

Team ID	PNT2022TMID14156
Project Name	Visualisation and predicting Heart Diseases with an interactive Dash Board

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## **1. INTRODUCTION**

### **1.1 Project Overview**

Heart-related diseases or Cardiovascular Diseases (CVDs) are the main reason for a huge number of deaths in the world over the last few decades and has emerged as the most life-threatening disease, not only in India but in the whole world. Many researchers, in recent times, have been using several machine learning techniques to help the healthcare industry and professionals in the diagnosis of heart-related diseases. This indicates a need for a reliable, accurate and feasible system to continuously monitor and diagnose CVD for timely action and treatment. The major cause of death in the developed world is heart disease. To analyse and predict which patients are most likely to suffer from heart disease in the near future we have to find some solutions.

### **1.2 Purpose**

For the problem mentioned earlier statement, we can create or develop an interactive dashboard to visualise the people who might have a high chance of getting Cardiovascular Diseases(CVD) through a collection of datasets. Most of all heart diseases can be identified and treated using ECG in the medical field, and the theory of curing can be handwritten and they get to research it and finally implement it in practice. But in the modern technology world, we can predict and able to prevent diseases through visualization of people who can get caught heart diseases through data analytics. Through this, we can create awareness among people who are all at a high risk of getting CVD. This makes a way easy for Doctors and it consumes time for them.

## **2. LITERATURE SURVEY**

### **2.1 Existing Problem**

Most of the papers used the attribute reduction method since more Attributes consume more time for classification. But considering only a few factors for prediction will not give accuracy precisely. Some common influencing factors such as CPT (Chest Pain Type), RECG (Resting electrocardiographic (ECG)) and indirectly influencing factors such as Alcohol and Obesity are not considered. Without using these important factors, the prediction could not be given accurately. The system can also be improvised by using an ensemble machine-learning model. More accuracy can be achieved through the hybridisation of two or more algorithms. So, it is preferred to use a combination of algorithms to achieve higher accuracy.

### **2.2 References**

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Electronics and Informatics (ICOEI), Tirunelveli, India, 2019, pp. 292-297, doi: 10.1109/ICOEI.2019.8862604.

2. J. P. Li, A. U. Haq, S. U. Din, J. Khan, A. Khan and A. Saboor, "Heart Disease Identification Method Using Machine Learning Classification in E-Healthcare," in IEEE Access, vol. 8, pp. 107562-107582, 2020, doi:10.1109/ACCESS.2020.3001149.

3. S. Nayak, M. K. Gourisaria, M. Pandey and S. S. Rautaray, "Prediction of Heart Disease by Mining Frequent Items and Classification Techniques," 2019 International Conference on Intelligent Computing and Control Systems (ICCS), Madurai, India, 2019, pp. 607-611, doi: 10.1109/ICCS45141.2019.9065805.

4. S. Harjai and S. K. Khatri, "An Intelligent Clinical Decision Support system based on Artificial Neural Network for Early Diagnosis of Cardiovascular Diseases in Rural Areas," 2019 Amity International Conference on Artificial Intelligence (AICAI), Dubai, United Arab Emirates, 2019, pp. 729-736, doi: 10.1109/AICAI.2019.8701237.

5. S. Chatterjee, Y. Jaggi and B. Sowmiya, "Survey on Prediction of Heart Disease Using Data Mining," 2019 International Conference on Intelligent Sustainable Systems (ICISS), Palladam, India, 2019, pp. 341-344, doi: 10.1109/ISS1.2019.8908062.

6. F. Mendonca, R. Manihar, A. Pal and S. U. Prabhu, "Intelligent Cardiovascular Disease Risk Estimation Prediction System," 2019 International Conference on Advances in Computing, Communication and Control (ICAC3), Mumbai, India, 2019, pp. 1-6, doi: 10.1109/ICAC347590.2019.9036738.

7. B. S. S. Rathnayake and G. U. Ganegoda, "Heart Diseases Prediction with Data Mining and Neural Network Techniques," 2019 3rd International Conference for Convergence in Technology (I2CT), Pune, India, 2018, pp. 1-6, doi: 10.1109/I2CT.2019.8529532.

8. Rajdhan, Apurb & Agarwal, Avi & Sai, Milan & Ghuli, Poonam. (2020). "Heart Disease Prediction using Machine Learning". International Journal of Engineering Research and. V9. 10.17577/IJERTV9IS040614.

9. T. Mahboob, R. Irfan and B. Ghaffar, "Evaluating ensemble prediction of coronary heart disease using receiver operating characteristics," 2018 Internet Technologies and Applications (ITA), Wrexham, UK, 2018, pp. 110-115, doi: 10.1109/ITECHA.2018.8101920.

10. A. Javeed, S. Zhou, L. Yongjian, I. Qasim, A. Noor and R. Nour, "An Intelligent Learning System Based on Random Search Algorithm and Optimized Random Forest Model for Improved Heart Disease Detection," in IEEE Access, vol. 7, pp. 180235-180243, 2019, doi: 10.1109/ACCESS.2019.2952107.

11. H. A. Esfahani and M. Ghazanfari, "Cardiovascular disease detection using a new ensemble classifier," 2019 IEEE 4th International Conference on Knowledge-Based

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Engineering and Innovation (KBEI), Tehran, Iran, 2019, pp.1011-1014, doi: 10.1109/KBEI.2019.8324946.

### 2.3 Problem Statement Definition

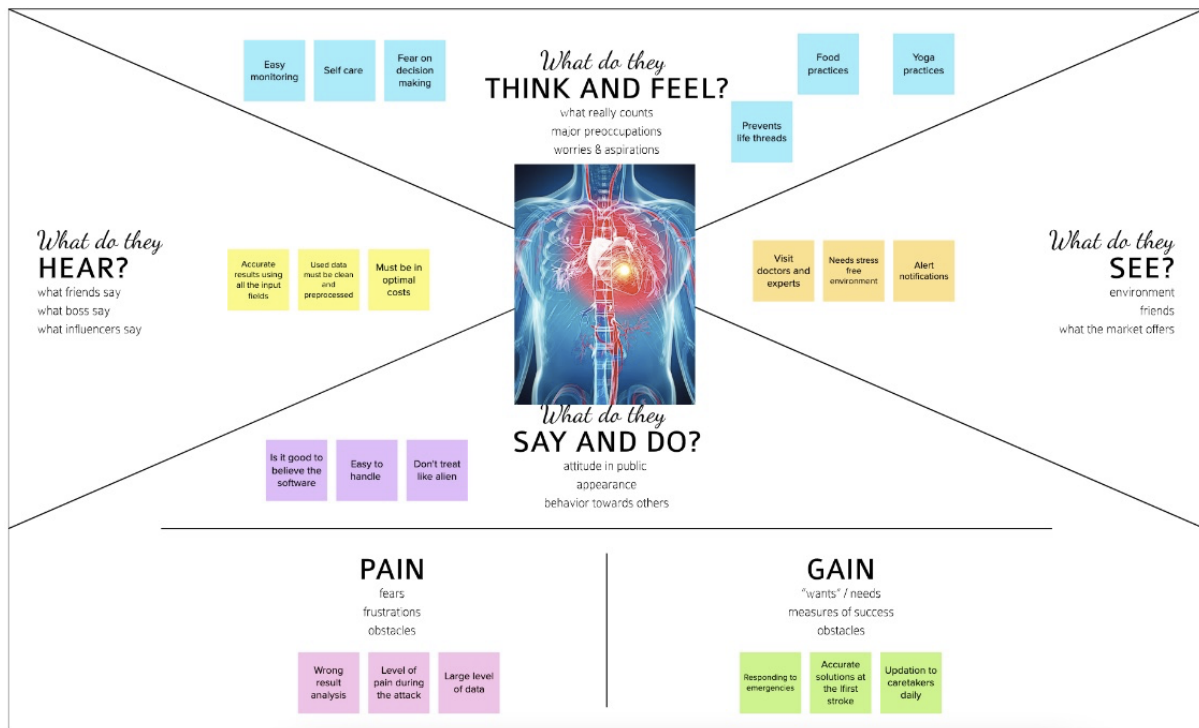
This work proposes a smartphone-based heart disease prediction system that can both monitor as well a predictor of heart disease. A system to monitor patients in real-time has been developed using Node MCU interfaced with temperature, humidity and pulse rate sensors. The developed system is capable of transmitting the acquired sensor data to a cloud(firebase) every 10 seconds. An Android application is designed to display the sensor data. One best machine learning algorithms was ported to the Android application for heart disease prediction in real-time. The machine learning algorithms were trained and tested using two widely used open-access datasets. Five machine learning algorithms were checked for their performances using two different methods. ANN was found to be the best-performing algorithm with an accuracy of 93.5%. This algorithm is deployed to the Android application and heart disease is predicted in real-time.

The proposed work is limited by the use of a single hidden layer for implementing a Neural network. Coronary artery disease is a system. The Cleveland heart data set is taken from UCI. This data set consists of 303 cases and 76 attributes/features. 13 features are used out of 76 features. Two tests with three algorithms Bayes Net, Support vector machine, and Functional Trees FT are performed for detection purposes. WEKA tool is used for the detection Diagnosis of Diseases by Using Different Machine Learning Coronary artery disease is detected and monitored by this proposed system. The Cleveland heart data set is taken from UCI. This data set consists of 303 cases and 76 attributes/features. 13 features are used out of 76 features. Two tests with three algorithms Bayes Net, Support machine, and Functional Trees FT are performed for detection purposes. The WEKA tool is used for detection.

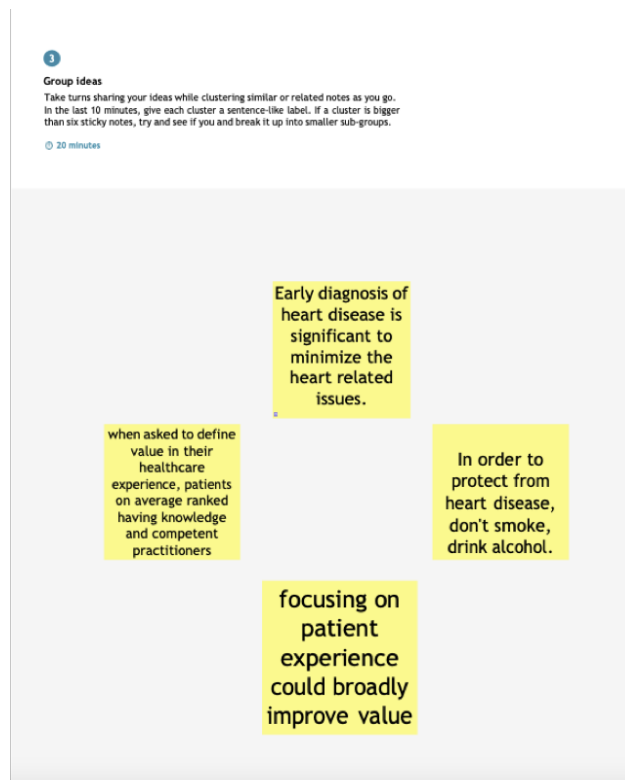
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### 3. IDEATION & PROPOSED SOLUTION

#### 3.1 Empathy Map Canvas



#### 3.2 Ideation & Brainstorming





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the subfield of AI study. Various researchers think that without learning, intelligence cannot be developed. Machine learning (ML) industry as a whole. Payers to healthcare companies around the world are taking advantage of ML today. In this post, I will demonstrate a use case and show how we can harness the power of ML world problems. We'll walk through a very simple baseline model for predicting heart disease from patient data, how to load the data, and make some predictions.

### 3.3 Proposed Solution

Most of all heart diseases can be identified and treated using ECG in the medical field, and the theory of curing can be handwritten and they get to research it and finally implement it in practice. But in the modern technology world, we can predict and prevent diseases through the visualisation of people who can get heart diseases through data analytics. Through this, we can create awareness among people at a high risk of CVD. This makes a way easy for Doctors and it consumes time for them.

The major cause of death in the developed world is heart disease. To analyse and predict which patients are most likely to suffer from heart disease in the near future we have to find some solutions. By using this method, we can separate the people who can be affected from normal people, and it will play a vital role in combining both the medical and technology field. Customers (patients) can get benefits through saving financial costs (spending on medical tests), and by collecting a dataset of their detailed condition, we can say whether they get affected or not. This makes older people travel less, and get results from their comfort zone. It is based on the number of users who maintain the software or a system according to its performance like workflow, increases or decreases in efficiency, response time etc... Its scalability can be measured by maintenance, checking for software, and fixing errors if occur in the server. By this, the good quality of the product is determined. If you suffer from a heart condition that interferes with your ability to work, you may qualify for disability benefits. There are a number of heart conditions that are specifically listed by the Social Security Administration as qualifying conditions. These conditions include chronic heart failure, ischemic heart disease, recurrent arrhythmias, hypertensive heart disease, an individual on the waiting list for a heart transplant or a heart transplant recipient, and more.

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### 3.4 Problem Solution Fit

Problem-Solution fit canvas 2.0

Purpose / Vision

Define CS, fit into CC	<b>1. CUSTOMER SEGMENT(S)</b> <small>Who is your customer? I.e. working parents of 0-5 y.o. kids</small>  people affected with heart diseases are said to be our customers and the doctors also considered as our customers because they are the ones who wants a technology based services for treating people.	<b>6. CUSTOMER CONSTRAINTS</b> <small>What constraints prevent your customers from taking action or limit their choices of solutions? I.e. spending power, budget, no cash, network connection, available devices.</small>  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 make decisions, what happens in their hearts and minds.	<b>5. AVAILABLE SOLUTIONS</b> <small>Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros &amp; cons do these solutions have? I.e. pen and paper is an alternative to digital notetaking</small>  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
	<b>2. JOBS-TO-BE-DONE / PROBLEMS</b> <small>Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides.</small>  It describe 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 their health condition when compare to before	<b>9. PROBLEM ROOT CAUSE</b> <small>What is the real reason that this problem exists? What is the back story behind the need to do this job? I.e. customers have to do it because of the change in regulations.</small>  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.	<b>7. BEHAVIOUR</b> <small>What does your customer do to address the problem and get the job done? I.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace)</small>  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).	
Identify strong TR & EM	<b>3. TRIGGERS</b> <small>What triggers customers to act? I.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news.</small>  By seeing the advanced technology providing a solution for their problem with low cost,and getting benefit from where they are ,so this makes customers to act.	<b>10. YOUR SOLUTION</b> <small>If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour.</small>  Our solution is about to find out the persons where all on the edge to get caught by heart disease. For this we taking a survey on peoples health conditions by age,gender , and what type of foods they are intaking , by this we predict and visualize the people those who are all normal vs affected through , Data Analytics.	<b>8. CHANNELS of BEHAVIOUR</b> <b>8.1 ONLINE</b> <small>What kind of actions do customers take online? Extract online channels from #7</small>  They can check the symptoms of heart diseases or any other health illness by referring in online websites, etc.....	Extract online & offline CH of BE
	<b>4. EMOTIONS: BEFORE / AFTER</b> <small>How do customers feel when they face a problem or a job and afterwards? I.e. lost, insecure &gt; confident, in control - use it in your communication strategy &amp; design.</small>  When they facing a problem of health illness,they feel lonely,get depressed of them and their family ,feel insecure etc...After knowing their illness can be treated,they have hope,confidence to tackle their problem.	<b>8.2 OFFLINE</b> <small>What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.</small>  They can consult a Doctor in practical of what problem they have in their body.		

Problem-Solution fit canvas is licensed under a Creative Commons Attribution-NonCommercial-NoDerivatives 4.0 license Created by Daria Nepriakhina / Amaltama.com



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## 4. REQUIREMENT ANALYSIS

### 4.1 Functional Requirement

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form. Registration through Gmail. Registration through Linked IN.
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 twodigit number.
FR-6	User Submission	Submission through Google form Submission through Email.

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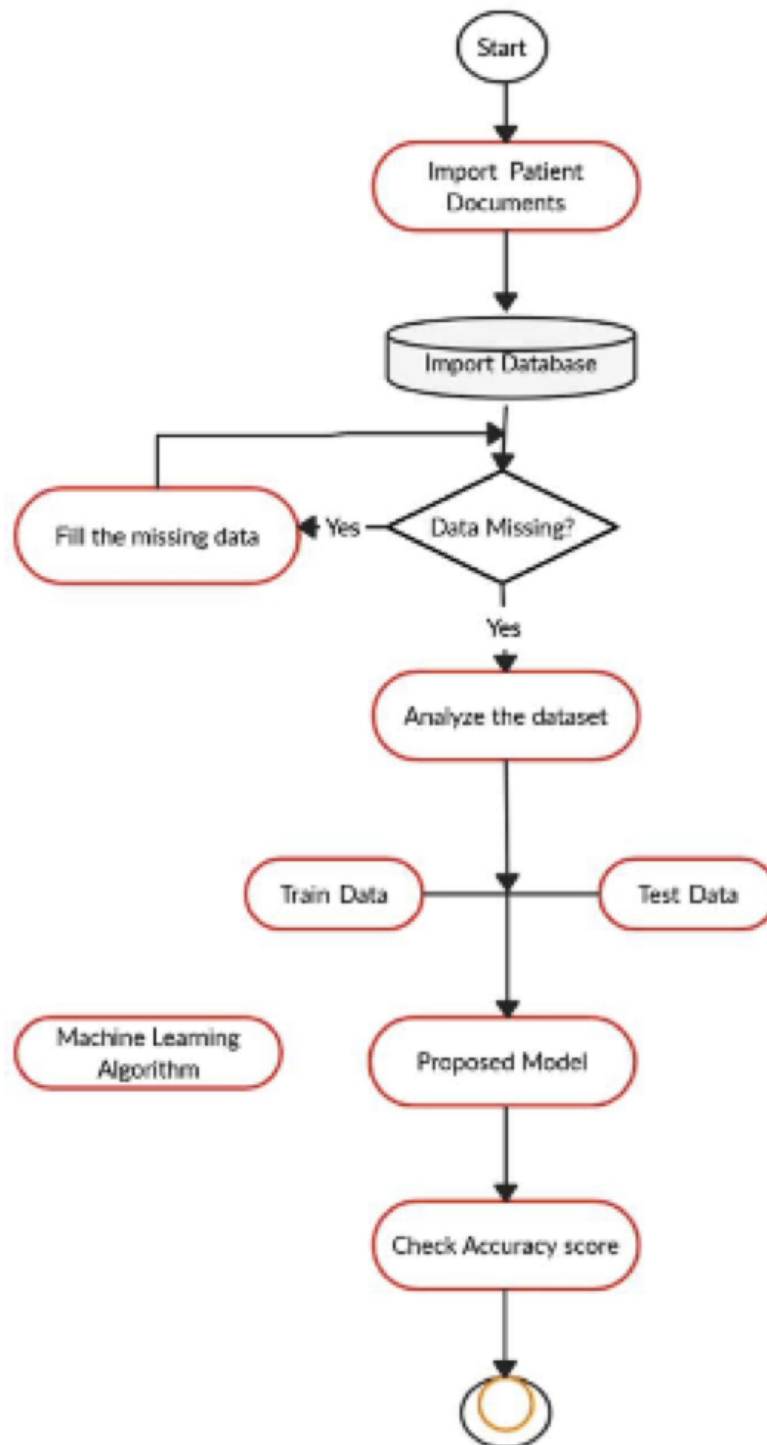
## 4.2 Non-Functional Requirement

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The EHDPS predicts the likelihood of patients getting heart disease. It enables significant knowledge, eg, relationships between medical factors related to heart disease and patterns, to be established.
NFR-2	Security	When it deals with(comes to)health factors, we should provide more security services. There shouldn't be no errors, lagging , base of data of a patient profile, while working on the software or product.
NFR-3	Reliability	Reliability is said to be the measure of stability or consistency of test scores shown in your product. Therefore your product will normal as a good performance one in the field of accuracy.
NFR-4	Performance	The performance should be fast relaying. This prediction system should be made available in cloud to ensure better accessibility and setting a milestone in providing good quality affordable healthcare.
NFR-5	Availability	The Availability of getting used to this software or
		product design is through by accessing IBM cognos Analytics and IBM cloud.
NFR-6	Scalability	It is based on the number of users who maintaining the software or a system according to its performance like workflow, increase or decrease in efficiency , response time etc. It scalability can be measured by maintenance, checking in for software updates, fixing errors if occurred in server. By this a good quality of product is determined.

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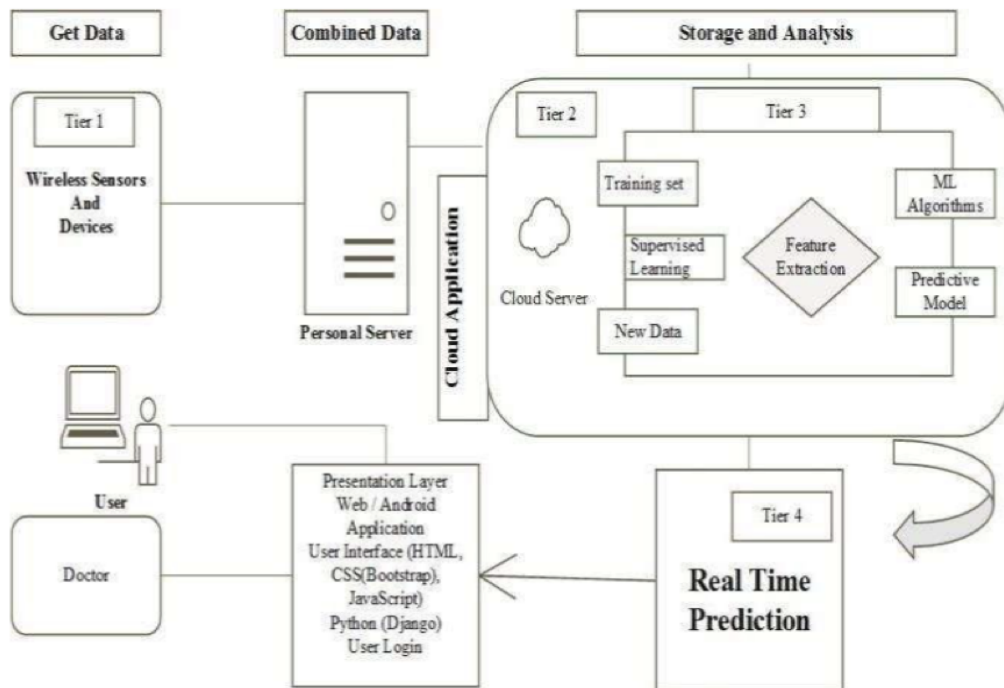
## 5. PROJECT DESIGN

### 5.1 Data Flow Diagram

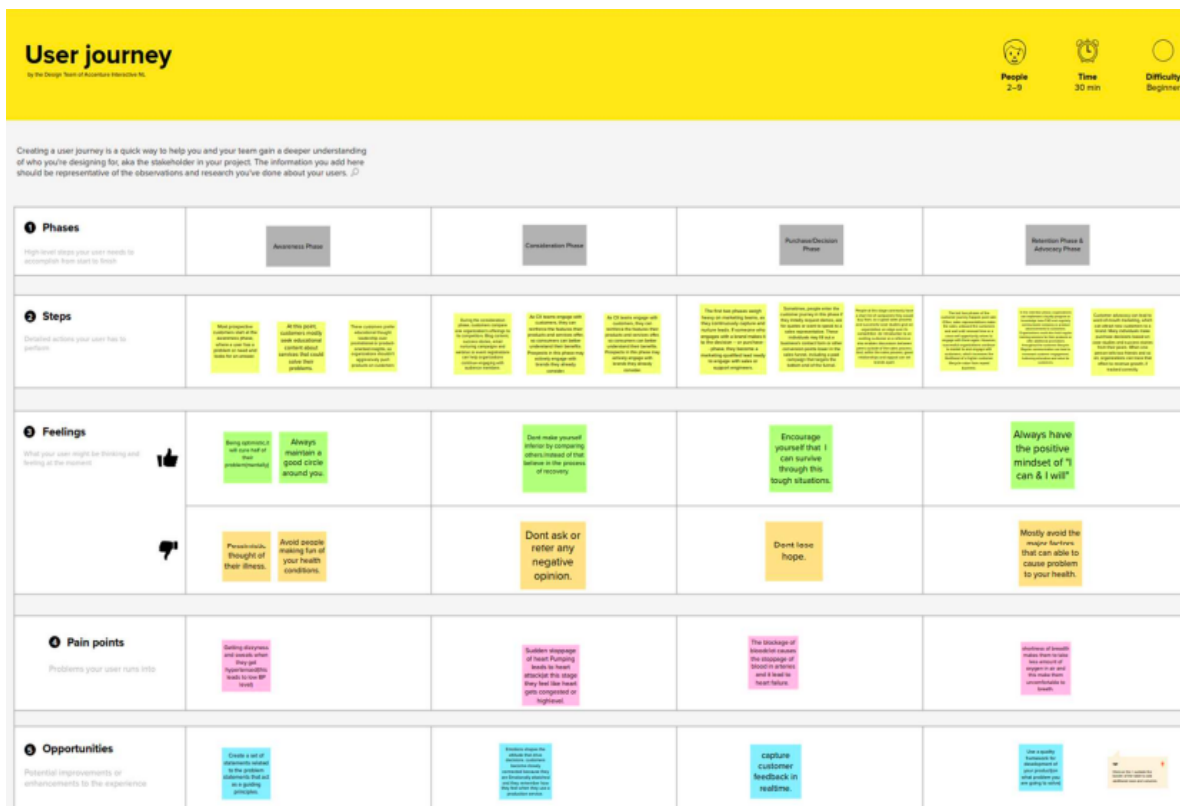




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## 5.3 Users Stories



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## 6. PROJECT PLANNING & SCHEDULING

### 6.1 Sprint Planning and Estimation

Sprint	Functional Requirement (Epic)	User Story Number	User Story/Task	Story points
Sprint-1	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2
Sprint-1		USN-2	As a user, I will receive a confirmation email once I have registered for the application	1
Sprint-2		USN-3	As a user, I can register for the application through the Facebook	2
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1
Sprint-2	Dashboard	USN-6	Profile - view & update your profile	2
Sprint-1		USN-7	Change Password - user can change the password	1
Sprint-1		USN-8	Home - Analyse your Heart	2

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Sprint-3		USN-9	<p>The user will have to fill in the below 13 fields for the system to predict a disease</p> <p>Age in Year -Gender</p> <p>-Chest Pain Type</p> <p>-Fasting Blood Sugar</p> <p>-Resting Electrographic results (Restecg)</p> <p>-Exercise Induced anginal (Exang) – The slope of the peak exercise ST segment</p> <p>-CA -number of major vessels colored by fluoroscopy</p> <p>-Thal</p> <p>-Trest Blood Pressure</p> <p>-Serum Cholesterol – Maximum heart rate achieved (Thalach) – ST Depression induced by exercise (Old peak)</p>	2
		USN-10	View Doctor. - View doctor detail by searching by names or filtering by specialty	1
Sprint-3	System Requirement	USN-11	<p>I. hardware Requirement</p> <p>i. Laptop or PC</p> <p>I5 processor system or higher</p>	2

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Sprint	Functional Requirement (Epic)	User story Number	User Story / Task	Story Points
			- 4 GB RAM or higher -128 GB ROM or higher ii. Android Phone (12.0 and above)	
Sprint-3		USN-12	11. Software Requirement iii. Laptop or PC <ul style="list-style-type: none"> <li>• Windows 10 or higher</li> <li>• Android Studio</li> </ul>	2
Sprint-4	Dashboard	USN-13	Query	1
		USN-14	Toll Free	1
		USN-15	Ratings	2
		USN-16	Verifications	2
		USN-17	Validation	1
		USN-18	Feedback - send feedback to the admin	2

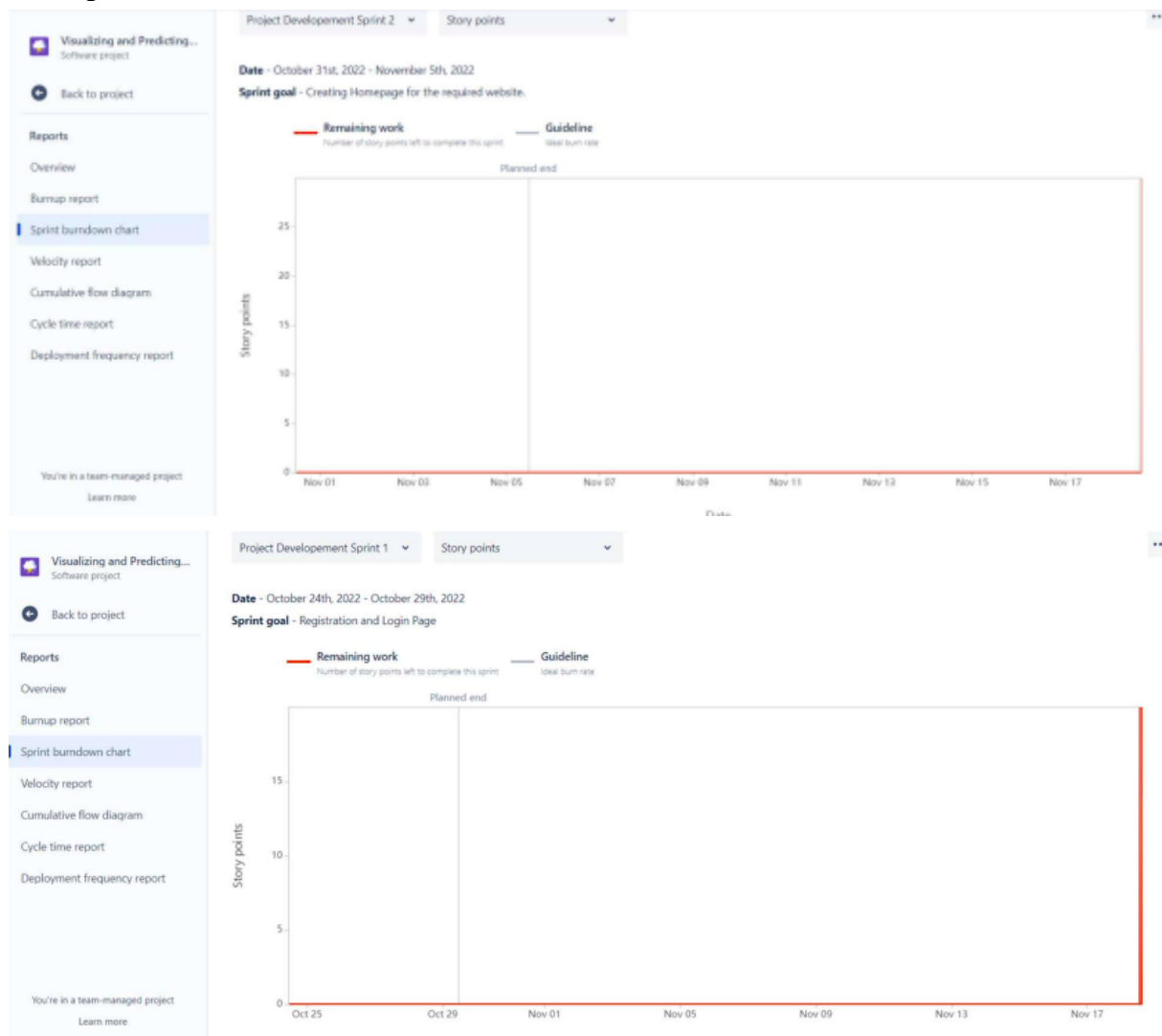


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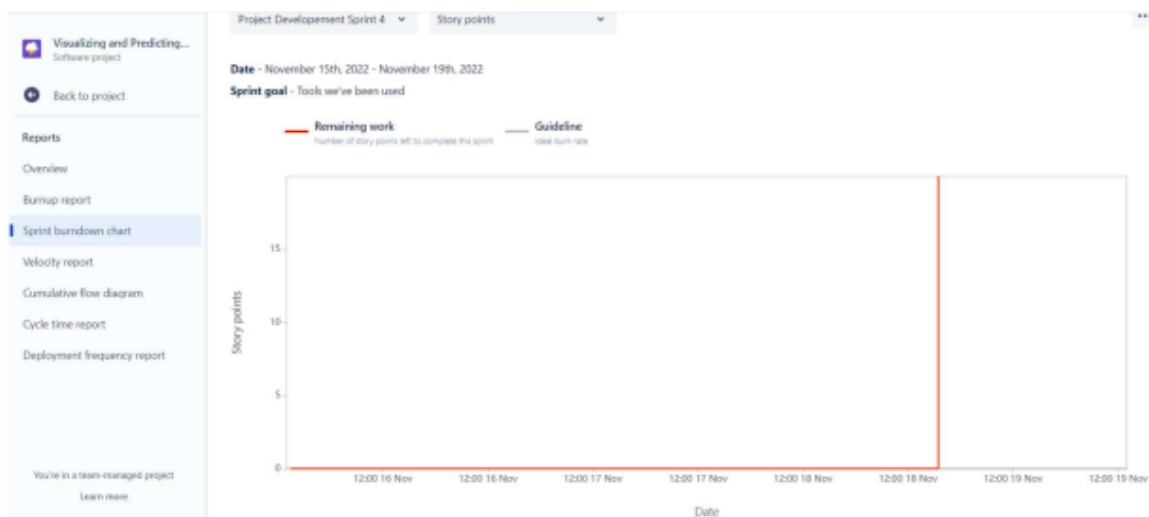
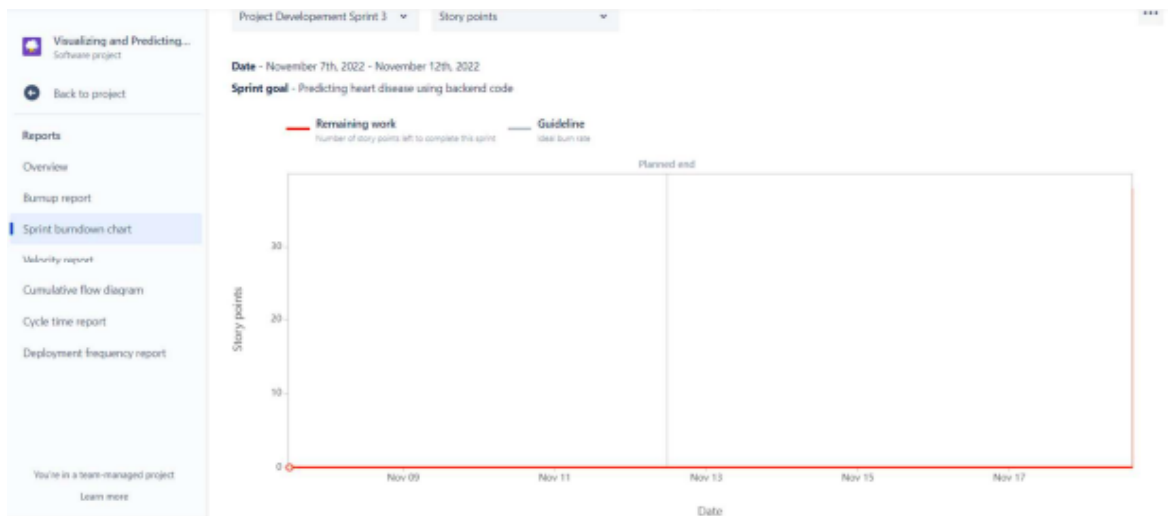
## 6.2 Sprint Delivery Schedule

Sprint	Total Story Points	Duration in days	Sprint Start Date	Sprint End date	Story points Completed( as on planned end date)
Sprint-1	20	6	24 Oct 2022	29 Oct 2022	20
Sprint-2	20	6	31 Oct 2022	05 Nov 2022	18
Sprint-3	20	6	07 Nov 2022	12 Nov 2022	20
Sprint-4	20	6	14 Nov 2022	19 Nov 2022	19

## 6.3 Reports from JIRA



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## 7. CODING & SOLUTION

### 7.1 Feature 1

```

<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta http-equiv="X-UA-Compatible" content="IE=edge">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>LOGIN PASSWORD VALIDATION | PRARAZ TUTORIAL</title>

  <link rel="stylesheet" href="style.css">
  <script src="valid.js"></script>
</head>
<body>
  <div class="form">

```

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```

<h1>LOGIN HERE</h1>
<p>Username :</p>
<input type="text" name="" placeholder="Name Here">
<p>Password :</p>
<input type="password" name="" placeholder="Password Here" id="pass">
<input type="checkbox" onclick="myfunction()">
<input type="submit" name="" value="LOGIN" onclick="validate()">
</div>

<div>
  <p id="length"></p>
</div>
</body>
</html>

```

## Features 2:

```

@import
url('https://fonts.googleapis.com/css2?family=Arvo:ital,wght@0,400;0,700;1,400&family=Kanit:ital,wght@0,300;0,400;0,500;1,300;1,400&family=Lobster&family=Poppins:ital,wght@0,400;0,500;0,600;0,700;1,400;1,500;1,900&family=Roboto:wght@300;500;700;900&display=swap');
* {
  padding: 0;
  margin: 0;
  box-sizing: border-box;
}

body {
  position: absolute;
  background-color: white;
  height: 100vh;
  width: 100vw;
  font-family: 'Poppins', sans-serif;
}

html {
  scroll-behavior: smooth;
}

h2 {
  font-weight: normal;
}

.details {
  color: white;
  padding: 3%;
  background-color: #7227D5;

```

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font-size: 22px;

```

}
.details p{
  padding: 3%;
}
section {
  width: 100vw;
  min-height: 100vh;
}
.result{
  box-shadow: 3px 3px 6px black;
  font-weight: bold;
  font-size: 30px;
}
header {
  text-align: center;
  align-items: center;
  width: 100%;
  height: 100px;
  background-color: #00000065;
  position: fixed;
  z-index: 99;
}

#container {
  margin-top: 20px;
  display: flex;
  align-items: center;
  justify-content: center;
}

#container ul a {
  text-decoration: none;
  color: black;
}

#container ul {
  list-style: none;
  text-decoration: none;
}

#container ul li {
  box-shadow: rgba(0, 0, 0, 0.35) 0px 5px 15px;

```

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margin-left: 50px;  
background-color: #ffcc3f;  
width: 150px;  
border: 3px solid white;  
border-radius: 10px;  
height: 50px;  
line-height: 50px;  
text-align: center;  
float: left;  
font-size: 19px;  
position: relative;  
transition: all 0.7s ease;

}

#container ul li:hover {  
background-color: #e24646d5;  
}

#container ul ul {  
display: none;  
}

#container ul li:hover>ul {  
display: block;  
}

#container ul ul ul {  
margin-left: 100px;  
margin-top: -40px;  
position: absolute;  
}

.content {  
position: relative;  
top: 100px;  
width: 100%;  
height: 100%;  
}

.content img {  
margin-top: 15px;  
width: 100%;  
height: 82%;  
}

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```

.content h1 {
  letter-spacing: 2px;
  color: #EA2027;
  padding-top: 20px;
  text-transform: uppercase;
  font-weight: bold;
  font-size: 40px;
  text-align: center;
  font-family: 'Arvo', serif;
}

#content {
  padding: 10px;
  background-color: #e4c9ba94;
}

#content h1 {
  padding-bottom: 30px;
  padding-top: 100px;
  color: #EA2027;
  text-transform: uppercase;
  font-weight: bold;
  font-size: 40px;
  text-align: center;
  font-family: 'Arvo', serif;
}

.para {
  font-family: 'Kanit', sans-serif;
  font-size: 25px;
  text-indent: 50px;
  display: flex;
  flex-direction: column;
  gap: 30px;
}

.para p {
  letter-spacing: 2px;
}

.box {
  box-shadow: rgba(0, 0, 0, 0.25) 0px 54px 55px, rgba(0, 0, 0, 0.12) 0px -12px 30px, rgba(0, 0, 0, 0.12) 0px 4px 6px, rgba(0, 0, 0, 0.17) 0px 12px 13px, rgba(0, 0, 0, 0.09) 0px -3px 5px;
  border-radius: 15px;
}

```

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```
margin: 40px;
padding: 10px;
font-family: 'Lobster', cursive;
font-size: 30px;
text-indent: 50px;
border: 10px solid red;
margin-left: 22%;
width: 60%;
height: 100px;
background-color: rgba(57, 240, 240, 0.664);
display: flex;
align-items: center;
justify-content: center;
}
```

```
#content .list {
padding: 30px;
font-family: 'Kanit', sans-serif;
font-size: 25px;
display: flex;
flex-direction: column;
gap: 30px;
}
```

```
#subtypes {
padding: 10px;
font-family: 'Arvo', serif;
background-color: rgba(57, 240, 240, 0.664);
}
```

```
#subtypes h1 {
padding-top: 100px;
color: #EA2027;
text-transform: uppercase;
font-weight: bold;
font-size: 40px;
text-align: center;
font-family: 'Arvo', serif;
}
```

```
.para1 {
padding: 30px;
font-family: 'Kanit', sans-serif;
font-size: 25px;
letter-spacing: 2px;
}
```

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}

```
.para1 h4 {
  font-size: 30px;
  color: #0652DD;
  font-family: 'Poppins', sans-serif;
  padding-top: 30px;
  text-transform: uppercase;
}
```

```
.para1 p {
  padding-top: 10px;
  text-indent: 50px;
}
```

```
.para1 span {
  letter-spacing: 3px;
  color: red;
  font-size: 35px;
  font-weight: bold;
  font-family: 'Kanit', sans-serif;
}
```

```
.para1 h5 {
  font-size: 30px;
  font-family: 'Arvo', serif;
  padding-top: 10px;
  text-indent: 30px;
}
```

```
.para1 .list ul li {
  padding-top: 10px;
}
```

```
.para1 h6 {
  text-indent: 30px;
  font-size: 20px;
}
```

```
.para1 .three ul li {
  padding-top: 10px;
}
```

```
#diagnosis {
  padding: 10px;
```



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```
background-color: #FEA47F;
}
```

```
#diagnosis h1 {
padding-top: 100px;
color: #EA2027;
text-transform: uppercase;
font-weight: bold;
font-size: 40px;
text-align: center;
font-family: 'Arvo', serif;
}
```

```
#diagnosis h4 {
color: #2c2c54;
}
```

```
#heartpredict {
display: none;
}
```

```
#goal h1 {
padding-top: 100px;
color: #EA2027;
text-transform: uppercase;
font-weight: bold;
font-size: 40px;
text-align: center;
font-family: 'Arvo', serif;
}
```

```
.goal {
padding: 20px;
padding-top: 20px;
display: flex;
align-items: center;
justify-content: center;
gap: 15px;
}
```

```
.goal img {
width: 40%;
height: 30%;
}
```

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```
.goal p {
  justify-content: center;
  text-indent: 40px;
  font-family: 'Kanit', sans-serif;
  font-size: 25px;
  letter-spacing: 2px;
}
```

```
#dataset {
  display: flex;
  flex-direction: column;
  align-items: center;
  justify-content: center;
  gap: 60px;
  background-color: #FDA7DF;
}
```

```
#dataset h1 {
  padding-top: 100px;
  color: #EA2027;
  text-transform: uppercase;
  font-weight: bold;
  font-size: 40px;
  text-align: center;
  font-family: 'Arvo', serif;
}
```

```
#dataset h2 {
  text-decoration: underline;
  text-underline-offset: 5px;
  letter-spacing: 2px;
  font-weight: bold;
  font-size: 35px;
  font-family: 'Kanit', sans-serif;
}
```

```
table {
  margin-bottom: 40px;
  font-size: 20px;
  align-items: center;
  width: 1400px;
  height: 400px;
  border-collapse: collapse;
  padding-bottom: 50px;
}
```

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```
td,
th {
  background-color: #34e7e4;
  border: 5px solid #b34545;
  padding: 10px;
}
```

```
#technique {
  background-color: #F8EFBA;
}
```

```
#technique h1 {
  padding-top: 100px;
  color: #EA2027;
  text-transform: uppercase;
  font-weight: bold;
  font-size: 40px;
  text-align: center;
  font-family: 'Arvo', serif;
}
```

```
.tech {
  padding: 20px;
}
```

```
.tech h4 {
  font-size: 30px;
  color: #0652DD;
  font-family: 'Poppins', sans-serif;
  padding-bottom: 30px;
  text-transform: uppercase;
}
```

```
.tech p {
  justify-content: center;
  text-indent: 40px;
  font-family: 'Kanit', sans-serif;
  font-size: 25px;
  letter-spacing: 2px;
}
```

```
.tech img {
  height: 300px;
  padding-left: 40%;
}
```

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}

```
#result {
  background-color: #55E6C1;
}
```

```
.result h1 {
  padding-top: 100px;
  color: #EA2027;
  text-transform: uppercase;
  font-weight: bold;
  font-size: 40px;
  text-align: center;
  font-family: 'Arvo', serif;
}
```

```
.result p {
  box-shadow: rgba(50, 50, 93, 0.25) 0px 50px 100px -20px, rgba(0, 0, 0, 0.3) 0px 30px 60px -30px,
  rgba(10, 37, 64, 0.35) 0px -2px 6px 0px inset;
  border-radius: 30px;
  margin: 50px;
  background-color: #9880fa8f;
  align-items: center;
  padding: 50px;
  justify-content: center;
  text-indent: 70px;
  font-family: 'Kanit', sans-serif;
  font-size: 27px;
  letter-spacing: 2px;
}
```

```
#predict {
  height: 1500px;
  background-color: #9c88ff;
}
```

```
#predict h1 {
  padding-top: 100px;
  color: #EA2027;
  text-transform: uppercase;
  font-weight: bold;
  font-size: 40px;
  text-align: center;
  font-family: 'Arvo', serif;
}
```

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```
.heart_img {
  padding-top: 50px;
  padding-left: 17%;
}
```

```
.heart_table {
  margin-left: -100px;
  height: 500px;
  display: flex;
  align-items: center;
  justify-content: space-around;
}
```

```
.heart_box {

  padding-top: 60px;
}
```

```
.heart_box label {
  padding-left: 10px;
  font-size: 25px;
  font-family: 'Kanit', sans-serif;
}
```

```
.heart_box input {
  padding: 3px;
  font-size: 25px;
  box-shadow: rgba(50, 50, 93, 0.25) 0px 13px 27px -5px, rgba(0, 0, 0, 0.3) 0px 8px 16px -8px;
  border: none;
  border-radius: 8px;
  width: 350px;
  height: 35px;
}
```

```
#predict button {
  margin-top: 60px;
  border-radius: 10px;
  font-weight: bold;
  color: black;
  letter-spacing: 3px;
  font-family: 'Arvo', serif;
  align-items: center;
  width: 200px;
  margin-left: 45%;
}
```

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```

border: 3px solid white;
background-color: #ffcc3f;
transition: all 0.7s ease;
}

#predict button:hover {
  background-color: #e24646d5;
}

#analytics{

  background-color: #f8a5c2;
}
#analytics h1 {
  padding-top: 100px;
  color: #EA2027;
  text-transform: uppercase;
  font-weight: bold;
  font-size: 40px;
  text-align: center;
  font-family: 'Arvo', serif;
}
.last_table{
  padding-bottom: 50px;
  margin-left: 200px;
}
#sign_in {
  padding-top: 100px;
  font-family: 'Poppins', sans-serif;
  height: 100vh;
  width: 100vw;
  background-color: #7227d5c4;
  display: flex;
  justify-content: center;
  align-items: center;
}

.card {
  background: #fff;
  width: 1100px;
  min-height: 550px;
  box-shadow: rgba(0, 0, 0, 0.3) 0px 19px 38px, rgba(0, 0, 0, 0.22) 0px 15px 12px;
  display: flex;
}

```

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```

.form,
.image {
  width: 50%;
}

.image {
  background-image: url('../images/login.jpeg');
  background-size: cover;
  background-position: center;
  margin-left: 550px;
  margin-top: -300px;
}

.overlay {
  width: 100%;
  height: 100%;
  background-color: rgba(114, 39, 213, 0.31);
  display: flex;
  justify-content: center;
  align-items: center;
  flex-direction: column;
  text-align: center;
}

.overlay h3 {
  color: white;
  letter-spacing: 1px;
  font-size: 30px;
  font-weight: 700;
  opacity: 0.6;
}

.overlay p {
  color: white;
  font-size: 18px;
  font-weight: bold;
  opacity: 0.6;
}

.form {
  padding: 60px 25px;
  display: flex;
  flex-direction: column;
}

```

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```
.form h3 {
  font-size: 34px;
  font-weight: 500;
  position: relative;
  margin-bottom: 30px;
}
```

```
.form h3::after {
  content: "";
  width: 30px;
  height: 3px;
  background: #7227D5;
  position: absolute;
  left: 0;
  bottom: 2px;
  border-radius: 5px;
}
```

```
.fa {
  color: #7227D5;
  position: absolute;
  top: 10px;
  font-size: 22px;
}
```

```
.input-field {
  width: 100%;
  margin-bottom: 10px;
  position: relative;
}
```

```
.input-field input {
  display: block;
  width: 100%;
  padding: 10px 30px;
  outline: none;
  border: none;
  border-bottom: 2px solid rgb(182, 180, 180);
  font-size: 20px;
}
```

```
.form>a {
  color: #7227D5;
  text-decoration: none;
  font-size: 18px;
}
```



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```
margin-bottom: 35px
}
```

```
button {
  height: 45px;
  background: #7227D5;
  border: none;
  color: white;
  border-radius: 5px;
  font-size: 22px;
}
```

```
button+p {
  text-align: center;
  padding-top: 30px;
  font-size: 18px;
}
```

```
button+p a {
  text-decoration: none;
  color: #7227D5;
  font-weight: 500;
}
```

```
input::placeholder {
  font-family: 'Poppins', sans-serif;
}
```

## 8.TESTING

### 8.1 Test Cases

A test case has components that describe input, action and an expected response, in order to determine if a feature of an application is working correctly. A test case is a set of instructions on “HOW” to validate a particular test objective/target, which when followed will tell us if the expected behaviour of the system is satisfied or not. Characteristics of a good test case:

Test Case No	Test Case Scenario	Status
1	Accurate: Exacts the purpose	Pass
2	Economical: No unnecessary steps or words	Pass

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3	Traceable: Capable of being traced to requirement	Pass
4	Repeatable: Can be used to perform the tests over and over	Pass
5	Reusable: Can be reused if necessary	Pass

## 8.2 User acceptance testing

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

## 9. RESULTS

### 9.1 Performance metrics

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

## 10. ADVANTAGES AND DISADVANTAGES

### Advantages

- Users can search for a doctor's help at any point in time.
- Users can talk about their Heart Disease and get an instant diagnosis.
- Doctors get more clients online.
- Very useful in case of emergency.

### Disadvantages

- Accuracy Issues: A computerized system alone does not ensure accuracy, and the warehouse data is only as good as the data entry that created it.
- The system is not fully automated, it needs data from the user for a full diagnosis

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## 11. CONCLUSION

The early prognosis of cardiovascular diseases can aid in making decisions on lifestyle changes in high-risk patients and in turn reduce the complications, which can be a great milestone in the field of medicine. This project resolved the feature selection i.e. backward elimination and RFECV behind the models and successfully predict heart disease, with 85% accuracy. The model used was Data Analytics. Further for its enhancement, we can train on models and predict the types of cardiovascular diseases providing recommendations to the users, and also use more enhanced models. Early detection of cardiac diseases and continuous supervision of clinicians can reduce the mortality rate. However, it is not possible to monitor patients every day in all cases accurately and consultation of a patient for 24 hours by a doctor is not available since it requires more sapience, time and expertise.

## 12. 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 consulting a doctor in case of an emergency.

## 13. APPENDIX

### Source Code

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2 Final//EN">
<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://cdnjs.cloudflare.com/ajax/libs/font-awesome/4.7.0/css/font-awesome.min.css">
<title>Heart Disease Prediction</title>
<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">
<link rel="stylesheet" href="../css/style.css">
</head>

<body>
<section id="home">
<header>
<div id="container">
<ul>
<li><a href="#home"><b>HOME</b></a></li>
```

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```

<li><a href="#content"><b>CONTENT</b></a>
<ul>

<li><a href="#subtypes"><b>SUBTYPES</b></a></li>

<li><a href="#diagnosis"><b>DIAGNOSIS</b></a></li>

<li><a href="#heartpredict"><b>USING ML</b></a>

<ul>

<li><a href="#goal"><b>GOAL</b></a></li>

<li><a href="#dataset"><b>DATASET</b></a></li>

<li><a href="#technique"><b>TECHNIQUE</b></a></li>

</ul>

</li>

<li><a href="#result"><b>RESULT</b></a></li>

</ul>

</li>

<li><a href="#predict"><b>PREDICT</b></a></li>

<li><a href="#analytics"><b>ANALYTICS</b></a></li>

<li><a href="#sign_in"><b>SIGN IN</b></a></li>

</ul>

</div>

</header>

<div class="content">

<h1>Heart Diseases Prediction</h1>



```

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</div>

</section>

<section id="content">

<h1>Heart Disease</h1>

<div class="para">

<p>

1. Heart disease describes a range of conditions that affect your heart. Diseases under the heart disease umbrella include blood vessel diseases, such as coronary artery disease, heart rhythm problems (arrhythmias) and heart defects you're born with (congenital

heart defects), among others.

</p>

<p>

2. The term "heart disease" is often used interchangeably with the term "cardiovascular disease". Cardiovascular disease generally refers to conditions that involve narrowed or blocked blood vessels that can lead to a heart attack, chest pain (angina)

or stroke. Other heart conditions, such as those that affect your heart's muscles, valves or rhythm, also are considered forms of heart disease.

</p>

<p>

3. Heart disease is one of the biggest causes of morbidity and mortality among the population of world. Prediction of cardiovascular disease is regarded as one of the most important subjects in the section of clinical data analysis. The amount of data

in the healthcare industry is huge. Data mining turns the large collection of raw healthcare data into information that can help to make informed decisions and predictions.

</p>

</div>

<div class="box">

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According to a news article, heart disease proves to be the leading cause of death for both women and men. The article states the following :

</div>

<div class="list">

<ul>

<li>Heart disease is the leading cause of death for both men and women. More than half of the deaths due to heart disease in 2009 were in men.</li>

<li>Coronary Heart Disease(CHD) is the most common type of heart disease, killing over 370,000 people annually.</li>

<li>Every year about 735,000 Americans have a heart attack. Of these, 525,000 are a first heart attack and 210,000 happen in people who have already had a heart attack.</li>

</ul>

</div>

</section>

<section id="subtypes">

<h1>HEARTDISEASES SUBTYPES</h1>

<div class="para1">

<h4>

1. Coronary heart disease:

</h4>

<p>

Coronary artery disease, also known as coronary heart disease, is the most common type of heart. It develops when the arteries that supply blood to the heart become clogged with plaque. This causes them to harden and narrow. Plaque contains cholesterol

and other substances. As a result, the blood supply reduces, and the heart receives less oxygen and fewer nutrients. In time, the heart muscle weakens, and there is a risk of heart failure and arrhythmias.

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When plaque builds up in the

arteries, it is called atherosclerosis. Plaque in the arteries can rupture from blockages and cause blood flow to stop, which can lead to a heart attack.

</p>

<h4>

2. Congenital heart defects:

</h4>

<h5>

A person with a congenital heart defect is born with a heart problem. There are many types of congenital heart defects, including Trusted Source:

</h5>

<div class="list">

<ul>

<li><span>Atypical heart valves:</span> Valves may not open properly, or they may leak blood.</li>

<li><span>Septal defects:</span> There is a hole in the wall between either the lower chambers or the upper chambers of the heart.</li>

<li><span>Atresia:</span> One of the heart valves is missing.</li>

<li>Congenital heart disease can involve major structural issues, such as the absence of a ventricle or problems with unusual connections between the main arteries that leave the heart.</li>

<li>Many congenital heart defects do not cause any noticeable symptoms and only become apparent during a routine medical check.</li>

<li>According to the American Heart Association (AHA) Trusted Source, heart murmurs often affect children, but only some are due to a defect.</li>

</ul>

</div>

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<div class="three">

<h4>3.Arrhythmia:</h4>

<p>Arrhythmia refers to an irregular heartbeatTrusted Source. It occurs when the electrical impulses that coordinate the heartbeat do not work correctly. As a result, the heart may beat too quickly, too slowly, or erratically.</p>

<h5>There are various types of arrhythmias, including:</h5>

<ul>

<li><span>Tachycardia:</span> This refers to a rapid heartbeat.</li>

<li><span>Bradycardia: </span> This refers to a slow heartbeat.</li>

<li><span>Premature contractions: </span> This refers to an early heartbeat</li>

<li><span>Atrial fibrillation:</span> This is a type of irregular heartbeat.</li>

<li>A person may notice a feeling like a fluttering or a racing heart.</li>

</ul>

</div>

</div>

</section>

<section id="diagnosis">

<h1>HEARTDISEASES DIAGNOSED</h1>

<div class="para1">

<h4>Physical exam and blood tests:</h4>

<p>During your appointment, your doctor will ask you about your symptoms and your family medical history. They'll also check your heart rate and blood pressure. Your doctor may also order blood tests. For example, cholesterol tests measure the

levels of fat and cholesterol in your bloodstream. Your doctor can use these tests to help determine your risk of heart disease and heart attack.</p>



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<h4>A complete cholesterol test checks four types of fats in your blood:</h4>

<div class="list">

<ul>

<li>Total cholesterol is the sum of all cholesterol in your blood.</li>

<li>Low-density lipoprotein (LDL) cholesterol is sometimes called “bad” cholesterol. Too much of it causes fat to build up in your arteries, which reduces blood flow. This can lead to a heart attack or stroke.</li>

<li>High-density lipoprotein (HDL) cholesterol is sometimes called “good” cholesterol. It helps carry away LDL cholesterol and clear your arteries.</li>

<li>Triglycerides are a type of fat in your blood. High levels of triglycerides are often associated with diabetes, smoking, and excessive alcohol consumption.</li>

<li>Your doctor may also order C-reactive protein (CRP) tests to check your body for signs of inflammation. They can use the results of your CRP and cholesterol tests to assess your risk of heart disease.</li>

</ul>

</div>

<h4>Noninvasive tests for heart disease:</h4>

<div class="list">

<ul>

<li>Electrocardiogram</li>

<li>Echocardiogram</li>

<li>Stress Test</li>

<li>Carotid Ultrasound</li>

<li>Holter Monitor</li>

<li>Chest X-ray</li>

<li>Tilt Table Test</li>

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<li>CT Scan</li>

<li>Heart MRI</li>

</ul>

</div>

</div>

</section>

<section id="heartpredict"></section>

<section id="goal">

<h1>GOALS</h1>

<div class="goal">



<p>

In the future, these techniques can be applied to a real-time database of the individual patient and by using the same attributes or by adding some more attributes we can determine the prediction of multiple diseases like kidney-related and lungs related

diseases. We can also implement the algorithms used previously for better results. This can be deployed to android and web platforms to analyze and predict using real-time data & by collaborating with doctors or medical organizations or

as a common platform for predicting diseases. As an extension to this work and some sort of limitation to the work performed here, different types of classifiers can be included in the analysis, and more in-depth sensitivity analysis can

be performed on these classifiers, also an extension can be made by applying the same analysis to other diseases datasets, and see the performance of these classifiers to classify and predict these diseases.

</p>

</div>

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</section>

<section id="dataset">

<h1>

DATASET DESCRIPTION

</h1>

<h2>

HTML TABLE

</h2>

<div class="table">

<table>

<tr>

<th>s.no</th>

<th>Attribute</th>

<th>Description</th>

<th>Type</th>

</tr>

<tr>

<td>1</td>

<td>Age</td>

<td>Age of patient</td>

<td>Numeric</td>

</tr>

<tr>

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<td>2</td>

<td>sex</td>

<td>Gender of patients</td>

<td>Nominal</td>

</tr>

<tr>

<td>3</td>

<td>Cp</td>

<td>Type of chest pain</td>

<td>Nominal</td>

</tr>

<tr>

<tr>

<td>4</td>

<td>Trestbps</td>

<td>Resting blood pressure</td>

<td>Numeric</td>

</tr>

<tr>

<td>5</td>

<td>Chol</td>

<td>Cholesterol level</td>

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<td>Numeric</td>

</tr>

<tr>

<td>6</td>

<td>FBS</td>

<td>Fasting Blood sugar</td>

<td>Nominal</td>

</tr>

<tr>

<td>7</td>

<td>RestECG</td>

<td>Electrocardiographic result</td>

<td>Numeric</td>

</tr>

<tr>

<td>8</td>

<td>Thalach</td>

<td>The maximum heart attained by patient</td>

<td>Numeric</td>

</tr>

<tr>

<td>9</td>

<td>Exang</td>

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<td>Exercise induced angina</td>

<td>Nominal</td>

</tr>

<tr>

<td>10</td>

<td>Oldpeak</td>

<td>ST depression induced angina</td>

<td>Numeric</td>

</tr>

</table>

</div>

</section>

<section id="technique">

<h1>

HEARTDISEASE PREDICTION-BEST ML APPROACHES

</h1>

<div class="tech">

<h4>1.Random Forest Classifier</h4>

<p>

The random forest algorithm provides flexibility and robustness for classification tasks using tabular data, which few other standard models can. Given its simplicity and versatility, the random forest classifier is widely used for fraud detection, loan

risk prediction, and predicting heart diseases.

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</p>



</div>

<div class="tech">

<h4>2. K-Nearest Neighbors</h4>

<p>

As the name says, a k neighbors classifier takes a data point and finds k other data points nearest to it in the vector space. In a supervised fashion, KNN creates clusters of the data samples having the same target value. Whenever a new value needs to

be classified, it uses a distance metric to assign it to one of the classes. For heart disease detection, there are only two classes that KNN needs to build. Thus, it is pretty robust and efficient for this task. Euclidean distance is

one of the popular distance metrics used by KNN, but there are many more available.

</p>



</div>

<div class="tech">

<h4>3. Decision Tree classifier</h4>

<p>

Decision Trees are the individual models that make a random forest after ensembling. Each decision tree classifier uses the dataset's attributes to create a tree. As shown in the image below, the branches end up in the leaves that are made up of target

values. Using visual components and an information gain index, the tree identifies the leading features of the labels of each class. Thus, the branches are created that maximize the information gained in each split and lead up to the leaf

node of that class. Decision trees are fast and robust for disease prediction if the dataset has powerful features for a simple use-case.

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</p>



</div>

<div class="tech">

<h4>4. Support Vector Machines

</h4>

<p>

A Support Vector Machine (SVM) algorithm is a non-probabilistic classifier aiming to generate hyperplanes that divide the data points of two classes in the vector space. For N number of features and M targets, SVM creates M-1 N-dimensional hyperplanes

that separate data points of different classes from each other. The image below shows how "support" vectors are calculated such that the margin (or distance) between the vectors of two classes is the most. SVM optimizes this margin metric

to find the best hyperplane for all the categories.

</p>



</div>

<div class="tech">

<h4>5. Artificial Neural Networks</h4>

<p>

An ANN is perhaps the most popular machine learning model in today's AI landscape, given its wide applications in deep learning in the form of convolutional neural networks. However, a normal ANN comprised of a handful of linear nodes can perform comparable

to the best standard ML models. The architecture of a standard ANN is shown in the figure below. As we can see, the hidden layer is the most crucial part of an ANN, and is made up of several linear nodes.

</p>



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</div>

</section>

<section id="result">

<div class="result">

<h1>RESULT</h1>

<P>

Heart disease prediction is a necessity as well as exigent work in the medical field. The mortality rate can be reduced if the disease is recognized at the initial stages, and precautions and proper treatment are possible. The algorithms are tested using

various features. Accurate forecasting of the diseases is the goal of the proposed method. The decision classifier approach proved to be very efficacious to predict the diseased using features like age, BMI, cholesterol, and more. Adding

feature BMI improved the accuracy of prediction. Thus, by assessing the results, the suggested approach generates a more precise prediction of cardiovascular diseases. Our project focuses on analyzing and designing a system where patients'

real-time information can be processed and evaluated based on previous symptoms and current symptoms for different diseases [2]. We have concluded that KNN, Support Vector, Decision tree, and Random Forest are the best algorithms with

higher accuracy rates than others for predicting and analysis among these KNN is easy to implement and requires less computational resources and thus could be implemented in a web-based system effortlessly.

</P>

</div>

</section>

<section id="predict">

<h1>HEART DISEASE PREDICTION</h1>

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```
<div class="heart_img">
```

```

```

```
</div>
```

```
<div class="heart_table">
```

```
<div class="heart_box">
```

```
<form action="/heart-disease" method="post">
```

```
<pre>
```

```
<label>AGE</label>
```

```
<input type="number" name="age" id="age" placeholder="" required/><br/>
```

```
<label>GENDER</label>
```

```
<input name="sex" min="0" max="1" id="thalach" placeholder=""
required="required"><br>
```

```
<label>DIASTOLIC BLOOD PRESSURE</label>
```

```
<input name="diabp" id="chol" placeholder="" required><br>
```

```
<label>CHEST PAIN TYPE</label>
```

```
<input type="number" name="diabetes" placeholder="" required><br>
```

```
</pre>
```

```
</div>
```

```
<div class="heart_box">
```

```
<pre>
```

```
<label>FASTING BLOOD SUGAR</label>
```

```
<input type="number" name="glucose" placeholder="" required><br>
```

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<label>HEART RATE</label>

<input name="heartrate" id="trestbps" placeholder="" required="required"><br>

<label>CHOLESTROL</label>

<input type="number" id="cp" name="chol" placeholder="" required><br/>

<label>SYSTOLIC BLOOD PRESSURE</label>

<input type="number" name="sysbp" id="exang" placeholder="" required="required"><br>

</pre>

</div>

</div>

<button> SUBMIT

</button>

</form>

</section>

<div class="details row " id="detailed">

<p class="col-lg-3">Age : <%= age %></p>

<p class="col-lg-3">Gender : <%= sex %> </p>

<p class="col-lg-3">Diastolic BP : <%= diaBp %> </p>

<p class="col-lg-3">Chest pain type : <%= chestpt %> </p>

<p class="col-lg-3">Fasting Blood Sugar : <%= glucose %> </p>

<p class="col-lg-3">Heart Rate : <%= heartrate %> </p>

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<p class="col-lg-3">Systolic Blood Pressure : <%=sysbp%></p>

<p class="col-lg-3">Cholestrol : <%= totchol %> </p>

<p class="col-lg-12 text-center result"><%= result %> </p>

<% if (result == "More chance of heart attack") { %>



<% } else { %>



<% } %>

</div>

<section id="analytics">

<h1>DATA VISUALIZATION</h1>

<div class="para1">

<h4>1.Chest Pain by Age:</h4>

<p>

Chest pain is often associated with heart disease, many people with heart disease say they have a vague discomfort that isn't necessarily identified as pain. In general, chest discomfort related to a heart attack or another heart problem may be described

by or associated with one or more of the following: Pressure, fullness, burning or tightness in your chest Crushing or searing pain that spreads to your back, neck, jaw, shoulders, and one or both arms Pain that lasts more than a few minutes,

gets worse with activity, goes away and comes back, or varies in intensity Shortness of breath Cold sweats Dizziness or weakness Nausea or vomiting...

</p>

<h4>2.Exploration Of BPvsChestPainType And Gender:</h4>

<p>

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Sex differences in pain perception are well-described, where female sex has higher somatic awareness compared to male sex (22). This potentially leads to women having greater sensitivity but lower specificity for cardiac chest pain. Further, differing

phenotypes of biological sex impact pain perception, e.g., younger premenopausal women with relatively high estrogen levels have a greater pain perception compared to older postmenopausal women with lower estrogen levels (23). Younger

pre-menopausal women are erroneously thought to be “protected” from CAD, and younger women's pain symptoms are more easily discounted. Specifically, socio-cultural gender is documented to contribute to subjective symptoms, where gender

bias in pain diagnosis and treatment has been identified within the patient-provider encounter and treatment decisions (24). A comprehensive evaluation of sex and gender differences in pain includes proximate cause contributions of experiential

(abuse, labor, and delivery), psychological (anxiety, depression, post-traumatic stress), genetic (X chromosome imprinting/Y chromosome), neurochemical (adenosine, cytokine expression), organizational (steroid action in development), activational

(steroid action in adulthood), systems level (cortical connectivity, vagal nerve modulation), and sociocultural (gender roles, gender role expectations)(25)...

</p>

### <h4>3.Exploration Of Max Heart Rate During The Chest Pain:</h4>

<p>

Your maximum heart rate is a calculation that helps you figure out what your ideal target heart rate is during exercise. You can estimate your maximum age-related heart rate by subtracting your age

from 220Trusted Source. For example, for a 35-year-old person, the estimated maximum age-related heart rate would be calculated as  $220 - 35 \text{ years} = 185 \text{ bpm}$ . This maximum heart rate calculation helps you see if you’re exercising too hard or not putting in enough energy. Your target heart rate uses this calculation to reflect the ideal bpm you need for a great workout. When your heart rate is too fast, it’s called tachycardia. For adults, a fast heart rate is defined as above 100 bpmTrusted Source. Tachycardia, which is when your heart rate is faster than it should be, can be caused by underlying health conditions like: anemia, congenital heart disease, heart disease that’s affecting blood flow, hyperthyroidism, injury to the heart, like from a heart attack, ventricular or supraventricular arrhythmias, Taking illegal drugs (like stimulants like cocaine or methamphetamines) or misusing prescription medications or non-prescription products (like diet supplements) may also cause your heart to beat too fast. Other, less serious reasons for a fast heart rate include: drinking caffeine, drinking alcohol, stress, physical exercise, pregnancy...

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#### 4.Exploration Of BP By Age:

Blood pressure is the force of blood flowing through a person's blood vessels. Doctors calculate a person's blood pressure using two measurements known as systolic and diastolic. Systolic blood pressure is the highest level of force at which the heart pumps blood around the body. Diastolic blood pressure is the resistance to the blood flow in the blood vessels. Blood pressure is written with systolic blood pressure first and then diastolic blood pressure, for example, 120/80 millimeters of mercury (mm Hg). If either measurement is too high, it could mean a person has high blood pressure. If they are too low, it could suggest low blood pressure. The cut-off point for diagnosing high blood pressure does not change with age. If a person needs to know whether their child's blood pressure is within the normal range, they should ask a doctor for guidance. Normal =Less than 120and Less than 80, Elevated =120– 129 and Less than 80, Hypertension =stage 1 130–139 or 80–89, Hypertension =stage 2 140 or higher or 90 or higher, Hypertension crisis =Higher than 180 or Higher than 120...

#### 5.Exploration Of Cholesterol By Age And Gender:

Cholesterol is a waxy, fat-like substance, and there are two types: low-density lipoprotein (LDL) and high-density lipoprotein (HDL). If there is too much LDL, or "bad," cholesterol in the bloodstream, it can build up in blood vessels, forming fatty deposits called plaques. These plaques can lead to Trusted Source other problems, including heart attacks and strokes. Total and LDL cholesterol levels should be low. But having more HDL, or "good," cholesterol in the blood may reduce the risk of a heart attack or stroke. However, kids with risk factors for high cholesterol should have their levels checked more frequently. Typically, males tend to have higher levels throughout their lives than females. A male's cholesterol levels increase with age, and a female's cholesterol levels rise after menopause...

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<th>Anyone 19 or younger</th>

<th>Men aged 20 or over</th>

<th>Women aged 20 or over</th>

</tr>

<tr>

<td>total cholesterol</td>

<td>less than 170 mg/dl</td>

<td>125–200 mg/dl</td>

<td>125–200 mg/dl</td>

</tr>

<tr>

<td>non-HDL</td>

<td>less than 120 mg/dl</td>

<td>less than 130 mg/dl</td>

<td>less than 130 mg/dl</td>

</tr>

<tr>

<td>LDL</td>

<td>less than 100 mg/dl</td>

<td>less than 100 mg/dl</td>

<td>less than 100 mg/dl</td>

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</tr>

<tr>

<td>HDL</td>

<td>more than 45 mg/dl</td>

<td>40 mg/dl or higher</td>

<td>50 mg/dl or higher</td>

</tr>

</table>

</div>

</section>

<section id="sign\_in">

<div class="card">

<div class="form">

<h3>Login</h3>

<div class="input-field">

<i class="fa fa-envelope"></i>

<input type="text" placeholder="Enter your email">

</div>

<div class="input-field">

<i class="fa fa-lock"></i>

<input type="password" placeholder="Enter your password">

</div>



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[Forgot password?](#)

Login

Don't have an account? [Signup now](#)

Every new friend is a new adventure

let's get connected

**Github & Project Demo Link**

<https://github.com/IBM-EPBL/IBM-Project-6411-1658828187>

<https://clipchamp.com/watch/91G9IOAIKwU>