VISUALIZING AND PREDICTING HEART DISEASES WITH

AN INTERACTIVE DASHBOARD

Team ID: PNT2022TMID53202

- Submitted by

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Project Report

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CHAPTER 1 INTRODUCTION:

1.1 : PROJECT OVERVIEW

Heart disease is a term used to describe a constellation of conditions that can affect the heart and/or its valves, vessels, structure, electrical system, or coronary arteries. Conditions that fall within the scope of heart disease include cardiac arrhythmias, high blood pressure, heart failure, coronary artery disease, valve disorders, and congenital heart defects, among others. Though each disease affects the heart differently, the ultimate problem with all varieties of heart disease is that, in one way or another, they can disrupt the vital pumping action of the heart. 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. By inputting information such as their blood pressure, cholesterol, and heart rate, they can find out. For better comprehension, a dashboard with a comparison tool for users' blood pressure and other metrics is also attached to the results. Random Forest Classifier is the main focus of this project. Our project's accuracy is 87%, which is higher than the majority of other systems in terms of quickly achieving accuracy.

1.2 : PURPOSE

The purpose of this study is to determine the likelihood that a patient will be diagnosed with a cardiovascular heart disease based on their medical characteristics, such as gender, age, chest pain, fasting blood sugar level, etc. Heart disease is the leading cause of death in the developed world. Since there are more and more cases of heart disease every day, it is important and concerning to anticipate any potential illnesses. This diagnosis is a difficult task that demands precision and effectiveness.

Therefore, efforts must be made to reduce the likelihood of suffering a heart attack or stroke. It is the primary cause of adult fatalities. Our initiative can determine who is most likely to be diagnosed with a cardiac condition by looking at a person's medical history. 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. Machine learning is used in a wide range of industries worldwide. The healthcare industry is not an exception. The presence or absence of locomotor disorders, heart diseases, and other conditions may depend heavily on machine learning. Such information, if anticipated well in advance, can provide valuable insights to medical professionals, who can then tailor their diagnosis and course of treatment for each patient.

CHAPTER 2 LITERATURE SURVEY

2.1 EXISTING PROBLEM

There have been quite a few studies done on using machine learning algorithms to diagnose heart disease. A reliable prediction of heart disease has been made using a variety of algorithms, including Logistic Regression, KNN, Random Forest Classifier, and others. Results show that each algorithm is capable of registering the specified objectives to varying degrees.

The decision boundary could be calculated by the model incorporating IHDPS using both the old and new deep learning and machine learning models. It made the most fundamental and significant factors/knowledge—like family history related to any heart disease—more accessible. However, the accuracy of the IHDPS model was much lower than that of new, upcoming models for detecting coronary heart disease using artificial neural networks and other machine and deep learning algorithms.

2.2 REFERENCES

[1] Animesh Hazra, Arkomita Mukherjee, Amit Gupta, Asmita Mukherjee, “Heart Disease Diagnosis and Prediction Using Machine Learning and Data Mining Techniques: A Review”, Research Gate Publications, July 2017.

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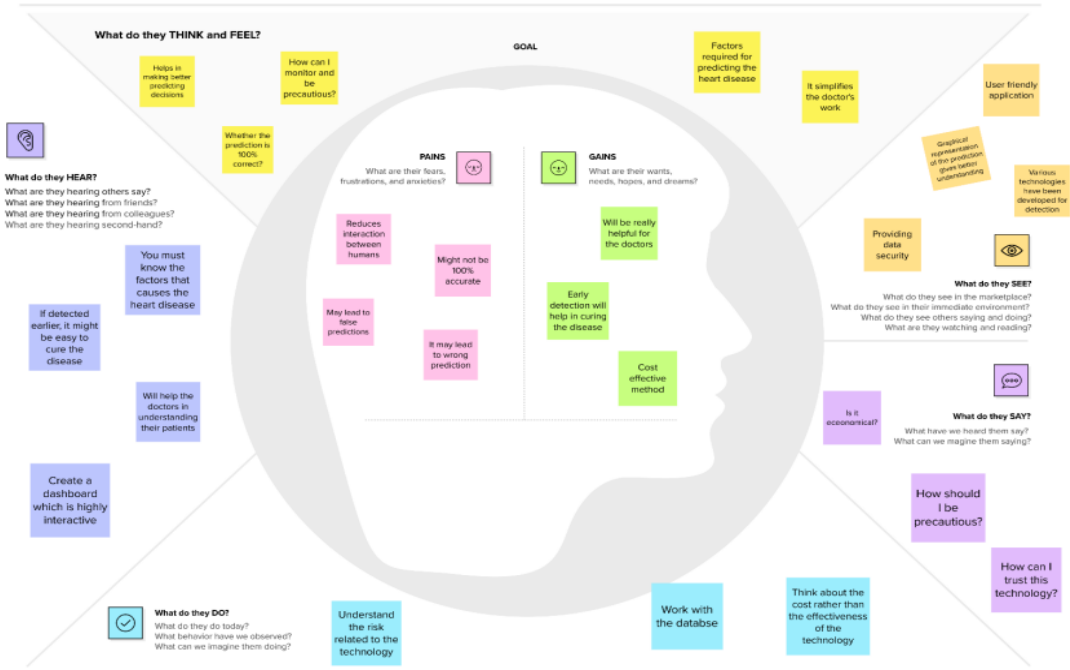
[9]Mr. Chala Beyene, Prof. Pooja Kamat, “Survey on Prediction and Analysis the Occurrence of Heart Disease Using Data Mining Techniques”, International Journal of Pure and Applied Mathematics, 2018.

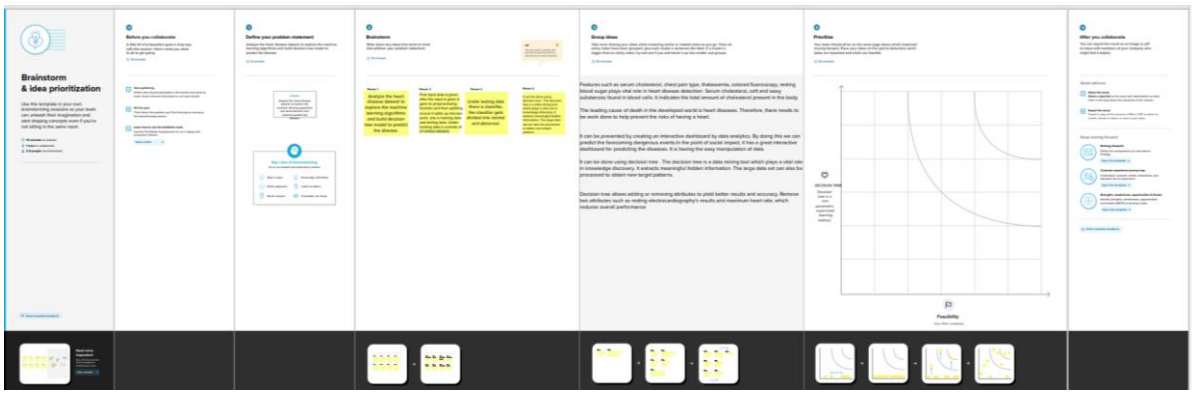
[10] R. Sharmila, S. Chellammal, “A conceptual method to enhance the prediction of heart diseases using the data techniques”, International Journal of Computer Science and Engineering, May 2018

CHAPTER 3 IDEATION & PROPOSED SOLUTION

3.1 EMPATHY MAP CANVAS



3.2 IDEATION AND BRAINSTORMING

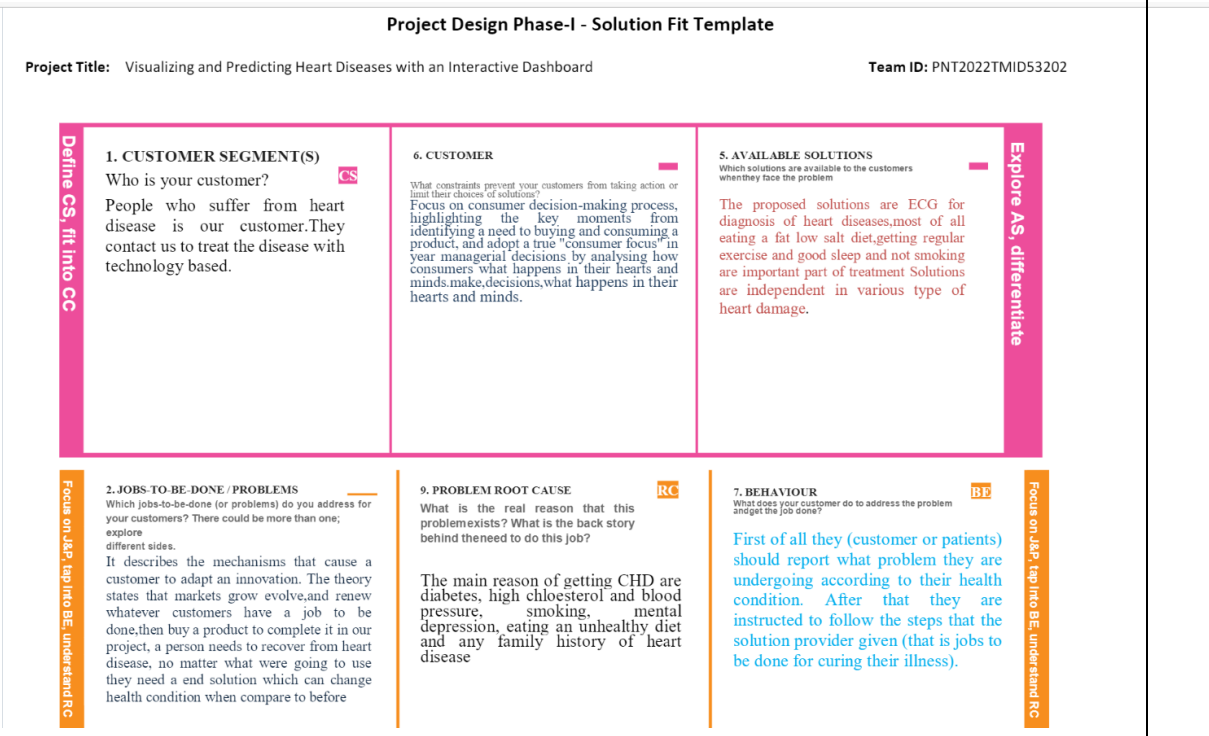


3.1 PROPOSED SOLUTION

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Analyze the heart disease dataset to explore the machine learning algorithms and build decision tree model to predict the disease.
2.	Idea / Solution description	To clean the model and pre-processing the model and to test and train the model using decision tree with the given dataset.
3.	Novelty / Uniqueness	We proposed a method for heart disease prediction using machine learning techniques, these results showed a great accuracy standard for producing a better estimation result.
4.	Social Impact / Customer Satisfaction	By using this method, we can separate the people those who can affected vs normal people, and it will play a vital role combining both medical and technology field. Customer(patients) can get benefit through saving financial cost (spending medical test), and by collecting dataset of their detailed condition,we can say that whether they get affected or not.
5.	Business Model (Revenue Model)	We can make revenue from this by making our developed model or a product form which can be modified into software kit, application or a webpage where they can interact easily. This all comes and developed under data analytics. We can get profited by selling or giving access with permission to our clients(Doctors).
6.	Scalability of the Solution	It is based on the number of users who maintaining the software or a system according to its performance like work flow, increase or decrease in efficiency, response time etc.By this a good quality of product is determined. If you suffer from a heart condition that interferes with your ability to work, you may qualify for disability benefits.

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 Dashboard

Team ID: PNT2022TMID53202

Define CS, fit into CC

1. CUSTOMER SEGMENT(S) CS

Who is your customer?

People who suffer from heart disease is our customer.They contact us to treat the disease with technology based.

6. CUSTOMER

What constraints prevent your customers from taking action or limit their choices of solutions?

Focus on consumer decision-making process, highlighting the key moments from identifying a need to buying and consuming a product, and adopt a true "consumer focus" in year managerial decisions by analysing how consumers what happens in their hearts and minds.make,decisions,what happens in their hearts and minds.

5. AVAILABLE SOLUTIONS

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

The proposed solutions are ECG for diagnosis of heart diseases,most of all eating a fat low salt diet,getting regular exercise and good sleep and not smoking are important part of treatment Solutions are independent in various type of heart damage.

Explore AS, differentiate

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

2. JOBS-TO-BE-DONE / PROBLEMS

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

It describes the mechanisms that cause a customer to adapt an innovation. The theory states that markets grow evolve,and renew whatever customers have a job to be done,then buy a product to complete it in our project, a person needs to recover from heart disease, no matter what were going to use they need a end solution which can change health condition when compare to before

9. PROBLEM ROOT CAUSE RC

What is the real reason that this problem exists? What is the back story behind the need to do this job?

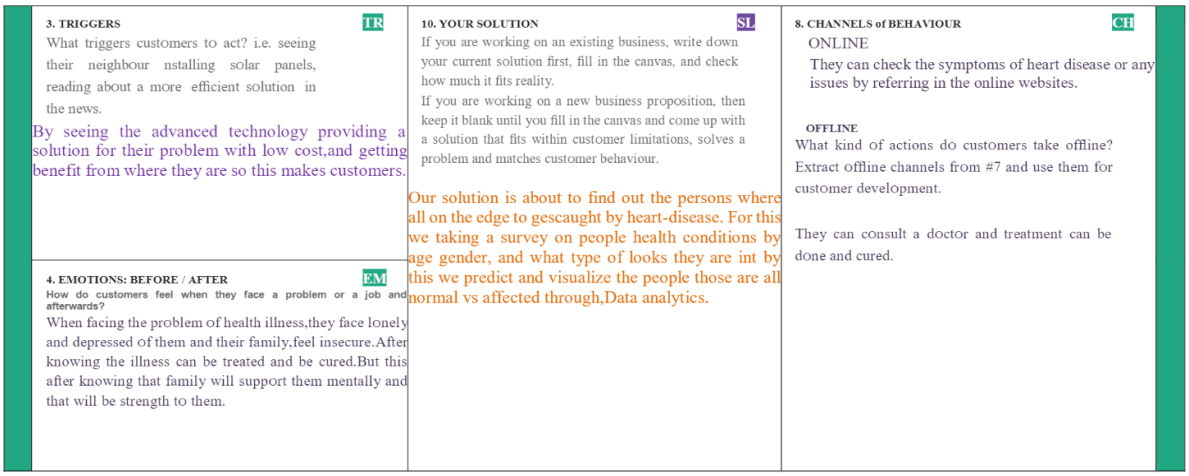
The main reason of getting CHD are diabetes, high chloesterol and blood pressure, smoking, mental depression, eating an unhealthy diet and any family history of heart disease

7. BEHAVIOUR BE

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

First of all they (customer or patients) should report what problem they are undergoing according to their health condition. After that they are instructed to follow the steps that the solution provider given (that is jobs to be done for curing their illness).

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



CHAPTER 4 REQUIREMENT ANALYSIS

4.1 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	Registration through Form Registration through Gmail Registration through LinkedIN
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	User verification	Verification through CAPTCHA Verification through I'm not a robot.
FR-4	User Authentication	Recognition of correct person Resending the code in case of forgot password.
FR-5	User validation	Reconfirming the new password Sending a two digit number in (Google account) your Old devices, so that you can enter into a new device By entering the two digit number.
FR-6	User Submission	Submission through Google form Submission through Email.

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
Data Flow Diagram & User Stories

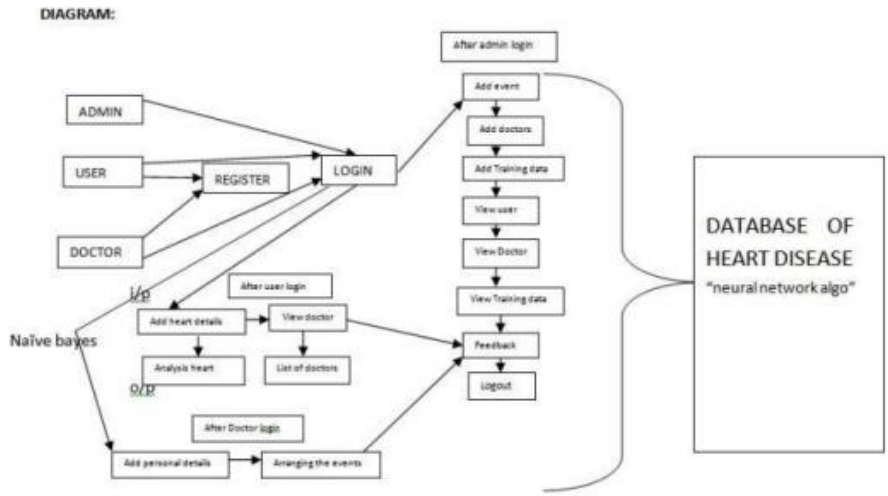
Date	03 October 2022
Team ID	PNT2022TMID53202
Project Name	Project – Visualizing and Heart disease with an interactive dashboard
Maximum Marks	4 Marks

Flow Diagrams:

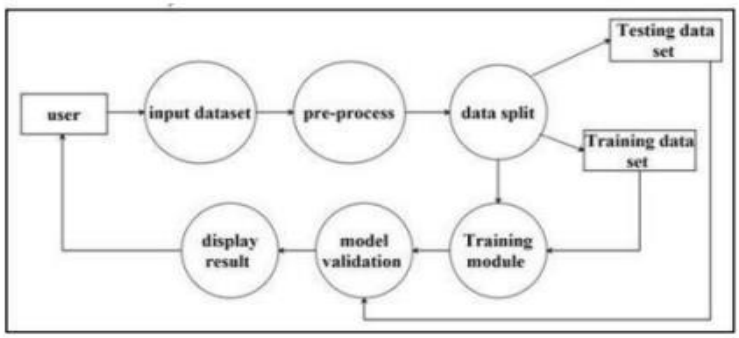
A Data Flow Diagram (DFD) is a graphical representation of the flow of data in a business information system. It describes the processes that are involved in a system to transfer data from the input to the file storage and reports generation. It shows how data enters and leaves the system, what changes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

Example: (Simplified)

DIAGRAM:



Flow :



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

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	PNT2022TMID53202
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	Hari Krishna, Pooja Laxmi
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	3	High	Charu , Amose
Sprint-1		USN-3	As a user, I can register for the application through Facebook	2	Low	Hari Krishna
Sprint-1		USN-4	As a user, I can register for the application through Google	2	Medium	Amose, Charu
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	3	High	Pooja Laxmi
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	Hari Krishna, Amose, Charu, Pooja Laxmi
Sprint-2	User entry	USN-7	As a User, I can enter my personal details for analysis	3	High	Hari Krishna
Sprint-2		USN-8	As a User, I can entry my medical records & symptoms	3	High	Amose
Sprint-3	User profile	USN-9	As a user, I can update the health details of users.	5	High	Charu
Sprint-3	Helpdesk	USN-10	As a user, I can post my queries & view the frequently asked question (FAQ)	5	High	Pooja Laxmi
Sprint-3		USN-11	As an admin, I can view the user queries	3	High	Hari Krishna, Amose, Charu , Pooja Laxmi

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

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

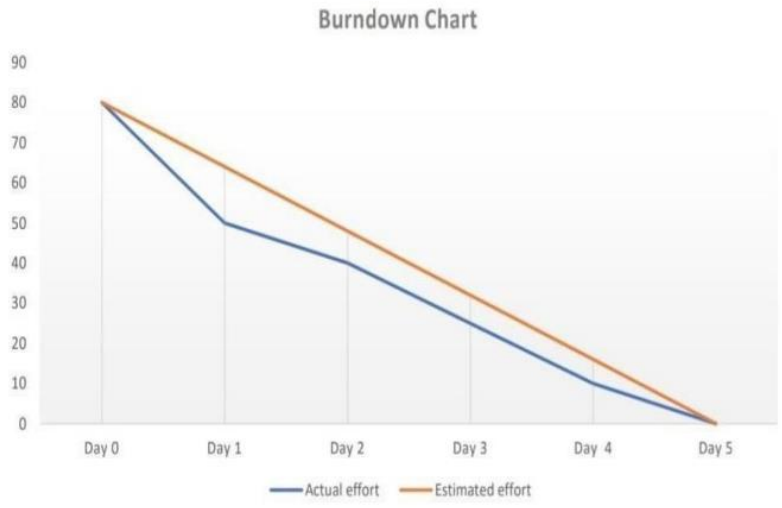
Velocity:

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)

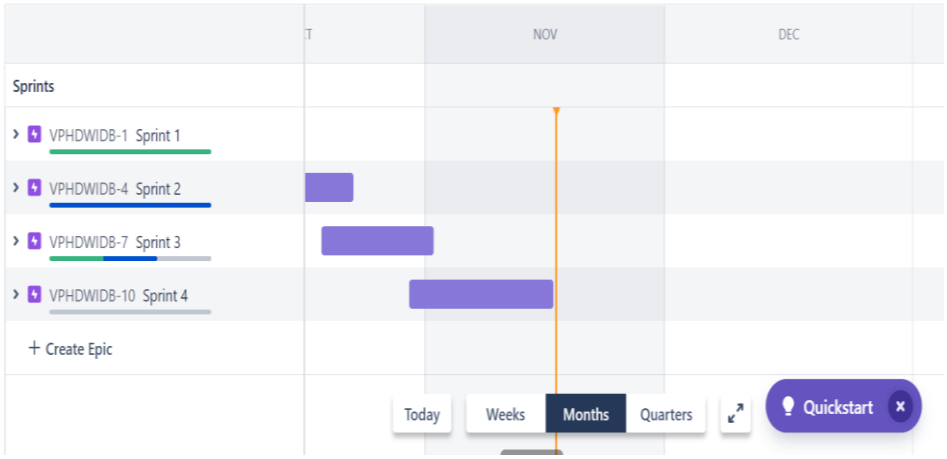
$$AV = \text{Sprint duration}/\text{Velocity} = 13/6 = 2.16$$

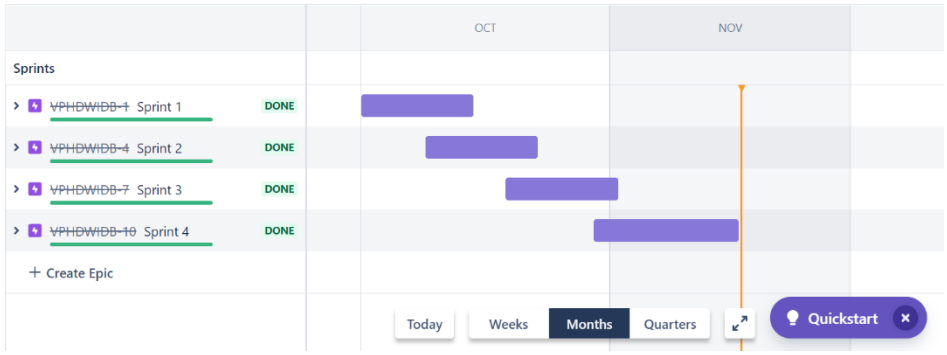
Burndown Chart:

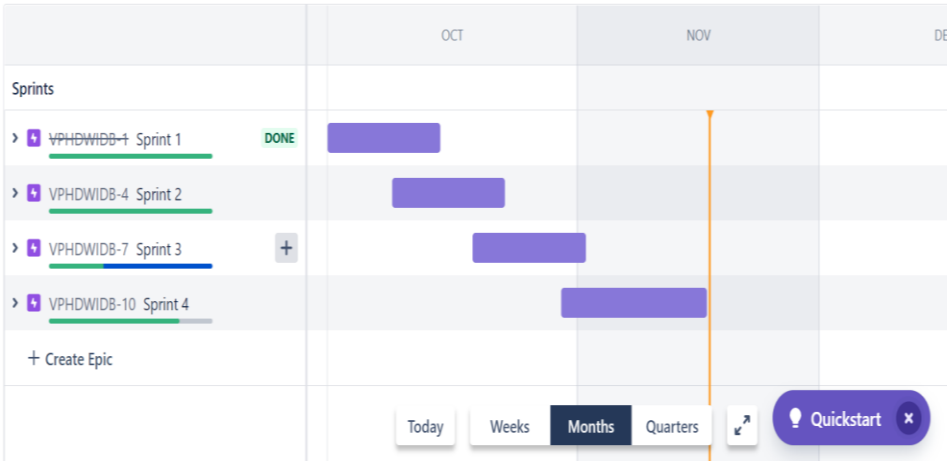
A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum. However, burn down charts can be applied to any project containing measurable progress over time.

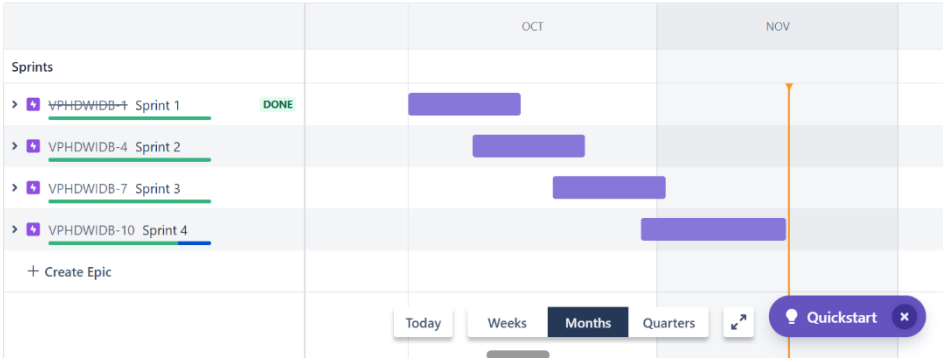


REPORTS FROM JIRA:









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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integrity="sha384-
JZR6Spejh4U02d8jOt6vLEHfe/JQGiRRSQQxSfFWpi1MquVdAyjUar5+76PVCmYl"
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>
```
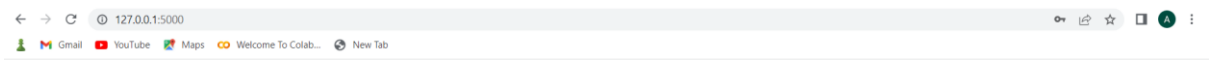
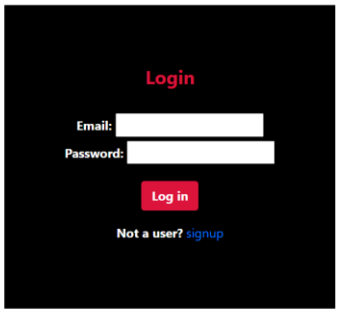

```
</body>
</html>
```





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-
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crossorigin="anonymous">
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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+76PVCmYl"
crossorigin="anonymous"></script>
    <link rel="stylesheet" href="{{url_for('static',filename='styles.css')}}">
    <title>Sign Up</title>
</head>
<body>
    <div class="login">
```
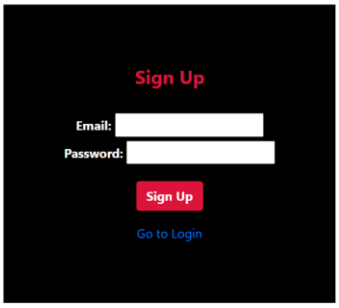

```
        <form action="" method="post">
            <h3 class="topic">Sign Up</h3>
            <label class="ll">Email: </label>
            <input type="email" name="email">
            <br>
            <label class="ll">Password:</label>
            <input type="password" name="pwd">
            <br>
            <Button class="btn">Sign Up</Button>
            </form>
            <p class="ll">{{msg}}</p>

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

</body>
</html>
```



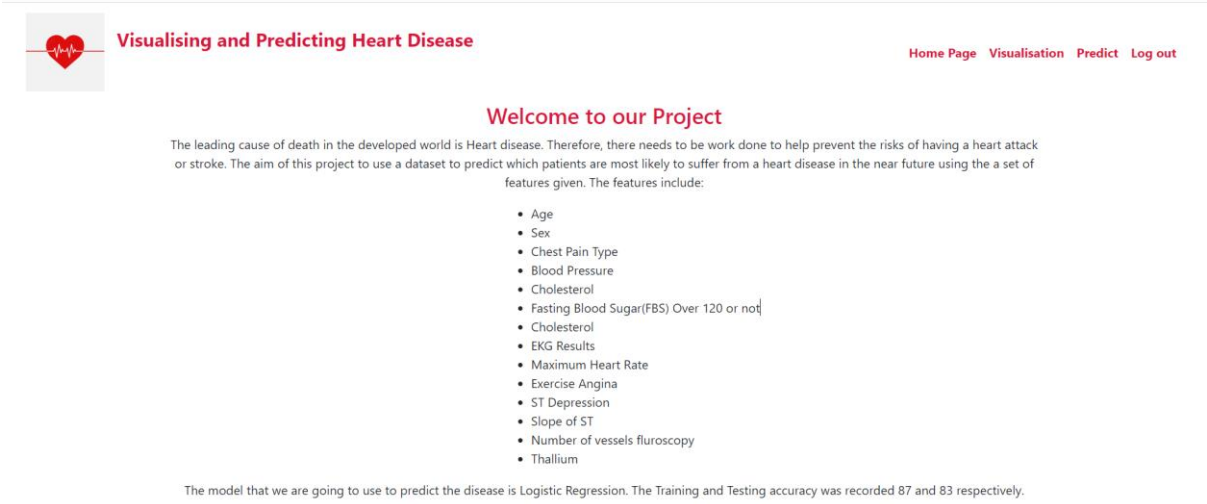
Feature 3: Home Page

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-
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>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>
```

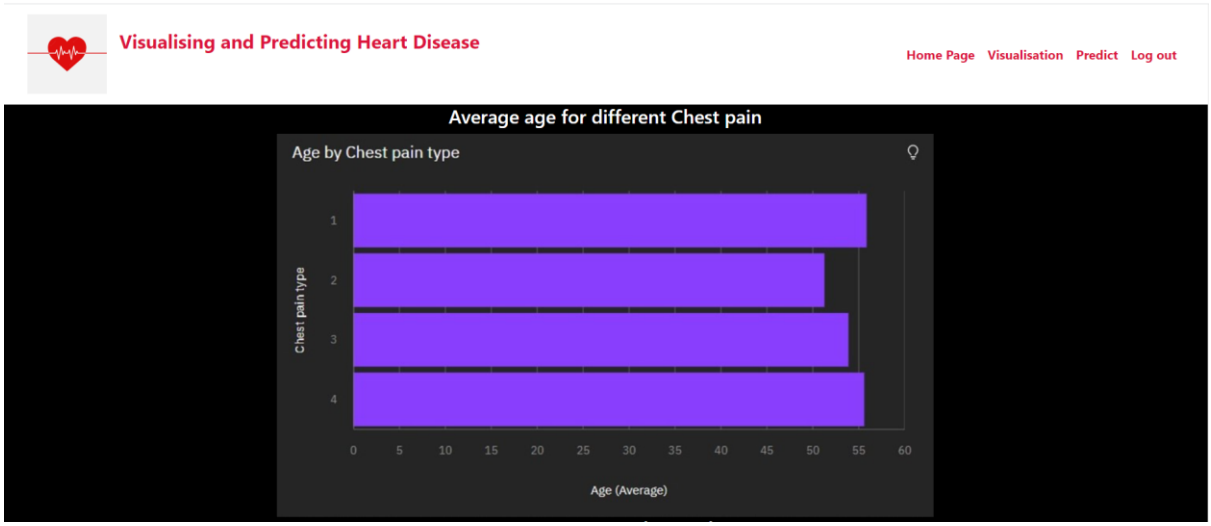


Feature 4: Visualisations
visual.html

```
<!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>
```

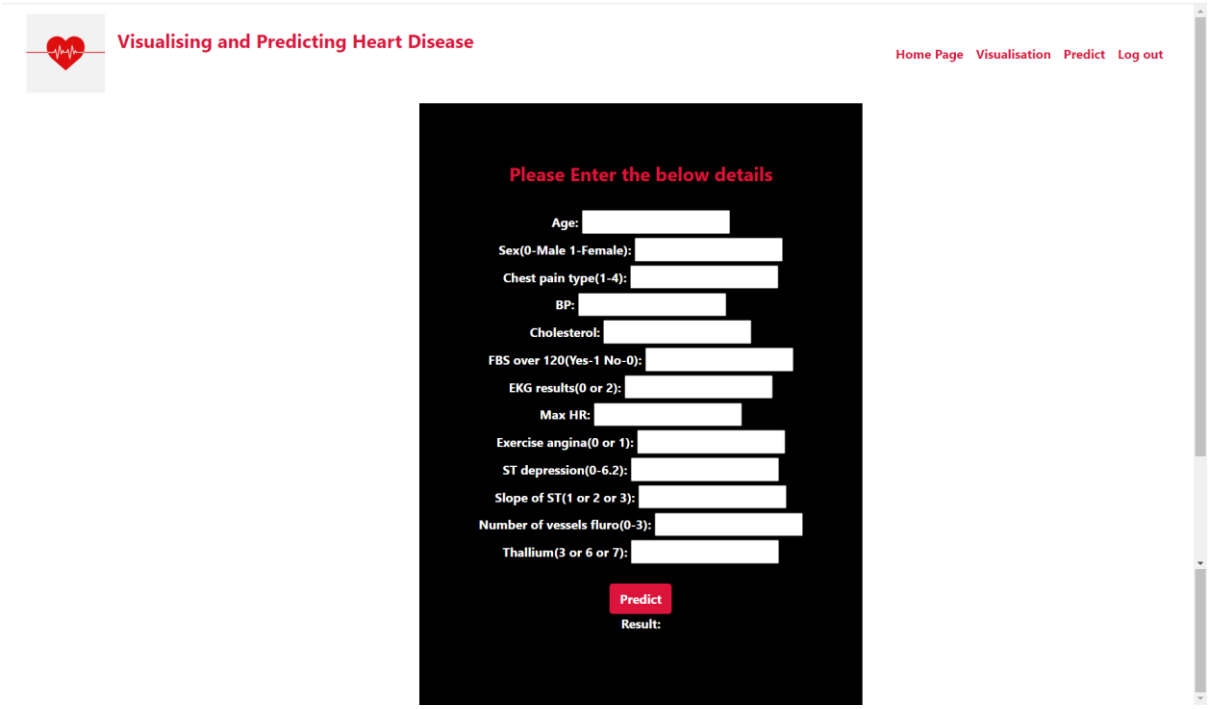


Feature 5: Prediction
predict.html

```
<!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	PNT2022TMID53202
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	PNT2022TMID53202
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-17336-1659634236/tree/main/Project%20Development%20Phase

GitHub Link: https://github.com/IBM-EPBL/IBM-Project-17336-1659634236

Project Demo link:
https://drive.google.com/file/d/1iyxzppcczTW6veNmBm8hKuP3VTo9dWLX/view?usp=share_link