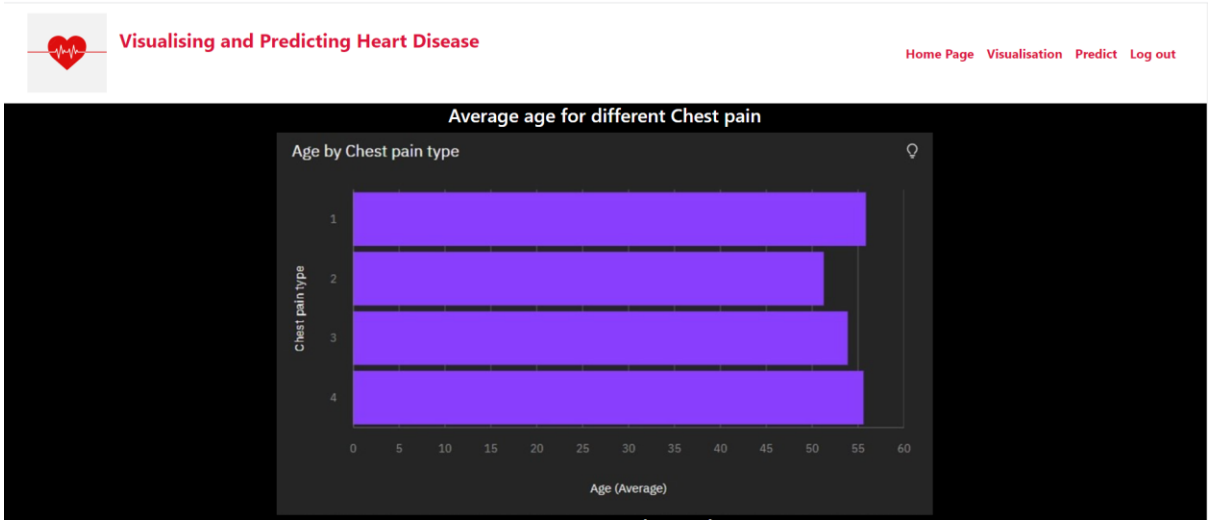
    <h3 class="title">Effect of heart disease on Average of Exercise angina</h3>
    <img class="imgg" src="{{url_for('static',filename='ExericeAngina.jpeg')}}" alt="">

    <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+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm"
crossorigin="anonymous">
        <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-
KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN"
crossorigin="anonymous"></script>
        <script src="https://cdn.jsdelivr.net/npm/popper.js@1.12.9/dist/umd/popper.min.js"
integrity="sha384-
ApNbgh9B+Y1QKtv3Rn7W3mgPxhU9K/ScQsAP7hUibX39j7fakFPskvXusvfa0b4Q"
crossorigin="anonymous"></script>
         <script src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstrap.min.js"
integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl"
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="Toggle
navigation">
           <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_for
import numpy as np
import pandas as pd
from sklearn.model_selection import train_test_split
from sklearn.linear_model import LogisticRegression
from sklearn.metrics import accuracy_score
import warnings
warnings.filterwarnings("ignore")
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','POST'])
def main():
    msg=""
    if(request.method=="POST"):
        email=request.form["email"]
        passwd=request.form["pwd"]
        conn=sqlite3.connect("signup.db")
        c=conn.cursor()
                c.execute("SELECT * FROM person WHERE email='"+email+"'and
pwd='"+passwd+"'")
        r=c.fetchall()
        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','POST'])
def signup():
    msg=""
    if(request.method=="POST"):
        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.commit()
            conn.close()
        else:
            msg="Input fields are empty"
    return render_template("signup.html",msg=msg)

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

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

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

```
@app.route("/predict",methods=["GET","POST"])
def predict():
   res=""
   if(request.method=="POST"):
                                                                heart_data =
pd.read_csv(r"C:\Users\abira\Desktop\IBM\venv\Heart_Disease_Prediction.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['n10']
      n11=request.form['n11']
      n12=request.form['n12']
      n13=request.form['n13']

     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)(n10)
         t11=(float)(n11)
         t12=(float)(n12)
         t13=(float)(n13)
         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)
```

Stylesheet
styles,css

```
.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 Phase

Model Performance Test

Date	10 November 2022
Team ID	PNT2022TMID53162
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

CHAPTER 9 **Acceptance Testing**

UAT Execution & Report Submission

Date	03 November 2022
Team ID	PNT2022TMID53162
Project Name	Project -Visualizing and predicting heart disease with an interactive dashboard
Maximum Marks	4 Marks

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User 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

5.1 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 no 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.

9 APPENDIX

SourceCode:https://github.com/IBM-EPBL/IBM-Project-18300-1659682764/tree/main/Project%20Development%20Phase

GitHub & Project Demo Link:

GitHub Link: https://github.com/IBM-EPBL/IBM-Project-18300-1659682764

Project Demo link: