

VISUALIZING AND PREDICTING HEART DISEASES WITH AN INTERACTIVE DASHBOARD

Team ID – PNT2022TMID34562

- Submittedby

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CHAPTER1

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 quite 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

1Ali, Liaqat, et al, "An optimized stacked support vector machines based expert system for the effective prediction of heart failure." IEEE Access 7 (2019): 54007-54014. www.ijcrt.org
© 2020 IJCRT | Volume 8, Issue 8 August 2020 | ISSN: 2320-2882 IJCRT2008170 International Journal of Creative Research Thoughts (IJCRT) www.ijcrt.org 1606

2Mohan, Senthilkumar, Chandrasegar Thirumalai, and Gautam Srivastava, "Effective heart disease prediction using hybrid machine learning techniques." IEEE Access 7 (2019): 81542-81554.

3Purushottam, Kanak Saxena and Richa Sharma, "Efficient heart disease prediction system." Procedia Computer Science 85 (2016): 962-969.

4Singh, Yeshvendra K., Nikhil Sinha, and Sanjay K. Singh, "Heart Disease Prediction System Using Random Forest", International Conference on Advances in Computing and Data Sciences. Springer, Singapore, 2016.

5Santhana Krishnan. J, Geetha S., "Prediction of Heart Disease Using Machine Learning Algorithms", 2019 1st International Conference on Innovations in Information and Communication Technology (ICIICT)

6 Bo Jin ,Chao Che, Zhen Liu, Shulong Zhang, Xiaomeng Yin, And Xiaopeng Wei, "Predicting the Risk of Heart Failure With EHR Sequential Data Modeling"

,IEEE Access 2018.

7 Aakash Chauhan , Aditya Jain , Purushottam Sharma , Vikas Deep, “Heart Disease Prediction using Evolutionary Rule Learning”, “International Conference on Computational Intelligence and Communication Technology” (CICT 2018).

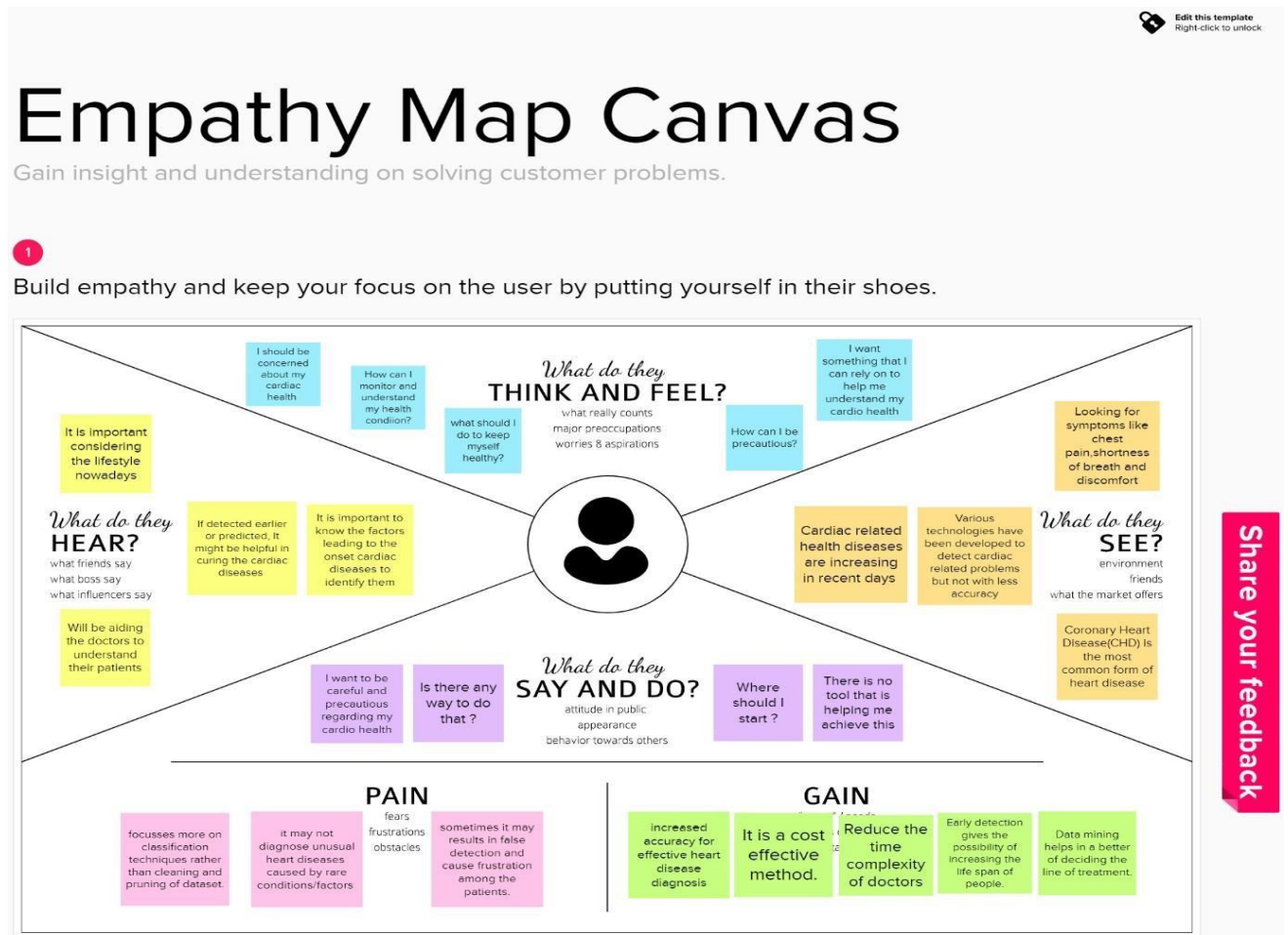
8Boshra Bahrami, Mirsaeid Hosseini Shirvani, “Prediction and Diagnosis of Heart Disease by Data Mining Techniques”, Journal of Multidisciplinary Engineering Science and Technology (JMEST) ISSN: 3159-0040 Vol. 2 Issue 2, February–2015.

9 M.Satish, D Sridhar, “Prediction of Heart Disease in Data Mining Technique”, International Journal of Computer Trends & Technology (IJCTT), 2015.

10 Lokanath Sarangi, Mihir Narayan Mohanty, Srikanta Pattnaik, “An Intelligent Decision Support System for Cardiac Disease Detection”, IJCTA, International Press 2015.

CHAPTER 3 IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



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.

3.1 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 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 by tapping into existing mediums and channels of behaviour.

3. TRIGGERS The triggers of the solution are, <ol style="list-style-type: none">1. Diagnosing heart disease at end stage.2. Increased death ratio due to heart diseases.	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 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.
4. EMOTIONS: BEFORE / AFTER 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.		

CHAPTER 4

REQUIREMENT ANALYSIS

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.

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.

CHAPTER5

PROJECTDESIGN

Data Flow Diagrams ,Solution& TechnicalArchitecture

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

Date	17 October 2022
Team ID	PNT2022TMD34562
Project Name	Project - Visualizing and Predicting Heart Diseases with an Interactive 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 Registration	Enables users to make registration through a Google account, phone number, and online application forms.
FR-2	User Confirmation	Confirmation mail or message is sent to the user immediately after registration.
FR-3	User's present status updation	Gets the user's important medical conditions like heart beat rate, blood pressure, blood sugar level and cholesterol level.
FR-4	Data Visualization	The present medical status of the patient is visualized for better interpretation using IBM Cognos Analytics.
FR-5	Disease Prediction	Uses advanced machine learning techniques to predict the presence or absence of a heart disease and also its type if the disease is present.

Non-functional Requirements:

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

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	<ul style="list-style-type: none">• Easier navigation boosts the entire product's usability, helping users enjoy all the features offered.• Our solution has better characteristics in navigation such as a hamburger menu.• The application has a simple and userfriendly graphical interface.• Any action can be performed with just a few clicks.• Gives a tour regarding the features of the dashboard for first-time users.
NFR-2	Security	<ul style="list-style-type: none">• The website does not require additional cookies to offer services.• It stores the data of the patients in a protected database.

		<ul style="list-style-type: none"> ● It confirms the user's identity before any prediction is disclosed. ● It does not allow another app or site to access data unless we intend to send data from the database to a different app or site that we don't own. ● It provides data to the intended recipients as customized by each user personally.
NFR-3	Reliability	<ul style="list-style-type: none"> ● The dashboard is accessible 24 x 7 ● It responds within the time frame needed. ● It is regularly updated as per the user requirements. ● The proposed solution provides a high degree of accuracy in the prediction of diseases.
NFR-4	Performance	<ul style="list-style-type: none"> ● The dashboard provides real-time notifications about the user condition to the intended users. ● The proposed solution offers services such as disease prediction, prevention, and treatment. ● Due to the employment of lightweight algorithms, the speed of performance of the prediction model is high.
NFR-5	Availability	<ul style="list-style-type: none"> ● The application is available 24 x 7 for users without any interruption. ● The user can access the application anytime, anywhere. ● The data is spread across clusters so that if one storage node fails the entire data is not lost.
NFR-6	Scalability	<ul style="list-style-type: none"> ● Any number of users can use the prediction model accurately without any delay at the same time using this application. ● It can be integrated with smartwatches and apps for further advancements.

Project Planning Phase

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

Product Backlog, Sprint Schedule, and Estimation

Use the below template to create product backlog and sprint schedule

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	Profile - view & update your profile	2	High	5
Sprint-1		USN-7	Change Password - user can change the password	1	High	2
Sprint-1		USN-8	Home - Analyze your Heart	2	High	5

Sprint	Functional Requirement (Epic)	User Story Number	User Story/ Task	Story Points	Priority	Team Members
Sprint-3		USN-9	The user will have to fill in the below 13 fields for the system to predict a disease -Age in Year -Gender -Chest Pain Type -Fasting Blood Sugar -Resting Electrographic Results(Restecg) -Exercise Induced Angina(Exang) -The slope of the peak exercise ST segment -CA – Number of major vessels colored by fluoroscopy -Thal -Trest Blood Pressure -Serum Cholesterol -Maximum heart rate achieved(Thalach) -ST depression induced by exercise(Oldpeak)	2	High	5
		USN-10	View Doctors - view doctor detail by searching by names or filter by specialty	1	Medium	4
Sprint-3	System Requirement	USN-11	I. Hardware Requirement i. Laptop or PC • I5 processor system or higher	2	High	2

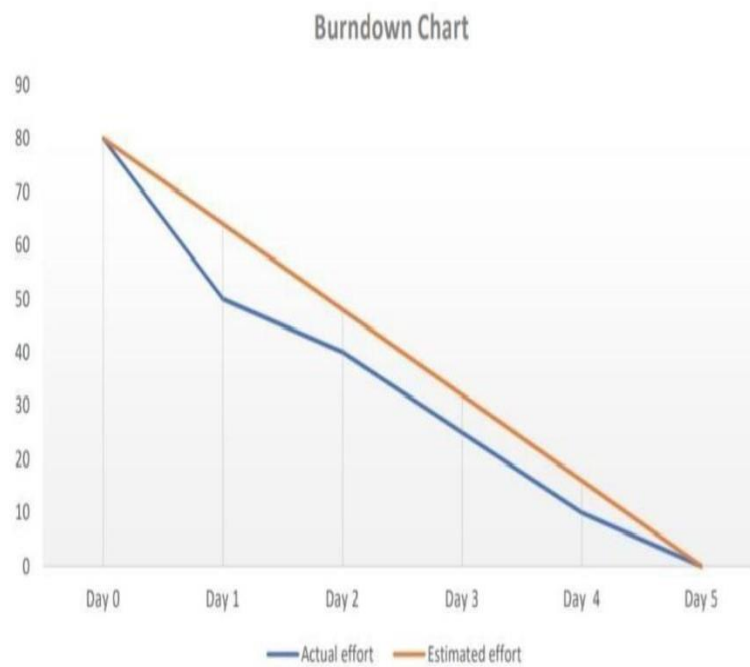
Sprint-4	Rating	USN-12	As a user, I can rate the app and give feedback	2	Low	Nandini
Sprint-4	User profile	USN-13	As an admin, I can update the health details of users.	5	High	Abirami
Sprint-4		USN-14	As an admin, I can add or delete users.	3	High	Shruthi
Sprint-4		USN-15	As an admin, I can manage the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

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

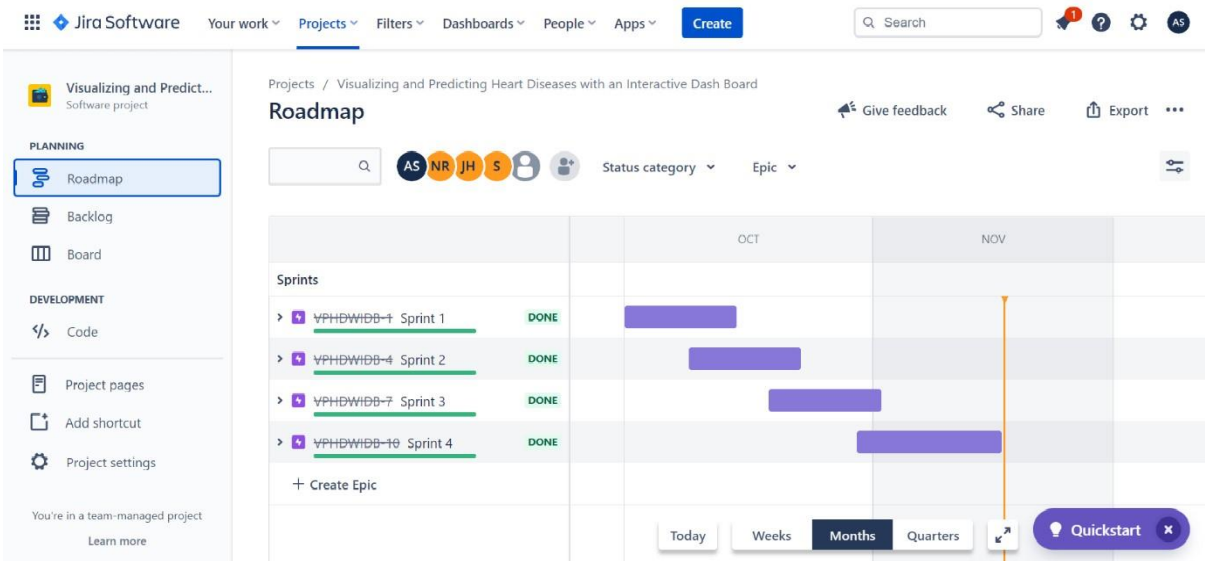
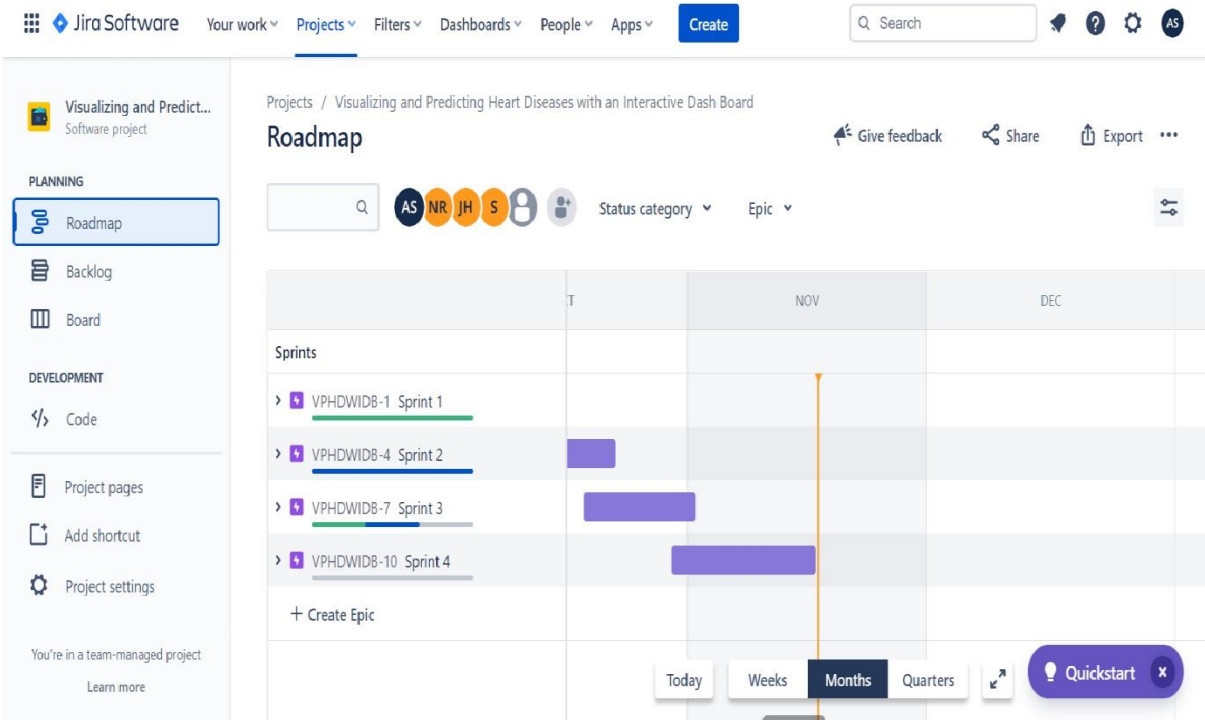
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	13	6 Days	24 Oct 2022	29 Oct 2022	13	29 Oct 2022
Sprint-2	13	6 Days	31 Oct 2022	05 Nov 2022	13	05 Nov 2022
Sprint-3	13	6 Days	07 Nov 2022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



Visualizing and Predict...
Software project

PLANNING

Roadmap

Backlog

Board

DEVELOPMENT

Code

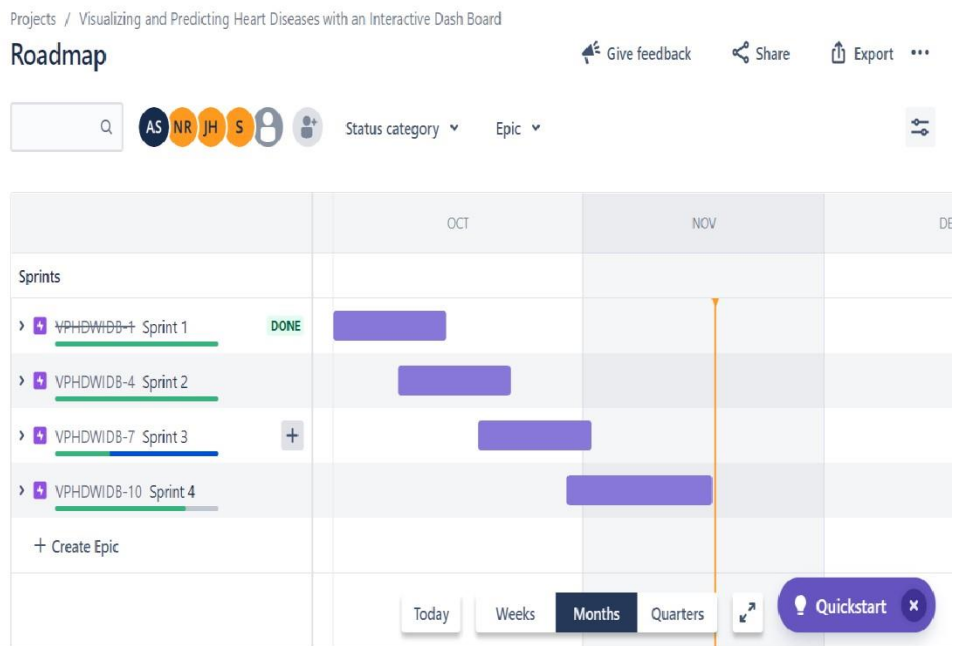
Project pages

Add shortcut

Project settings

You're in a team-managed project

Learn more



Visualizing and Predict...
Software project

PLANNING

Roadmap

Backlog

Board

DEVELOPMENT

Code

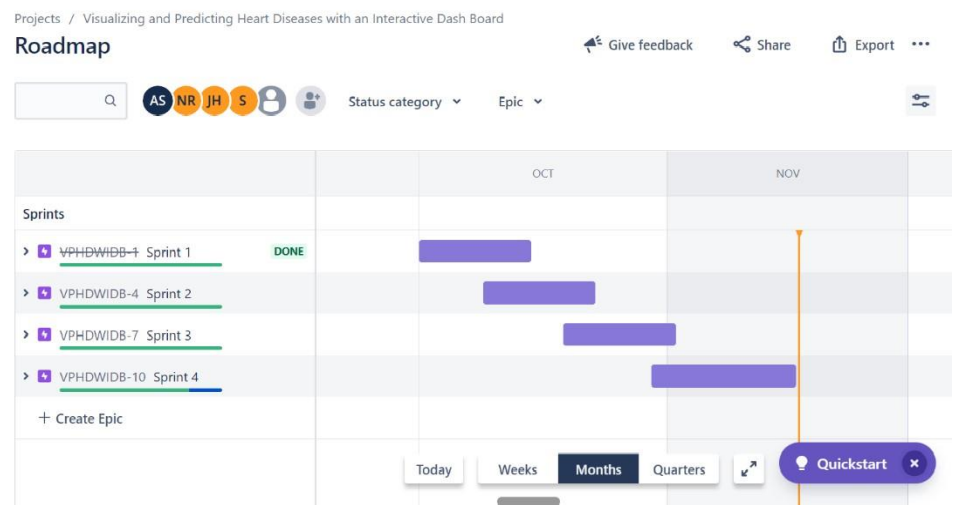
Project pages

Add shortcut

Project settings

You're in a team-managed project

Learn more



CHAPTER7

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 href="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/css/bootstrap.min.css" integrity="sha384-Gn5384xqQ1aoWXA+058RXPxPg6fy4IWvTNh0E263XmFcJlSAwiGgFAW/dAiS6JXm" rel="stylesheet" crossorigin="anonymous">
  <script src="https://code.jquery.com/jquery-3.2.1.slim.min.js" integrity="sha384-KJ3o2DKtIkvYIK3UENzmM7KCkRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5K" N" 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+76PVCmYI" 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="l1">Email: </label>
      <input type="email" name="email">
      <br>
      <label class="l1">Password:</label>
      <input type="password" name="pwd">
      <br>
      <Button class="btn">Log in</Button>
    </form>
    <p class="l1">{{ msg }}</p>
    <label class="l1">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="UTF8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=devicewidth, initialscale=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-
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crossorigin="anonymous"></script>
  <script src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstrap.min.js"
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="l1">Email </label>
```



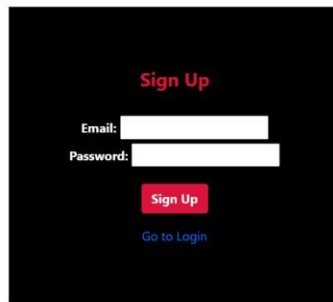
```

<input type="email" name="email">
<br>
<label class="l1">Password:</label>
<input type="password" name="pwd">
<br>
<Button class="btn">Sign Up</Button>
</form>
<p class="l1">{{ 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="UTF8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=devicewidth, initialscale=1.0">
  <link 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-
KJ3o2DKtIkVYIK3UENzmM7KChRr/rE9/Qpg6aAZGJwFDMVNA/GpGFF93hXpG5KkN"
crossorigin="anonymous"></script>
  <script src="https://cdn.jsdelivr.net/npm/popper.js@1.12.9/dist/umd/popper.min.js"
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crossorigin="anonymous"></script>

```

```

<script src="https://cdn.jsdelivr.net/npm/bootstrap@4.0.0/dist/js/bootstrap.min.js"
integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYI"
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">

</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 is 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>

```



Welcome to our Project

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 is to use a dataset to predict which patients are most likely to suffer from a heart disease in the near future using a set of features given. The features include:

- Age
- Sex
- Chest Pain Type
- Blood Pressure
- Cholesterol
- Fasting Blood Sugar(FBS) Over 120 or not
- Cholesterol
- EKG Results
- Maximum Heart Rate
- Exercise Angina
- ST Depression
- Slope of ST
- Number of vessels fluroscopy
- Thallium

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.

Feature 4: Visualisations

visual.html

```

<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF8">
  <meta http-equiv="XUA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=devicewidth, initialscale=1.0">
  <link rel="stylesheet" href="{ {url_for('static',filename='styles.css')}} ">
  <link rel="stylesheet"
href="https://cdn.jsdelivrivr.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/GpGFF93hXpG5Kk
N" 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+76PVCmYI"
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">

</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>


<h3 class="title">Average exercise angina during chest pain</h3>


<h3 class="title">Bp variation with respect to age</h3>


<h3 class="title">Effect of heart disease on Average of Exercise angina</h3>


<h3 class="title">Average age for different types of heart pain in existing heart disease</h3>

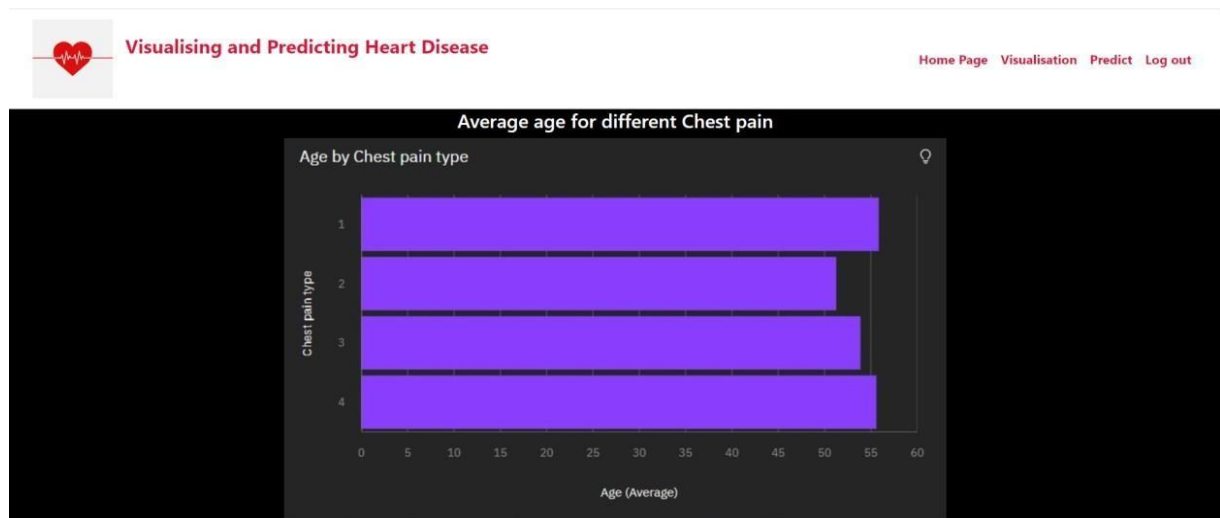

<h3 class="title">Maximum heart rate in existing heart disease by exercise angina</h3>


<h3 class="title">Serum cholesterol vs age</h3>

</div>

</body>
</html>

```



Feature 5: Prediction

predict.html

```

<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initialscale=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/GpGFF93hXpG5K
N" 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+76PVCmYI"
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">

</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="l1">Age: </label>
        <input type="text" name="n1">
        <br>
        <label class="l1">Sex(0-Male 1-Female): </label>
        <input type="text" name="n2">
        <br>
        <label class="l1">Chest pain type(1-4): </label>
        <input type="text" name="n3">
        <br>
        <label class="l1">BP: </label>
        <input type="text" name="n4">
        <br>
        <label class="l1">Cholesterol: </label>
        <input type="text" name="n5">
        <br>
        <label class="l1">FBS over 120(Yes-1 No-0): </label>
        <input type="text" name="n6">
        <br>
        <label class="l1">EKG results(0 or 2): </label>
        <input type="text" name="n7">
        <br>
        <label class="l1">Max HR: </label>
        <input type="text" name="n8">
        <br>
        <label class="l1">Exercise angina(0 or 1): </label>
        <input type="text" name="n9">
        <br>
        <label class="l1">ST depression(0-6.2): </label>
        <input type="text" name="n10">
        <br>
        <label class="l1">Slope of ST(1 or 2 or 3): </label>
        <input type="text" name="n11">
        <br>
        <label class="l1">Number of vessels fluro(0-3):
        </label>
        <input type="text" name="n12">
        <br>
        <label class="l1">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>
```

Visualising and Predicting Heart Disease

Home Page Visualisation Predict Log out

Please Enter the below details

Age:

Sex(0-Male 1-Female):

Chest pain type(1-4):

BP:

Cholesterol:

FBS over 120(Yes-1 No-0):

EKG results(0 or 2):

Max HR:

Exercise angina(0 or 1):

ST depression(0-6.2):

Slope of ST(1 or 2 or 3):

Number of vessels fluro(0-3):

Thallium(3 or 6 or 7):

Predict

Result:

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;  
}
```

CHAPTER8

TESTING

Project Development Phase

Model Performance Test

Date	10 November 2022
Team ID	PNT2022TMID34562
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 Visualizations / 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 Visualizations / Graphs - 7

UAT Execution & Report Submission

Date	03 November 2022
TeamID	PNT2022TMID34562
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 Users. 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 CaseAnalysis

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

RESULTS

Performance Metrics

1. Hours worked: 50 hours
2. Stick to Timelines: 100%
3. Stay within budget: 100%
4. Consistency of the product: 85%
6. Efficiency of the product: 85%
6. Quality of the product: 85%

ADVANTAGES & DISADVANTAGES:

ADVANTAGES:

- Smooth User Interface
- Accuracy is achieved quickly

DISADVANTAGES:

Random forest can be used for both classification and regression tasks, but it 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 of techniques 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 case of an emergency.

Thank you