VISUALIZING AND PREDICTING HEART DISEASE WITH AN INTERACTIVE DASHBOARD

TEAM ID PNT2022TMID28938

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INDEX

VISUALIZING AND PREDICTING HEART DISEASE USING INTERACTIVE DASHBOARD

1. INTRODUCTION

1.1 Project Overview

A innovative solution through which we can directly predict the heart disease based on your choice without any search. It can be done by using the dashboard.Using dashboard we can manage users choice . The Dashbord can give Predictions to the users based on their heart state. It can promote the best predicting and visulaizing of heart diseases. It will store the patient's details and their reports in the database. Dashbords can also help in collecting User feedback.

1.2 Purpose

We aim to decrease Heart Attacks and deaths due to this and to Personalize the patient report .This project can help to build brand awareness and deal with heart diseases .This enables accurate and quick prevention of heart attacks, remedy of heart diseases ,visualizing of heart diseases.

2. LITERATURE SURVEY

2.1 Existing problem

People find it difficult to navigate through pages citing various heart diseases using normal search method in a website related to medicine. The usual search method takes some time to display all the heart diseases and attacks and doesn't satisfy the user. The user is unable to input their reports and to predict the heart attacks.

2.2 References

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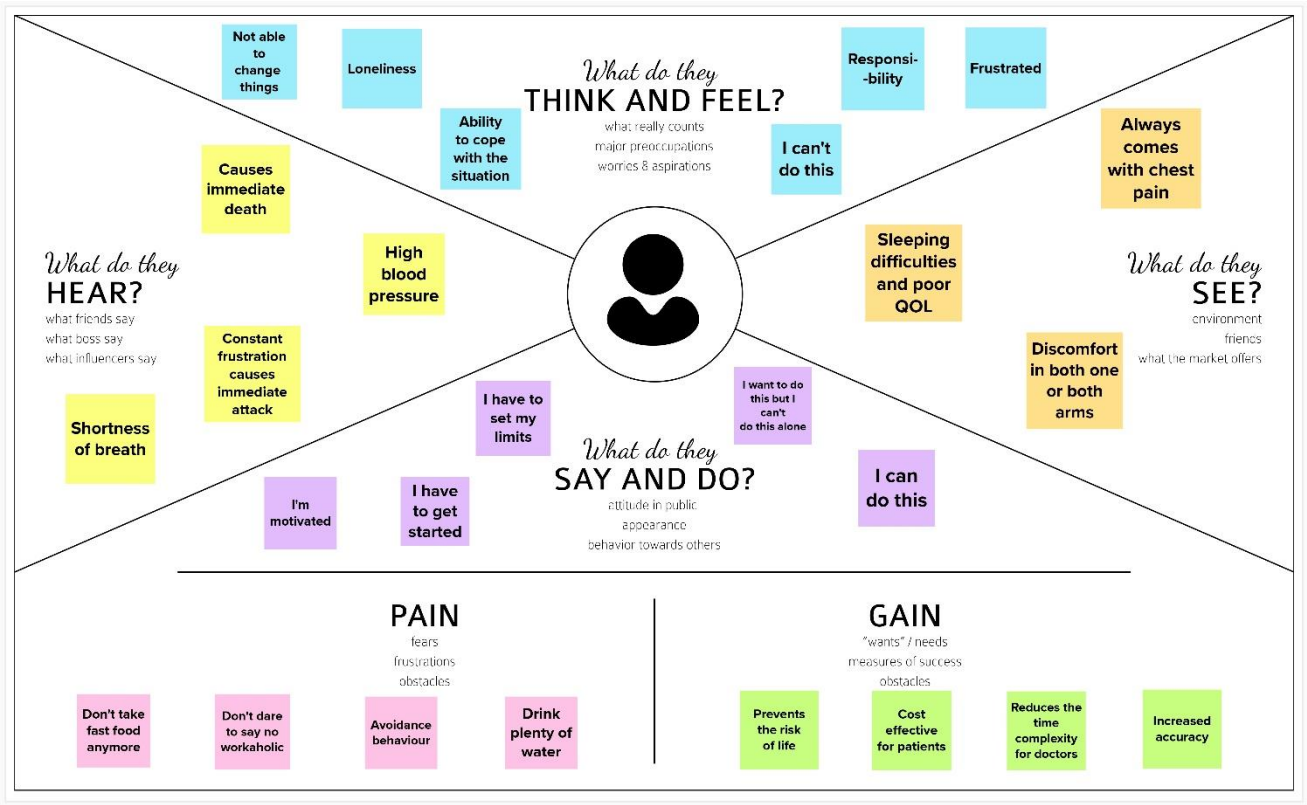
2.3 Problem Statement Definition

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 heart attacks or strokes.
Heart acts a major role in the corporeal organisms. The diseases of the heart want more perfection and exactness for diagnosis and analyses. Heart disease is a dangerous disease. This disease occurs due to various problems such as overpressure, blood sugar, high blood pressure, Cholesterol, etc. in the human body By using Python and machine learning, this paper is analyzed and predicted heart disease. We can predict this disease by using various attributes in the dataset. We have collected a data set consisting of 13 elements and 383 individual values to analyze the patient's performance. The main aim of the paper is to get better accuracy to detect heart disease using the ML algorithm.

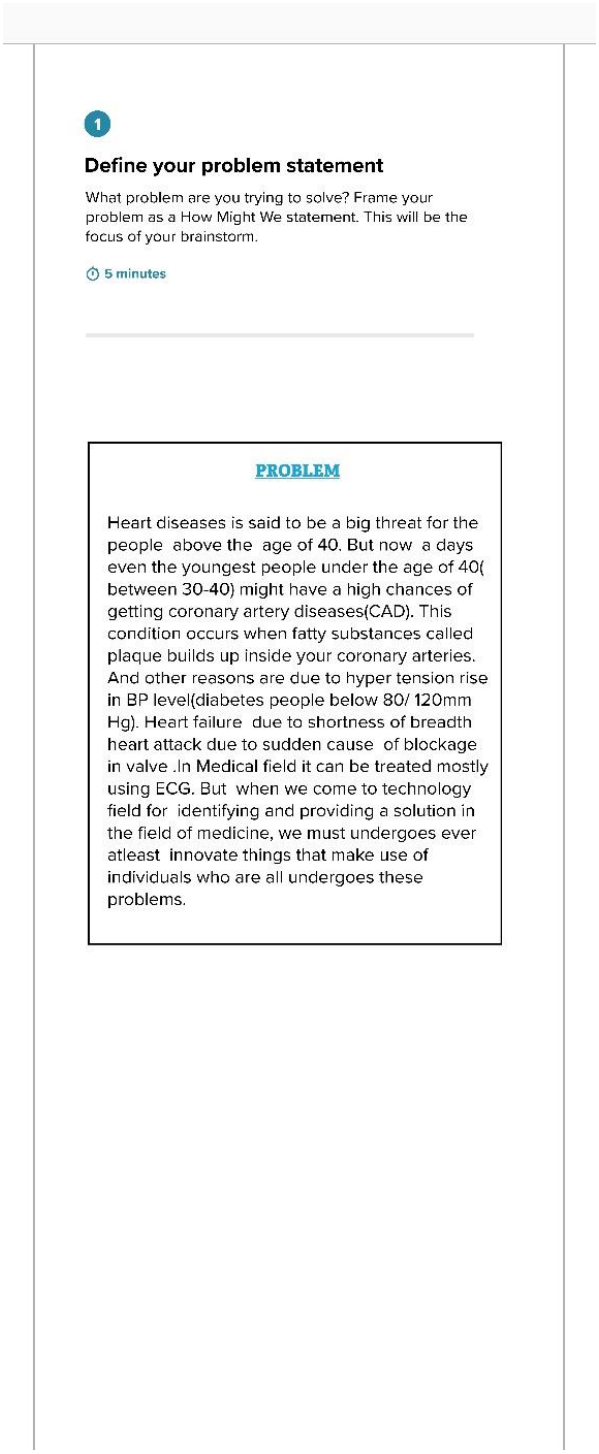
3. IDEATION PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming:

Step-1: Team Gathering, Collaboration and Select the Problem Statement



1

Define your problem statement

What problem are you trying to solve? Frame your problem as a How Might We statement. This will be the focus of your brainstorm.

5 minutes

PROBLEM

Heart diseases is said to be a big threat for the people above the age of 40. But now a days even the youngest people under the age of 40(between 30-40) might have a high chances of getting coronary artery diseases(CAD). This condition occurs when fatty substances called plaque builds up inside your coronary arteries. And other reasons are due to hyper tension rise in BP level(diabetes people below 80/ 120mm Hg). Heart failure due to shortness of breadth heart attack due to sudden cause of blockage in valve .In Medical field it can be treated mostly using ECG. But when we come to technology field for identifying and providing a solution in the field of medicine, we must undergoes ever atleast innovate things that make use of individuals who are all undergoes these problems.

Step-2: Brainstorm, Idea Listing and Grouping

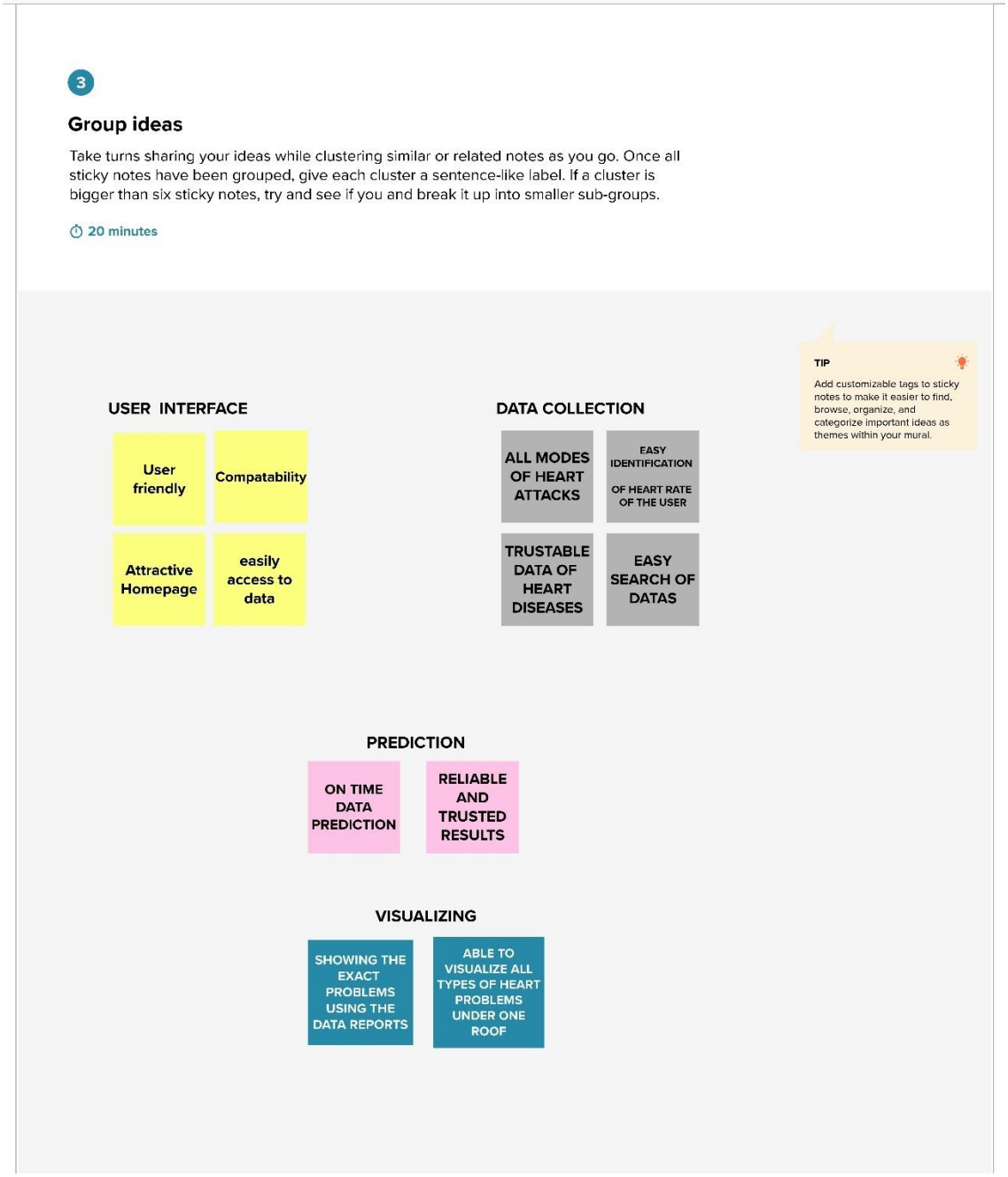
2

Brainstorm solo

Have each participant begin in the "solo brainstorm space" by silently brainstorming ideas and placing them into the template. This "silent-storming" avoids group-think and creates an inclusive environment for introverts and extroverts alike. Set a time limit. Encourage people to go for quantity.

10 minutes

Step-3: Group ideas



Step-4: Prioritize

3.3 Proposed Solution

Navigating between various screens and difficult to search the heart conditions are a problem when making an online search or to know about the heart diseases. Typically, websites include searching for a heart diseases and attacks due to this separately.

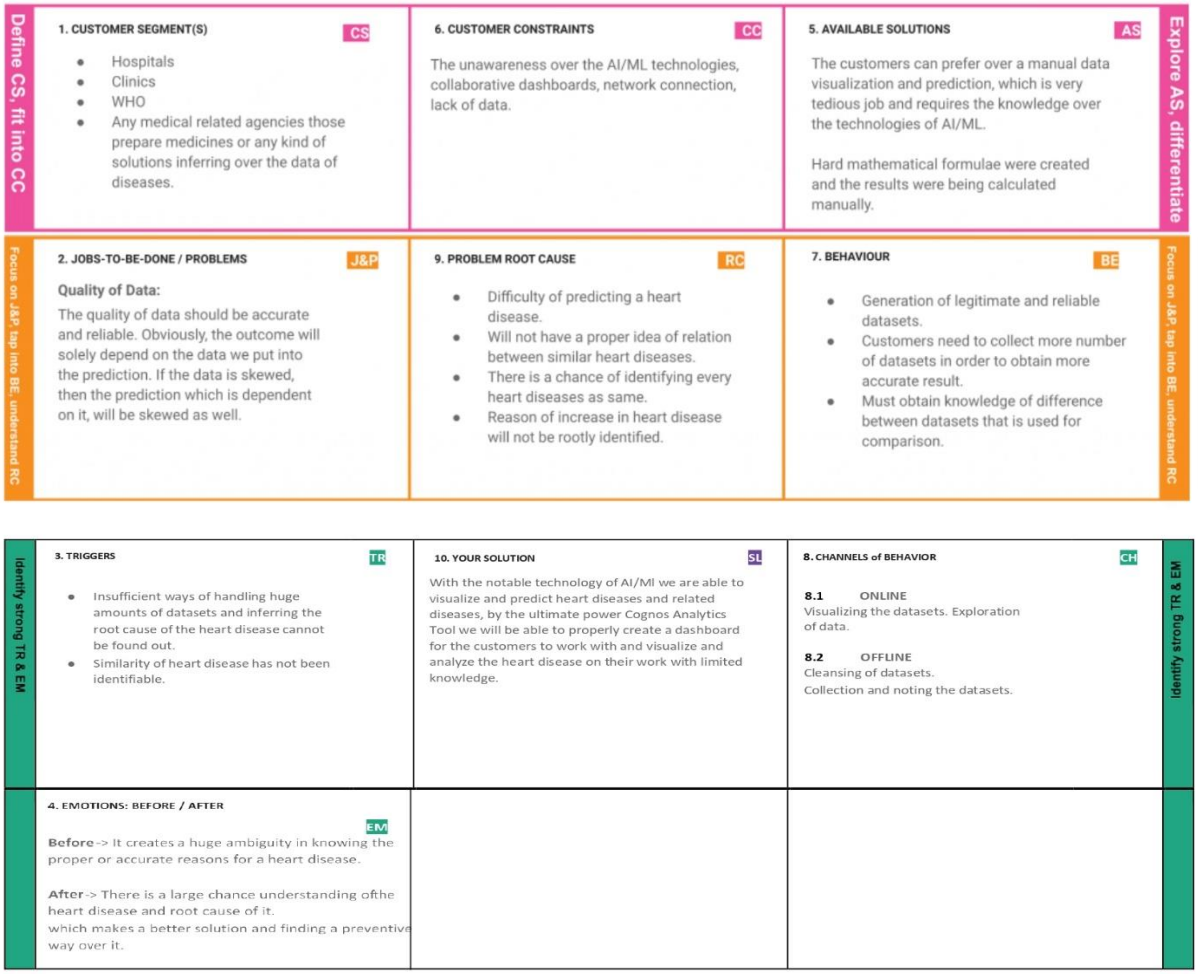
Search of various heart conditions in different websites leads to the user finding a invalid or that is unrelated to what they were looking for.

3.4 Problem Solution fit

Visualizing and Predicting Heart Diseases with an Interactive Dash Board

TEAM ID: PNT2022TMID28938

PROBLEM SOLUTION FIT



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 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	Visualizing Data	User can visualize the trends on the heart disease through Dashboard created using IBM Cognos Analytics.
FR-5	Generating Report	User can view his/her health report and can make decisions accordingly.

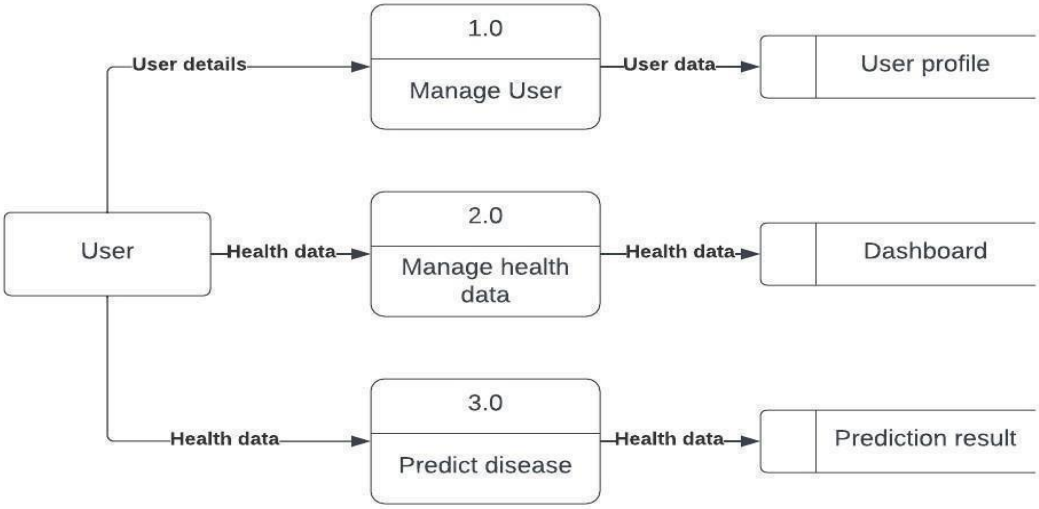
4.2 Non-Functional requirements

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

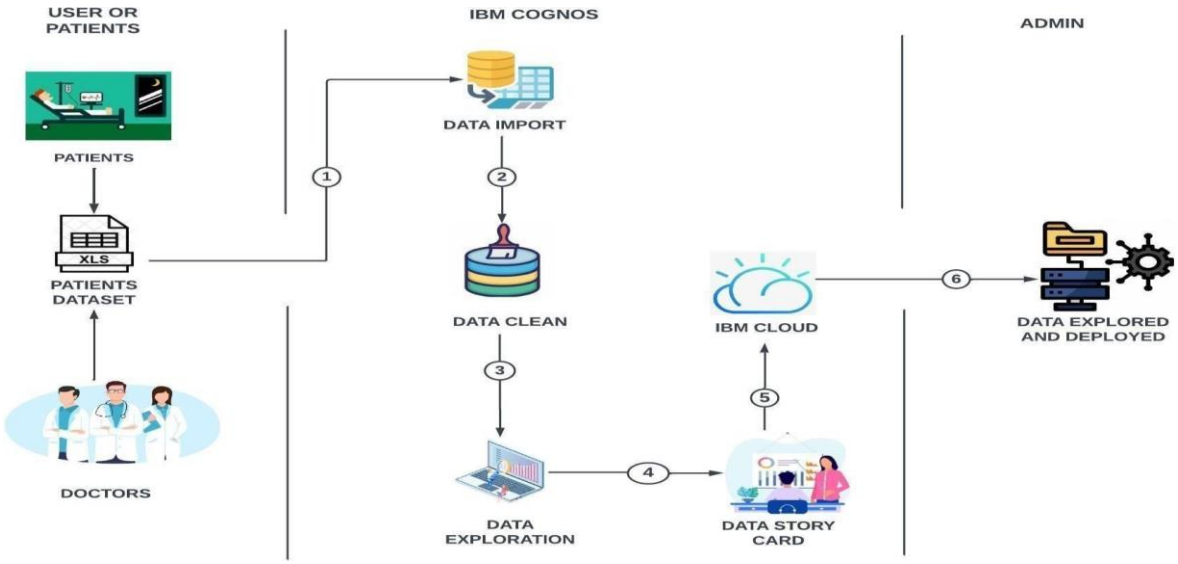
NFR-1	**Performance**	Relaying should be performed quickly. This prediction system should be made available in the cloud to make it easier to use and to set a new standard for affordable, high-quality healthcare.
NFR-2	**Availability**	The application has to be available 24 x 7 for users without any interruption.
NFR-3	**Scalability**	It is determined by the number of people who maintain the software or system based on its performance, such as workflow, efficiency increase or decrease, response time, etc. Maintenance, checking for software updates, and fixing server errors can all be measures of its scalability. This identifies a product of high quality.

5. PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture



5.3 User Stories

Flow:

1) User creates an account in the application.
2) User enters the medical records in the dashboard.
3) User can view the visualizations of trends in the form of graphs and charts for his/her medical records with the trained dataset.
4) User can view the accuracy of probability of occurrence of heart disease in the dashboard.

Document an existing experience

Narrow your focus to a specific scenario or process within an existing product or service. In the **Steps** row, document the step-by-step process someone typically experiences, then add detail to each of the other rows.

SCENARIO **Browsing, booking, attending, and rating a local city tour**	**Enter** What do people experience as they begin the process?	**Engage** In the core moments in the process, what happens?	**Exit** What do people typically experience as the process finishes?
Steps What does the person (or group) typically experience?	By searching through online Finding our prediction dashboard Create User Account	Visualize the information of prediction User gives their problems as their input to prediction system Reviews of the users about prediction system	Easy to access and visualize the prediction
Interactions What interactions do they have at each step along the way? ▪ **People:** Who do they see or talk to? ▪ **Places:** Where are they? ▪ **Things:** What digital touchpoints or physical objects would they use?	Interactive Dashboard for Heart Disease prediction Disease Prediction at online	Interaction with Dashboard View the results from interactive dashboard	 
Goals & motivations At each step, what is a person's primary goal or motivation? ("Help me..." or "Help me avoid...")	Help me to check whether i have heart disease or not Help me to get awarness about my health condition	Quick prediction for the given symptoms Emotional support, empathy and respect	Maintain Good health Awareness about heart diseases
Positive moments What steps does a typical person find enjoyable, productive, fun, motivating, delightful, or exciting?	Detailed information about diseases Easy to access and visualize the prediction	Positive results from the perdiction Clear information communication	Detailed explanation about the diseases Improved Prediction system
Feelings and pains of Customers	Fear about their health condition Bewilderment	Trust User friendly environment	Knowing health condition from home Cost-effective method
Areas of opportunity How might we make each step better? What ideas do we have? What have others suggested?	Suggestion to avoid heart diseases Displaying Symptoms related to heart diseases	Healthy Lifestyle Recommendation Learn about treatment and self-care	Staying informed about the diseases Incorporate new desired activities

User Type	Functional Requirement(Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Webuser)	Registration	USN-1	As a user, I can register for the applicationby entering my email, password, and confirming my password.	I can access my account / Dashboard	High	Sprint-1
		USN-2	As a user, I will receive confirmation emailonce I have registered for the application	I can receive confirmation email & click confirm	High	Sprint-1
	Login	USN-3	As a user, I can log into the application byentering email & password	I can access my account / Dashboard when loggedin	High	Sprint-1
Customer (Webuser)	Dashboard	USN-4	User can view his/her complete medical analysis and accuracy of disease prediction	I can view my medical analysis in the dashboard	High	Sprint-2
		USN-5	User can view the accuracy of occurrenceof heart disease	I can view the accuracy of heart disease in thedashboard	High	Sprint-2
Customer Care Executive	Helpdesk	USN-6	As a customer care executive, he/she canview the customer queries.	I can post my queries inthe dashboard	Medium	Sprint-3
		USN-7	As a customer care executive, he/she cananswer the customer queries.	I can get support fromhelpdesk	High	Sprint-3
Administrator	User Profile	USN-8	As an admin, he/she can update the health details of users.	I can view my updated health details.	High	Sprint-4
User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
		USN-9	As an admin, he/she can add or delete users.	I can access my account / Dashboard when logged in	High	Sprint-4
		USN-10	As an admin, he/she can manage the user details.	I can view the organized data of myself.	High	Sprint-4

6. PROJECT PLANNING &SCHEDULING

6.1 Sprint Planning & Estimation

Title	Description	Date
Literature Survey and Information Gathering	Gathering Information by referring the technical papers, research publications	20 SEPTEMBER 2022
Prepare Empathy Map	Capture user pain and gainsPrepare List of Problem Statement	20 SEPTEMBER 2022
Ideation	Prioritise a top 3 ideas basedon feasibility and Importance	4 OCTOBER 2022
Proposed Solution	Solution include novelty, feasibility, business model, social impactand scalability of solution	30 OCTOBER 2022
Problem Solution Fit	Solution fit document	10NOVEMBER 2022
Solution Architecture	Solution Architecture	16NOVEMBER 2022
Customer Journey	Understanding User Interactions and experienceswithapplication	16NOVEMBER 2022
Functional Requirement	Prepare functional Requirement	16NOVEMBER 2022
Data flow Diagrams	Data flow diagram	16NOVEMBER 2022
Technology Architecture	Technology Architecturediagram	16 NOVEMBER 2022
Milestone & sprintdelivery plan	Activity what we done&further plans	16 NOVEMBER 2022
Project DevelopmentDelivery of sprint1,2,3 & 4	Develop and submit the developed codeby testing it	29 OCTOBER 2022 – 16 NOVEMBER 2022

6.2 Sprint Delivery Schedule

Sprint	Functionl Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Story points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can registerfor the application by entering my email, password, and confirming my password.	I can access my account /dashboard	10	high	Jaswant L Aravind G
		USN-2	As a user, I will receiveconfirmation email once I have registered for the application	I can receive confirmation email & click confirm	5	High	Jaswant L Aravind G
		USN-3	As a user, I can registerfor the application throughGmail	I can register & access the dashboard with Gmail Login	5	High	Jaswant L Aravind G
Sprint-2	Login	USN-4	After Registration Login page will appear, the user will login using the login credentials	I can register & access the dashboard with Gmail Login	20	High	Jaswant L Aravind G Manish Kumar K S Jeeva V
Sprint-3	Dashboard	USN-5	The user is allowed toview or update isprofile	I can see theprofile.	10	Medium	Jaswant L Aravind G Manish Kumar K S Jeeva V

		USN-6	The user can changepassword	I can able to change the password.	10	Medium	Jaswant L Aravind G Manish Kumar K S Jeeva V
Sprint-4	Classified result	USN-7	Home - Analyse your Heart	I can detect the heart condition from where ever I want.	5	High	Jaswant L Aravind G Manish Kumar K S Jeeva V
		USN-8	The user will have to fill in the 13 required fields for the system topredict a heart disease	This will prevent the user to predict whether I has heart disease or not based on the values I entered	10	High	Jaswant L Aravind G Jeeva V Manish Kumar K S
		USN-9	The report is generatedbased onthe condition	The user can able to view/download the report if needed	5	Medium	Jeeva V Manish Kumar K S Jaswant L Aravind G

7. CODING & SOLUTIONING (Explain the features added in the project along with code)

7.1 Feature

Loginandregister.php

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>CARDIOVASCULAR RISK CALCULATOR</title>
    <link rel="stylesheet" href="style.css">
    <link
href="https://fonts.googleapis.com/css2?family=Chilanka&family=Dancing+Script:wght
@700&display=swap" rel="stylesheet">
</head>
<body>
    <div class="full-page">
        <div class='navbar'>
            <div class='logo'>
                <a href='#'><h1>Cardiovascular Risk Calculator</h1></a>
            </div>
            <nav>
                <ul id='MenuItems'>

                    <li><button class='loginbtn'onclick="document.getElementById('login-
form').style.display='block'" style="width:auto;">Login</button></li>
                    <li><button class='loginbtn'onclick="document.getElementById('register-
form').style.display='block'" style="width:auto;">Register</button></li>
                </ul>
            </nav>
        </div>
        <div class="sub-page">
```

```
        <div class="overlay"></div>
         <div class="text" >
            <h4> <p> A healthy heart <br> will give you the courage to face and overcome
<br>any challenge in life <br>"Start From The Healthy Heart" </p> </h4>
          </div>
       </div>
       <div id='login-form' class="login-page">
          <div class="form-box">
             <span onclick="document.getElementById('login-form').style.display='none'"
class="close">&times;</span>
             <div class="form">
                <form class='login-form', action="validate.php", method="post">
                   <center><h1 class="main-heading">Login Form</h1></center>
                                    <input type="text"name='emailid' placeholder="Email
ID", required/>
                                    <input type="password" name='password'
placeholder="password", required/>
                                    <button>LOGIN</button>
                                 </form>
             </div>
          </div>
       </div>
       <div id="register-form" class='register-page'>
          <div class="form-box1">
            <span onclick="document.getElementById('register-form').style.display='none'"
class="close">&times;</span>
             <div class="form1">
                <form class='register-form', action="registration.php", method="post">
                   <center><h1 class="main-heading">Register Form</h1></center>
                                    <input type="text" name='user'placeholder="user name"
required/>
                                    <input type="text" name='emailid'placeholder="email-id"
required/>
```

```
                                    <input type="password"name='password'
placeholder="password" required/>
                                    <button>REGISTER</button>
                </form>
              </div>
            </div>
        </div>
    </div>
</body>
</html>
```

8. TESTING

8.1 Test Cases

- This report shows the number of test cases that have passed, failed, and untested

Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	0	5
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

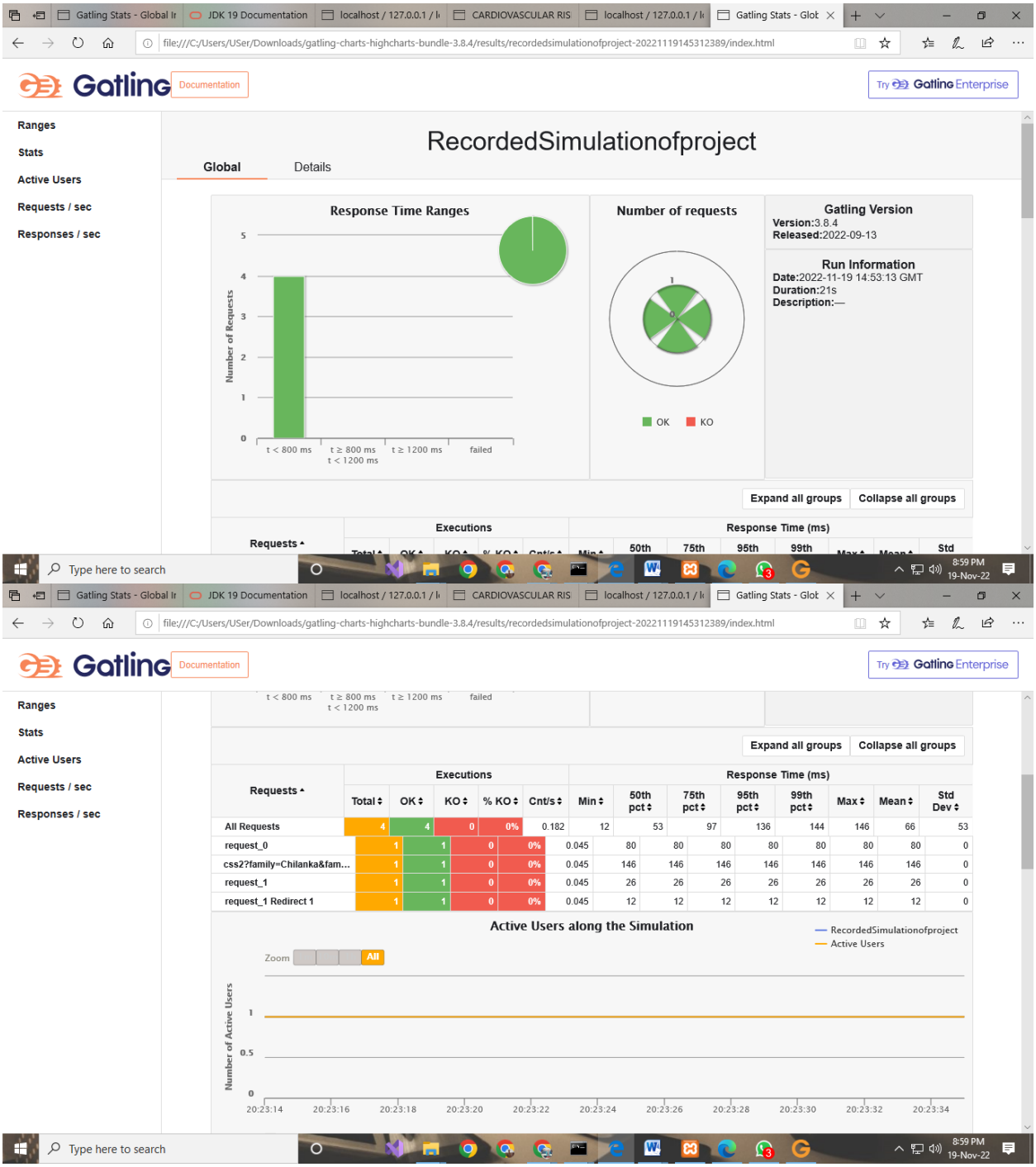
8.2 User Acceptance Testing

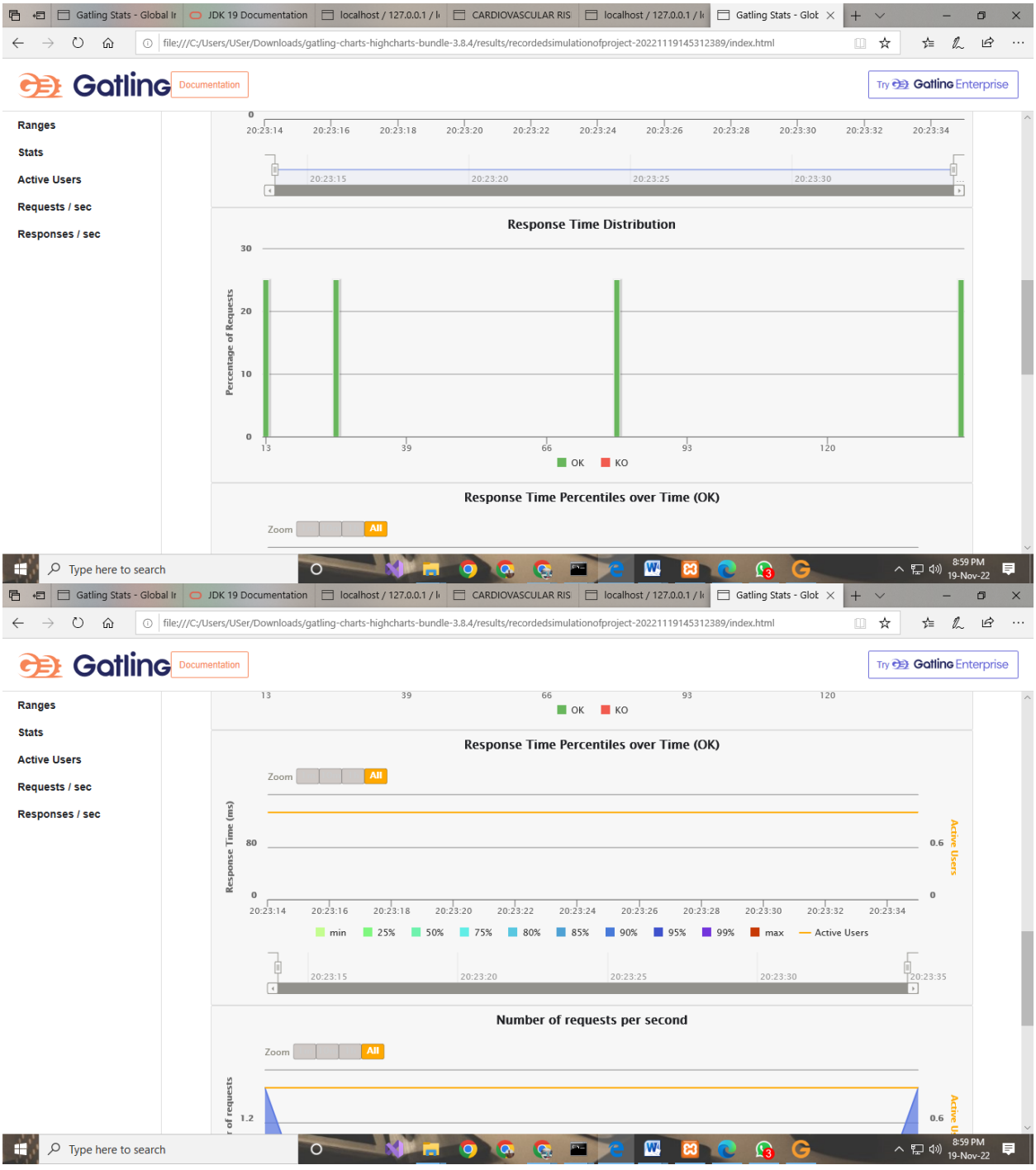
- This report shows the number of resolvedor closed bugs at each severity level, and howthey were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	14	6	3	0	23
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	28	16	14	23	81

9. RESULTS

9.1 Performance Metrics

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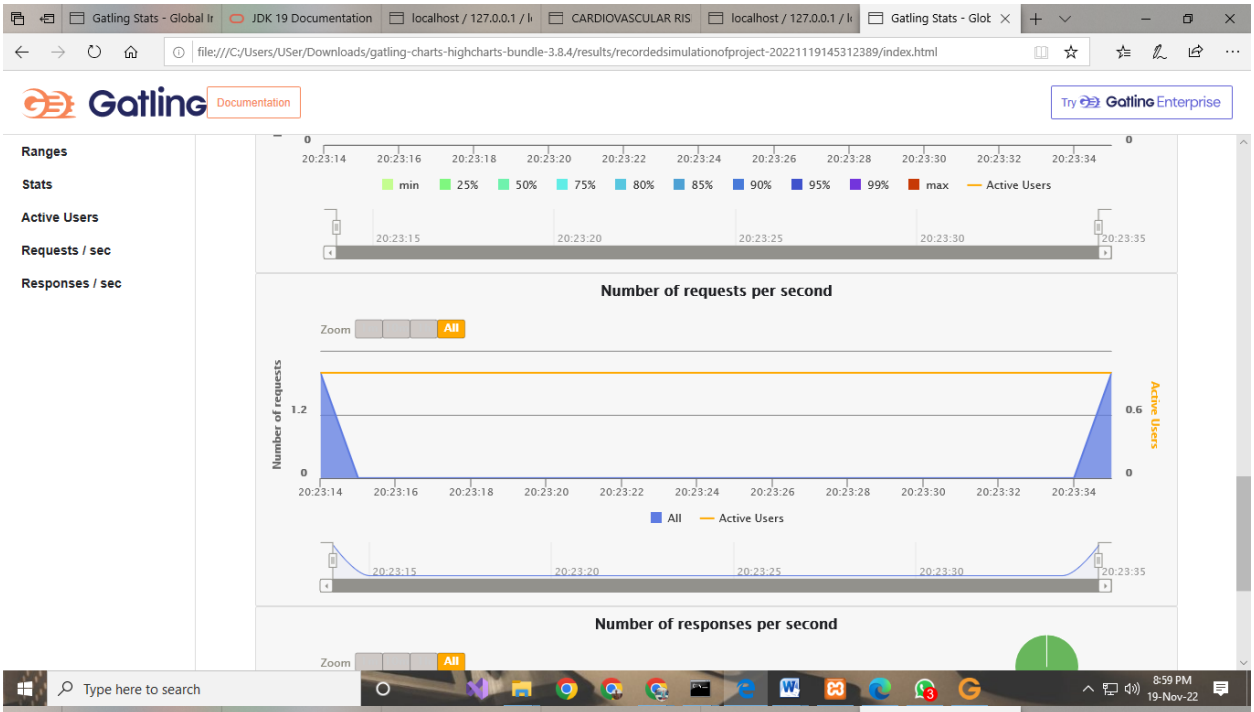
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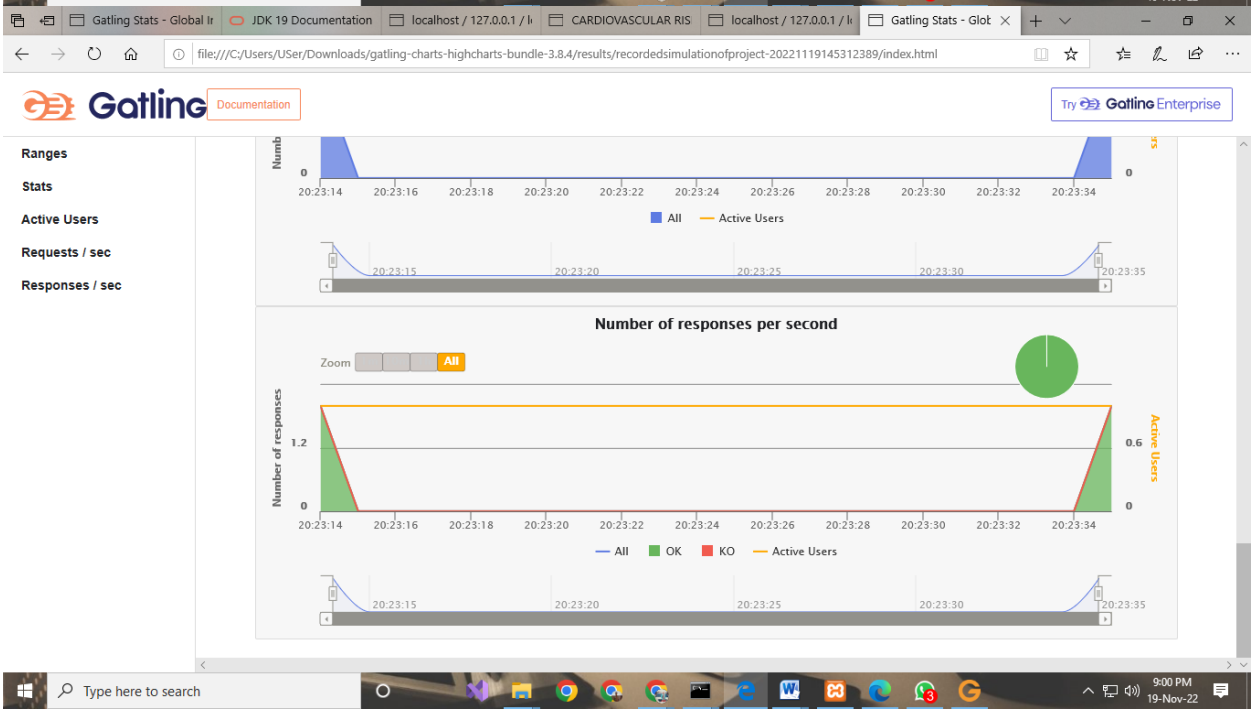
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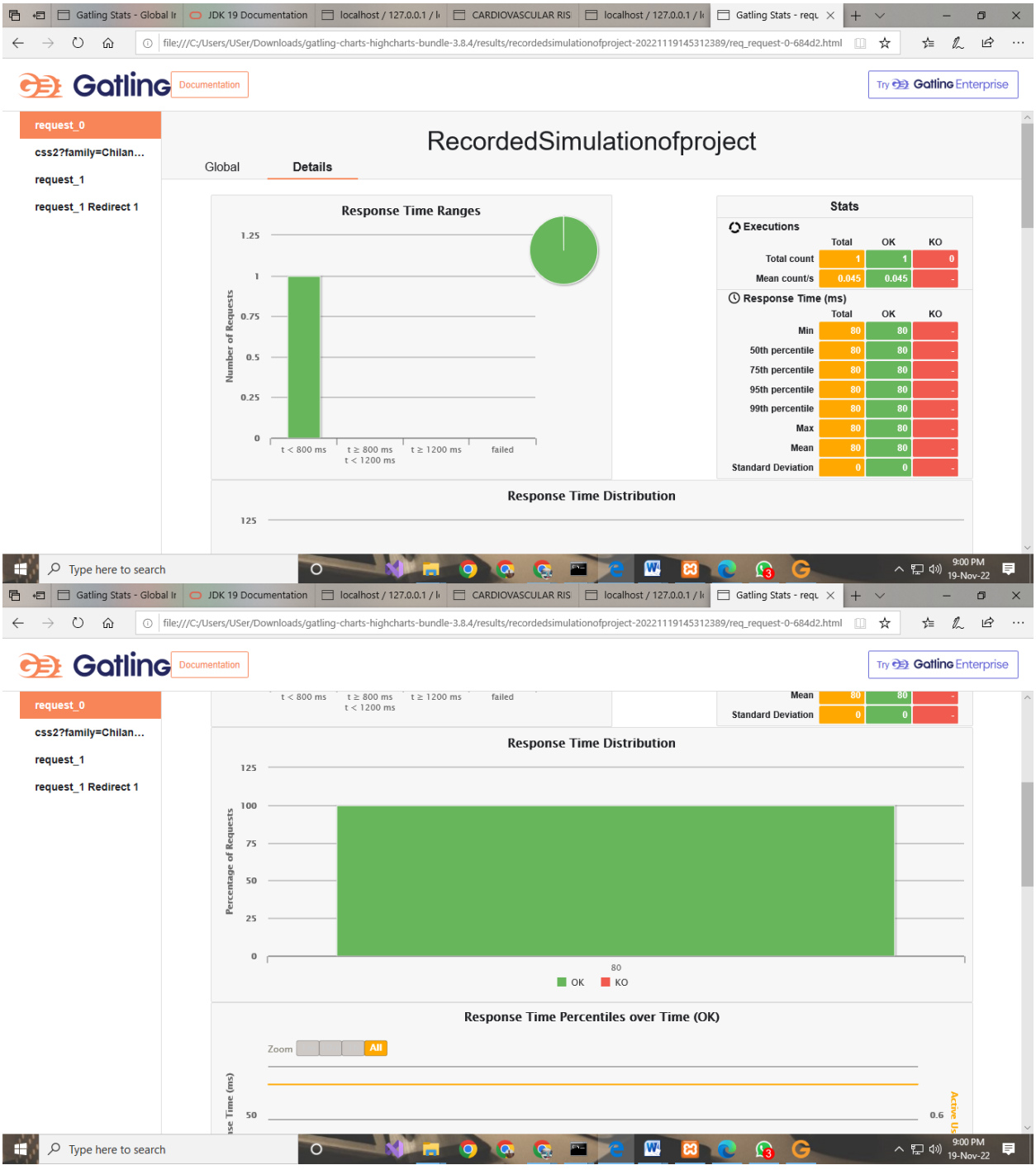
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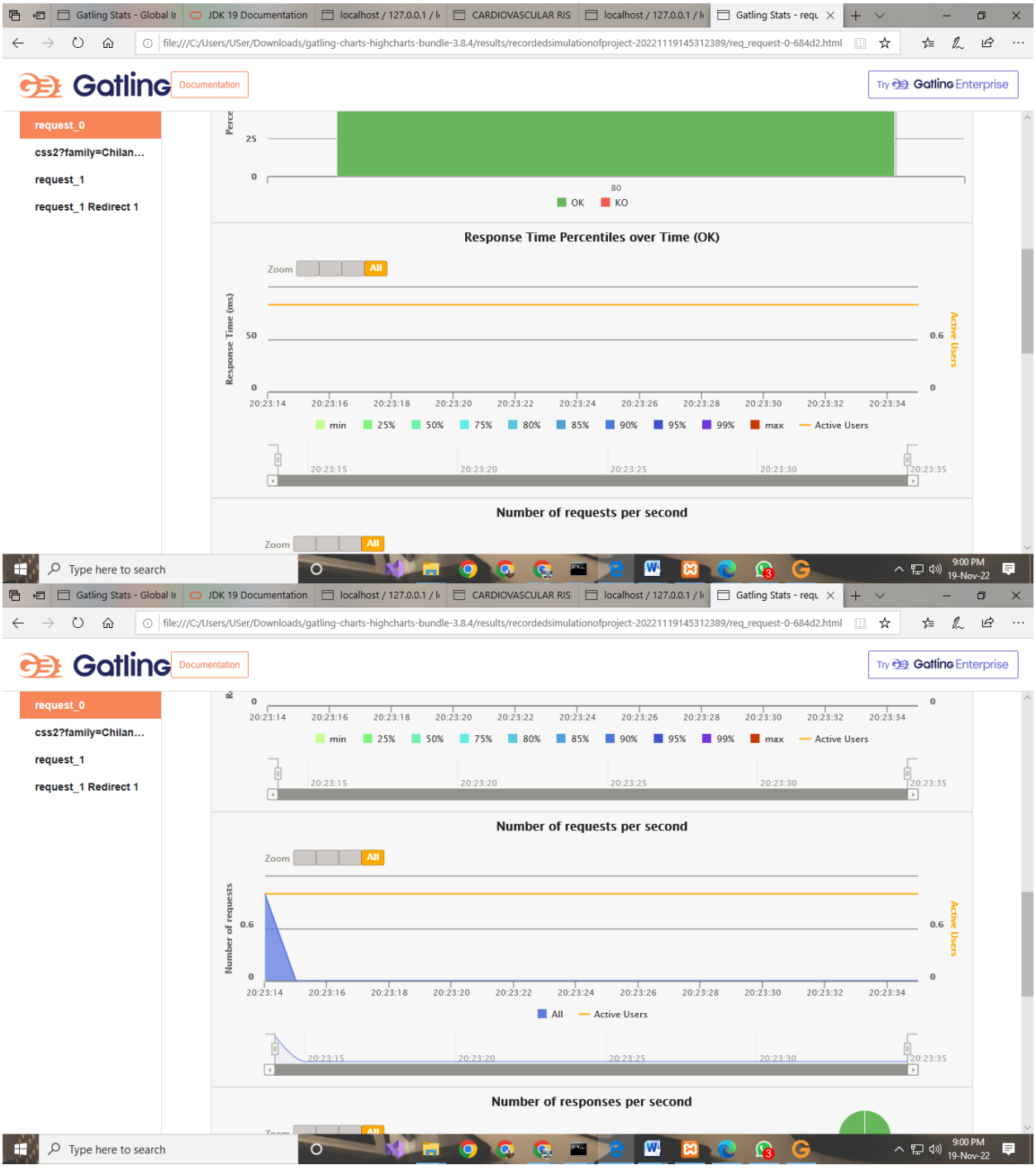
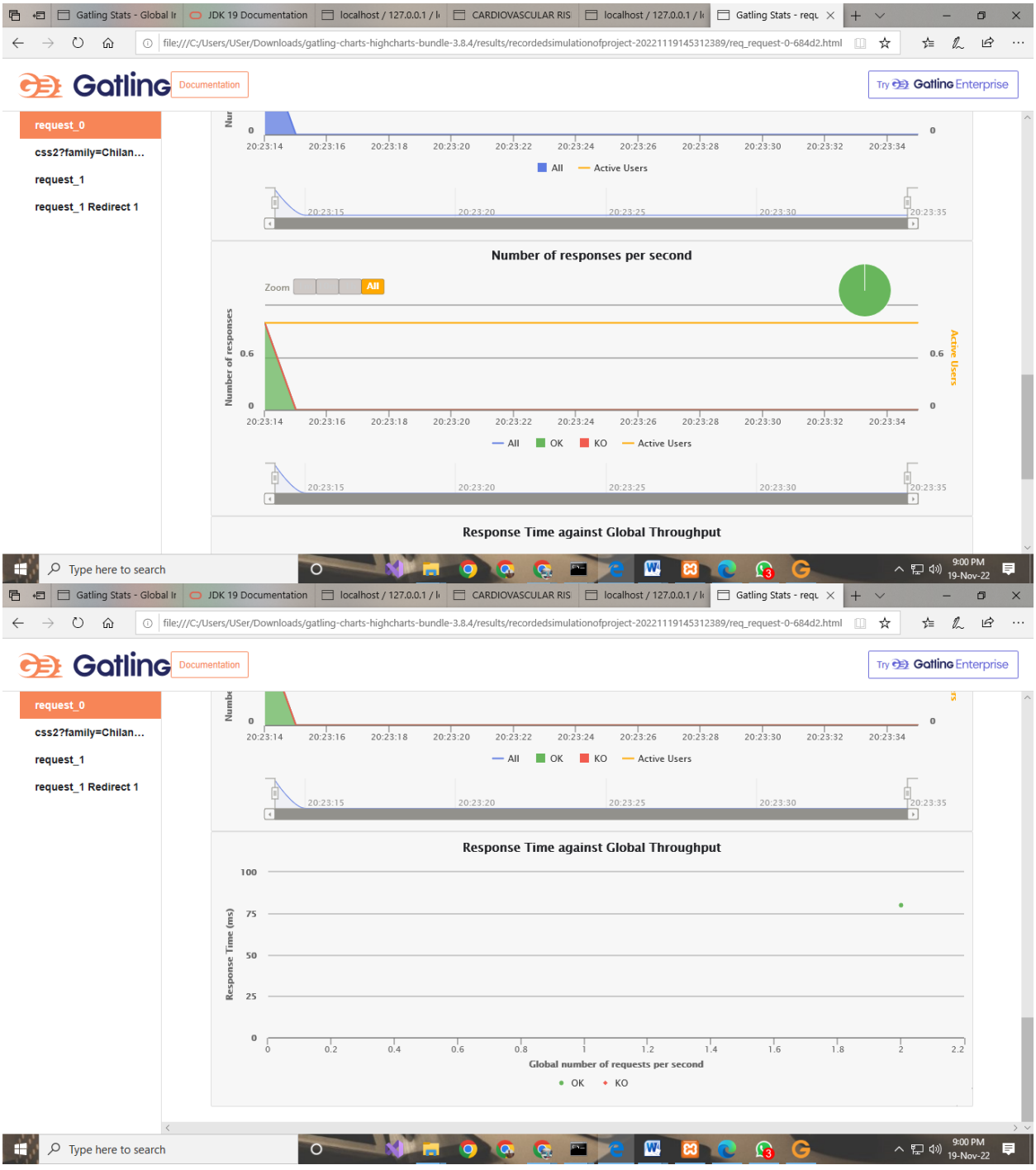
localhost / 127.0.0.1 / l
Gatling Stats - requ
file:///C:/Users/USer/Downloads/gatling-charts-highcharts-bundle-3.8.4/results/recordedsimulationofproject-20221119145312389/req_request-0-684d2.html
Gatling
Documentation
Try Gatling Enterprise
request_0
css2?family=Chilan...
request_1
request_1 Redirect 1
RecordedSimulationofproject
Global
Details
Response Time Ranges
Number of Requests
1.25
1
0.75
0.5
0.25
0
t < 800 ms
t ≥ 800 ms
t < 1200 ms
t ≥ 1200 ms
failed
Stats
Executions
Total
OK
KO
Total count
1
1
0
Mean count/s
0.045
0.045
-
Response Time (ms)
Total
OK
KO
Min
80
80
-
50th percentile
80
80
-
75th percentile
80
80
-
95th percentile
80
80
-
99th percentile
80
80
-
Max
80
80
-
Mean
80
80
-
Standard Deviation
0
0
-
Response Time Distribution
125
Type here to search
9:00 PM
19-Nov-22
Gatling Stats - Global Ir
JDK 19 Documentation
localhost / 127.0.0.1 / l
CARDIOVASCULAR RIS
localhost / 127.0.0.1 / l
Gatling Stats - requ
file:///C:/Users/USer/Downloads/gatling-charts-highcharts-bundle-3.8.4/results/recordedsimulationofproject-20221119145312389/req_request-0-684d2.html
Gatling
Documentation
Try Gatling Enterprise
request_0
css2?family=Chilan...
request_1
request_1 Redirect 1
t < 800 ms
t ≥ 800 ms
t < 1200 ms
t ≥ 1200 ms
failed
Mean
80
80
-
Standard Deviation
0
0
-
Response Time Distribution
Percentage of Requests
125
100
75
50
25
0
80
OK
KO
Response Time Percentiles over Time (OK)
Zoom
All
50
0.6
Type here to search
9:00 PM
19-Nov-22


Gatling Stats - Global Ir
JDK 19 Documentation
localhost / 127.0.0.1 / l
CARDIOVASCULAR RIS
localhost / 127.0.0.1 / l
Gatling Stats - requ
file:///C:/Users/USer/Downloads/gatling-charts-highcharts-bundle-3.8.4/results/recordedsimulationofproject-20221119145312389/req_request-0-684d2.html
Gatling
Documentation
Try Gatling Enterprise
request_0
css2?family=Chilan...
request_1
request_1 Redirect 1
Perce
25
0
80
OK
KO
Response Time Percentiles over Time (OK)
Zoom
All
Response Time (ms)
Active Users
50
0.6
0
20:23:14
20:23:16
20:23:18
20:23:20
20:23:22
20:23:24
20:23:26
20:23:28
20:23:30
20:23:32
20:23:34
min
25%
50%
75%
80%
85%
90%
95%
99%
max
Active Users
20:23:15
20:23:20
20:23:25
20:23:30
20:23:35
Number of requests per second
Zoom
All
Type here to search
9:00 PM
19-Nov-22
Gatling Stats - Global Ir
JDK 19 Documentation
localhost / 127.0.0.1 / l
CARDIOVASCULAR RIS
localhost / 127.0.0.1 / l
Gatling Stats - requ
file:///C:/Users/USer/Downloads/gatling-charts-highcharts-bundle-3.8.4/results/recordedsimulationofproject-20221119145312389/req_request-0-684d2.html
Gatling
Documentation
Try Gatling Enterprise
request_0
css2?family=Chilan...
request_1
request_1 Redirect 1
0
20:23:14
20:23:16
20:23:18
20:23:20
20:23:22
20:23:24
20:23:26
20:23:28
20:23:30
20:23:32
20:23:34
min
25%
50%
75%
80%
85%
90%
95%
99%
max
Active Users
20:23:15
20:23:20
20:23:25
20:23:30
20:23:35
Number of requests per second
Zoom
All
Number of requests
Active Users
0.6
0
All
Active Users
20:23:15
20:23:20
20:23:25
20:23:30
20:23:35
Number of responses per second
Type here to search
9:00 PM
19-Nov-22


Gatling Stats - Global Ir
JDK 19 Documentation
localhost / 127.0.0.1 / lo
CARDIOVASCULAR RIS
localhost / 127.0.0.1 / lo
Gatling Stats - requ
file:///C:/Users/USer/Downloads/gatling-charts-highcharts-bundle-3.8.4/results/recordedsimulationofproject-20221119145312389/req_request-0-684d2.html
Gatling
Documentation
Try Gatling Enterprise
request_0
css2?family=Chilan...
request_1
request_1 Redirect 1
All
Active Users
Number of responses per second
Zoom
All
Number of responses
Active Users
OK
KO
Response Time against Global Throughput
Type here to search
9:00 PM
19-Nov-22
Response Time (ms)
Global number of requests per second

10. ADVANTAGES & DISADVANTAGES

10.1. Advantages

a. The proposed work predicts the chances of Heart Disease and classifies Patients risk level

b. It is implementing different data mining techniques such as Naive Bayes,Decision Tree, Logistic Regression and Random Forest.

c. User friendly

10.2. Disadvantages

a. Data analytics techniques do not help to. provide effective decision making.
b. Cannot handle enormous datasets
c. Prediction of cardiovascular disease results is not accurate

11. CONCLUSION

The long-term preservation of human life and the early identification of irregularities in heart problems will benefit from the identification of the processing of raw healthcare data related to the heart. In this study, raw data was processed using machine learning techniques to produce a brand-new understanding of cardiac disease. In the medical field, heart disease prediction is difficult and crucial. The death rate, however, can be significantly reduced if the disease is identified in its early stages and preventative measures are put in place as soon as feasible. To move the investigations from simply theoretical frameworks and simulations to actual datasets, further elaboration of this study is extremely desirable. The model's ability to be employed to increase the precision of heart attack prediction in any individual was regulated using a very helpful technique.

When compared to the previously employed classifiers, such as naive bayes, etc., the proposed model's strength was quite satisfying. It was able to predict signs of having a heart illness in a specific individual by applying KNN and Logistic Regression, which demonstrated good accuracy. Therefore, by utilizing the provided model to determine the likelihood that the classifier will correctly and reliably detect the heart illness, a large amount of pressure has been reduced. The Given heart disease prediction system improves and lowers the cost of medical care. This project gives us significant knowledge that can help us predict the patients with heart disease It is implemented on the .pynb format.

12. FUTURE SCOPE

This study discusses the issue of constricting and summarizing various data mining strategies utilized in the field of medical forecasting. For intelligent and successful heart attack prediction via data mining, the emphasis is on combining various methods and combinations of numerous target attributes. Significantly, 15 attributes are specified for predicting heart attacks, and using simple data mining techniques, other approaches, including ANN, time series, clustering and association rules, soft computing approaches, etc., can also be included. The results of predictive data mining on the same dataset show that Decision Tree outperforms and, occasionally, Bayesian classification has accuracy levels comparable to those of decision tree, but other predictive methods, such as KNN, Neural Networks, and Classification based on clustering, are not performing well. The second finding is that using a genetic algorithm to lower the actual data quantity and obtain the ideal subset of attributes suitable for heart disease prediction increases the decision tree and Bayesian classification's accuracy. For the automation of heart disease prediction, the proposed work can be expanded and improved. Real data from healthcare institutions and agencies must be gathered, and all methods must be compared for the highest level of accuracy.

13. APPENDIX
Source Code

Registration.php

```
<?php
session_start();

$connection=mysqli_connect('localhost','root','');
//$connection=mysqli_connect('localhost','root','write your password here')

mysqli_select_db($connection,'loginandregistrationform');

$name=$_POST['user'];
$email=$_POST['emailid'];
$password=$_POST['password'];
```

```
$select="select * from register_table where email_id='$email'";
$result=mysqli_query($connection,$select);
$num=mysqli_num_rows($result);
if($num==1)
{
   header('location:useralready.html');
}
else
{
   header('location:loginandregister.php');
   $reg="insert into register_table(name,email_id,password)
values('$name','$email','$password')";
   mysqli_query($connection,$reg);
}
?>
```

Validate.php

```
<?php
session_start();

$connection=mysqli_connect('localhost','root','');
//$connection=mysqli_connect('localhost','root','write your password here')

mysqli_select_db($connection,'loginandregistrationform');

$email=$_POST['emailid'];
$password=$_POST['password'];

$select="select * from register_table where email_id='$email' &&
password='$password'";
```

```
$result=mysqli_query($connection,$select);
$num=mysqli_num_rows($result);
if($num==1)
{
    header('location:mrf.html');
}
else
{
    header('location:incrt.html');
}
?>
```

GitHub & Project Demo Link

GITHUB LINK:

https://github.com/IBM-EPBL/IBM-Project-12332-1659447539

PROJECT DEMO LINK

https://drive.google.com/file/d/1KHg3C29oKwsmty14tYgHdJeTTB1iJBoH/view?usp=drivesdk