

VISUALIZING AND PREDICTING HEART DISEASE WITH AN INTERACTIVE DASHBOARD

TEAM ID PNT2022TMID35454

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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 Dashboard can give Predictions to the users based on their heart state. It can promote the best predicting and visualizing of heart diseases. It will store the patient's details and their reports in the database. Dashboards 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

SURVEY2.1

Existingproblem

People find it difficult to navigate through pages citing various heart diseases using normal searchmethod 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

- 1 V. Manikantan & S.Latha,"Predicting the Analysis of Heart Disease Symptoms Using Medicinal Data MiningMethods", International Journal on Advanced Computer Theory and Engineering, Volume-2, Issue-2, pp.5-10,2013.
- 2 Dr.A.V.Senthil Kumar, "Heart Disease Prediction Using Data Mining preprocessing and Hierarchical Clustering", International Journal of Advanced Trends in Computer Science and Engineering, Volume-4, No.6, pp.07-18, 2015.
- 3 Uma.K, M.Hanumathappa, "Heart Disease Prediction Using Classification Techniques with Feature SelectionMethod", Adarsh Journal of Information Technology, Volume-5, Issue-2, pp.22-29, 2016
- 4 Himanshu Sharma, M.A.Rizvi, "Prediction of Heart Disease using Machine Learning Algorithms:A Survey",International Journal on Recent and Innovation Trends in Computing and Communication,Volume5,Issue-8,pp.99-104, 2017.
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13. Soni, J., Ansari, U., Sharma, D., & Soni, S. (2011). Predictive data mining for medical diagnosis: An overview ofheart disease prediction. International Journal of Computer Applications, 17(8), 43-48.
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15. A. Methaila, P. Kansal, H. Arya, and P. Kumar, “Early heart disease prediction using data mining techniques,”in Proceedings of Computer Science & Information Technology (CCSIT-2014), vol. 24, pp. 53–59, Sydney, NSW,Australia, 2014

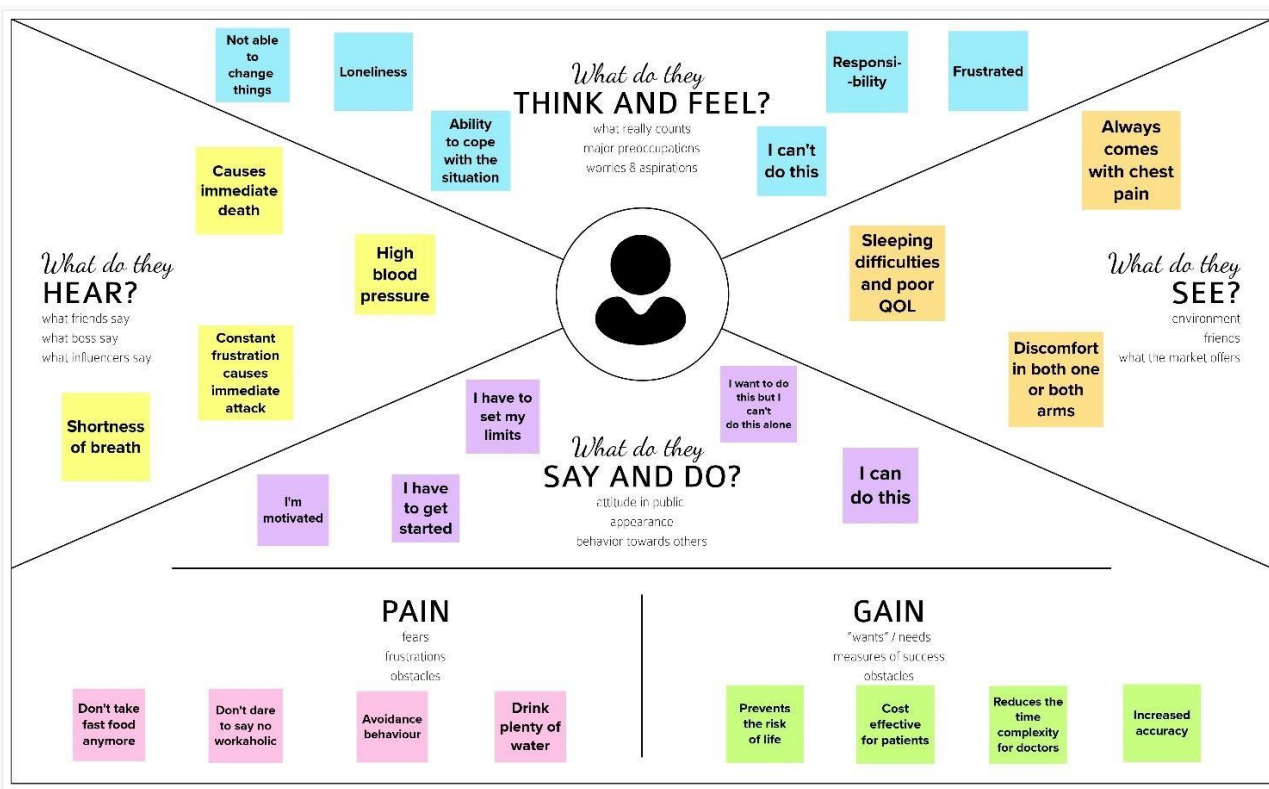
2.3 Problem Statement Definition

The leading cause of death in the developed world is heart disease. Therefore, there needs to beWork 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

JASWANT

Should have practice to self control

Must have to control their cholestrol level

ARAVIND

Have too maitain their Blood sugar level

To do physical excerise daily

JEEVA

Monitor the oxygen level in blood

To check andcontrol the pulse rate

MANISH KUMAR

Intake of hygiene Food

Practice exercise daily

Step-3: Group ideas

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. Once all sticky notes have been grouped, give each cluster a sentence-like label. If a cluster is bigger than six sticky notes, try and see if you can break it up into smaller sub-groups.

🕒 20 minutes

USER INTERFACE

User friendly

Compatability

Attractive Homepage

easily access to data

DATA COLLECTION

ALL MODES OF HEART ATTACKS

EASY IDENTIFICATION OF HEART RATE OF THE USER

TRUSTABLE DATA OF HEART DISEASES

EASY SEARCH OF DATAS

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

PREDICTION

ON TIME DATA PREDICTION

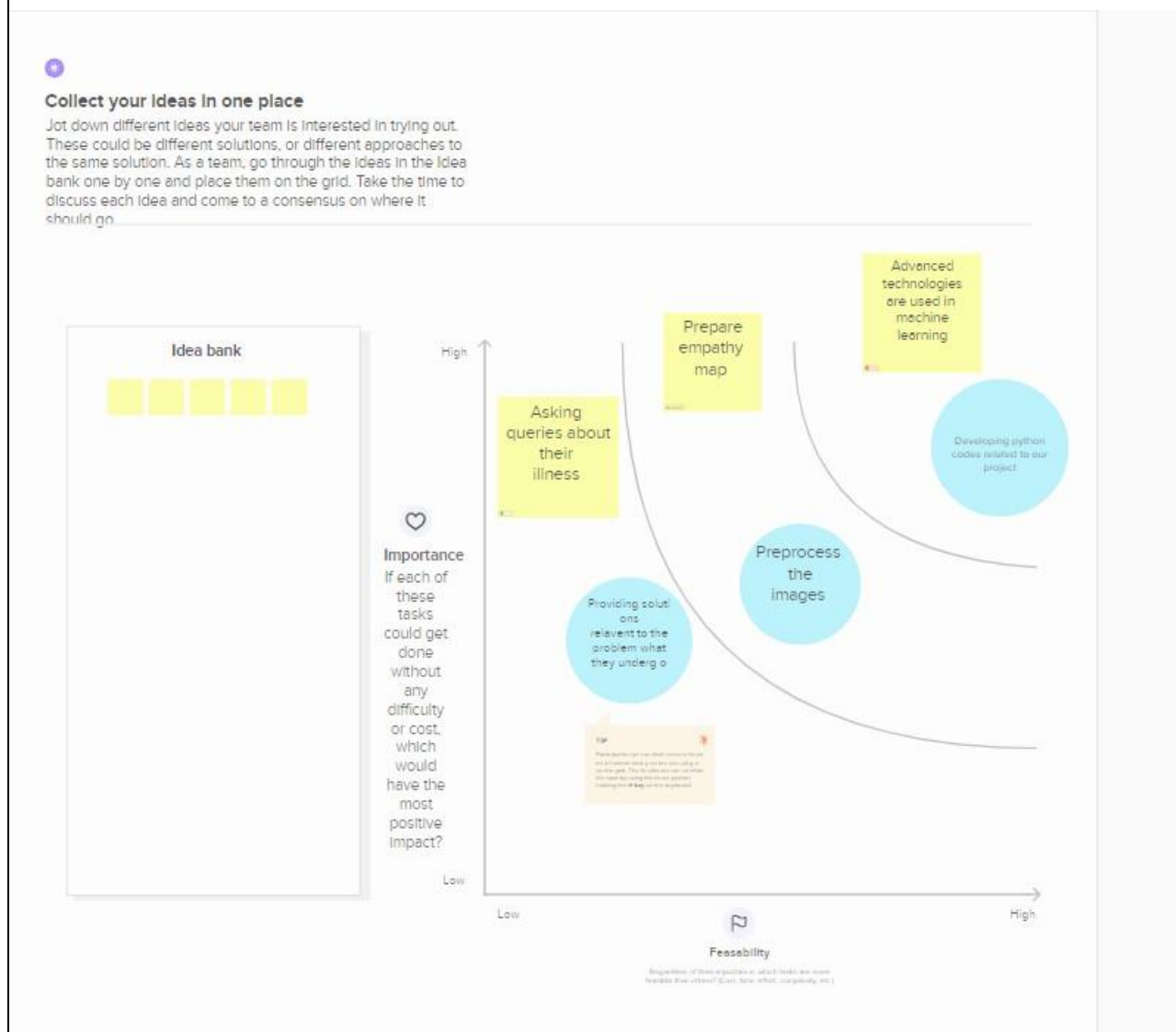
RELIABLE AND TRUSTED RESULTS

VISUALIZING

SHOWING THE EXACT PROBLEMS USING THE DATA REPORTS

ABLE TO VISUALIZE ALL TYPES OF HEART PROBLEMS UNDER ONE ROOF

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

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS <ul style="list-style-type: none"> Hospitals Clinics WHO Any medical related agencies those prepare medicines or any kind of solutions inferring over the data of diseases. 	6. CUSTOMER CONSTRAINTS CC <p>The unawareness over the AI/ML technologies, collaborative dashboards, network connection, lack of data.</p>	5. AVAILABLE SOLUTIONS AS <p>The customers can prefer over a manual data visualization and prediction, which is very tedious job and requires the knowledge over the technologies of AI/ML.</p> <p>Hard mathematical formulae were created and the results were being calculated manually.</p>	Explore AS, differentiate
	2. JOBS-TO-BE-DONE / PROBLEMS J&P <p>Quality of Data: The quality of data should be accurate and reliable. Obviously, the outcome will solely depend on the data we put into the prediction. If the data is skewed, then the prediction which is dependent on it, will be skewed as well.</p>	9. PROBLEM ROOT CAUSE RC <ul style="list-style-type: none"> Difficulty of predicting a heart disease. Will not have a proper idea of relation between similar heart diseases. There is a chance of identifying every heart diseases as same. Reason of increase in heart disease will not be rootly identified. 	7. BEHAVIOUR BE <ul style="list-style-type: none"> Generation of legitimate and reliable datasets. Customers need to collect more number of datasets in order to obtain more accurate result. Must obtain knowledge of difference between datasets that is used for comparison. 	
Identify strong TR & EM	3. TRIGGERS TR <ul style="list-style-type: none"> Insufficient ways of handling huge amounts of datasets and inferring the root cause of the heart disease cannot be found out. Similarity of heart disease has not been identifiable. 	10. YOUR SOLUTION SL <p>With the notable technology of AI/ML we are able to visualize and predict heart diseases and related diseases, by the ultimate power Cognos Analytics Tool we will be able to properly create a dashboard for the customers to work with and visualize and analyze the heart disease on their work with limited knowledge.</p>	8. CHANNELS of BEHAVIOR CH <p>8.1 ONLINE Visualizing the datasets. Exploration of data.</p> <p>8.2 OFFLINE Cleansing of datasets. Collection and noting the datasets.</p>	Identify strong TR & EM
	4. EMOTIONS: BEFORE / AFTER EM <p>Before-> It creates a huge ambiguity in knowing the proper or accurate reasons for a heart disease.</p> <p>After-> There is a large chance understanding of the heart disease and root cause of it, which makes a better solution and finding a preventive way over it.</p>			

4. REQUIREMENT

ANALYSIS4.1 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.

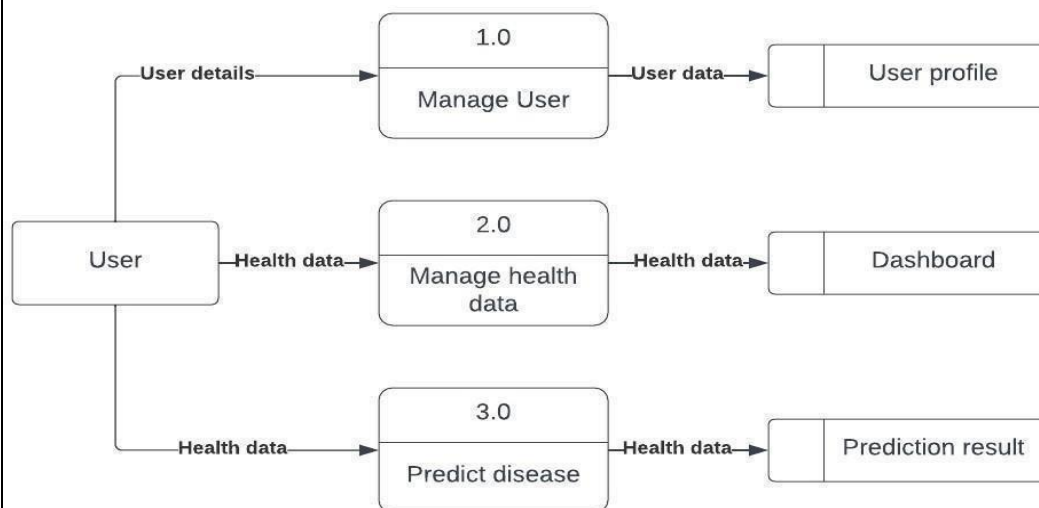
4.2 Non-Functional requirements

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

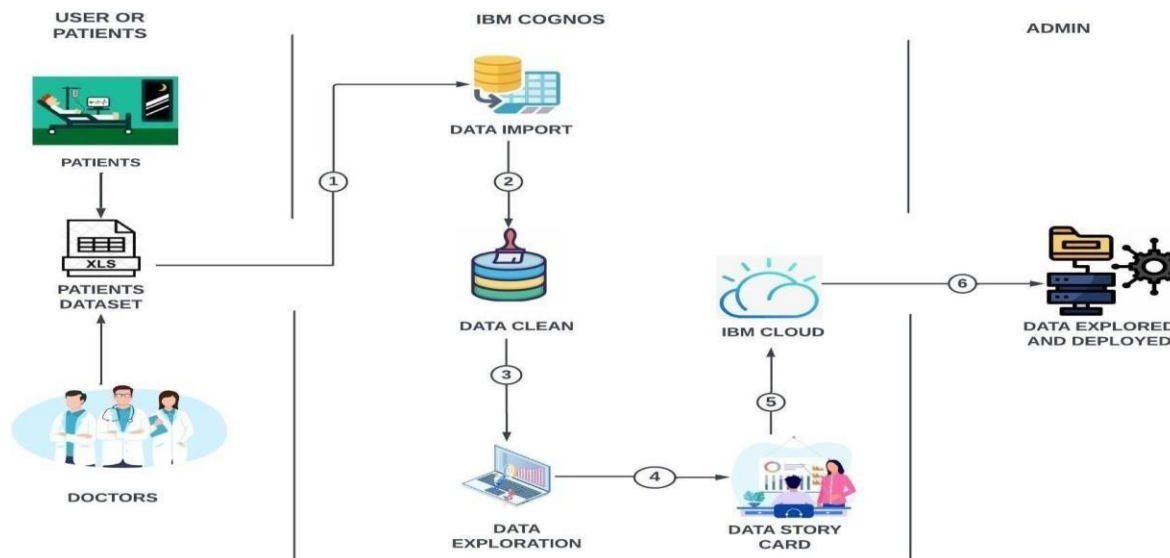
NFR-1	Performance	Relaying should be performed quickly. This prediction system should be made available in the cloud to make it easier to use and to set a new standard for affordable, high-quality healthcare.
NFR-2	Availability	The application has to be available 24 x 7 for users without any interruption.
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 Create User Account Finding our prediction dashboard	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 awareness 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 prediction 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 application by 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 email once 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 by entering email & password	I can access my account / Dashboard when logged in	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 occurrence of heart disease	I can view the accuracy of heart disease in the dashboard	High	Sprint-2
Customer Care Executive	Helpdesk	USN-6	As a customer care executive, he/she can view the customer queries.	I can post my queries in the dashboard	Medium	Sprint-3
		USN-7	As a customer care executive, he/she can answer the customer queries.	I can get support from helpdesk	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

&SCHEDULING6.1 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 gains Prepare List of Problem Statement	20 SEPTEMBER 2022
Ideation	Prioritise a top 3 ideas based on feasibility andImportance	4 OCTOBER 2022
Proposed Solution	Solution include novelty, feasibility, business model, social impact and scalabilityof solution	30 OCTOBER 2022
Problem Solution Fit	Solution fit document	10NOVEMBER 2022
Solution Architecture	Solution Architecture	16NOVEMBER 2022
Customer Journey	Understanding User Interactions and experiences with application	16NOVEMBER 2022
Functional Requirement	Prepare functional Requirement	16NOVEMBER 2022
Data flow Diagrams	Data flow diagram	16NOVEMBER 2022
Technology Architecture	Technology Architecture diagram	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	Function l Require m ent (Epic)	User Story Numbe r	User Story / Task	Acceptanc ecriteria	Story points	Priority	Team Members
Sprint-1	Registrati on	USN-1	As a user, I can Register for the application by entering my email, password, and confirming my password.	I can access my account /dashboard	10	high	Vijay J Harisha
		USN-2	As a user, I will Receive confirmatio N email once I have registered for the application	I can receive confirmatio nemail & click confirm	5	High	Vibushita Aadhya
		USN-3	As a user, I can registerfor the application throughGmail	I can register & access the dashboard with Gmail Login	5	High	Vijay J Harisha Vibushita
Sprint-2	Login	USN-4	After Registration Login page willappear, the user will login using the login credentials	I can register & access the dashboard with Gmail Login	20	High	Vijay J Harisha Vibushita Aadhya
Sprint-3	Dashboar d	USN-5	The user is allowed toview or update isprofile	I can see theprofile.	10	Medium	Vijay J Harisha Vibushita Aadhya

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

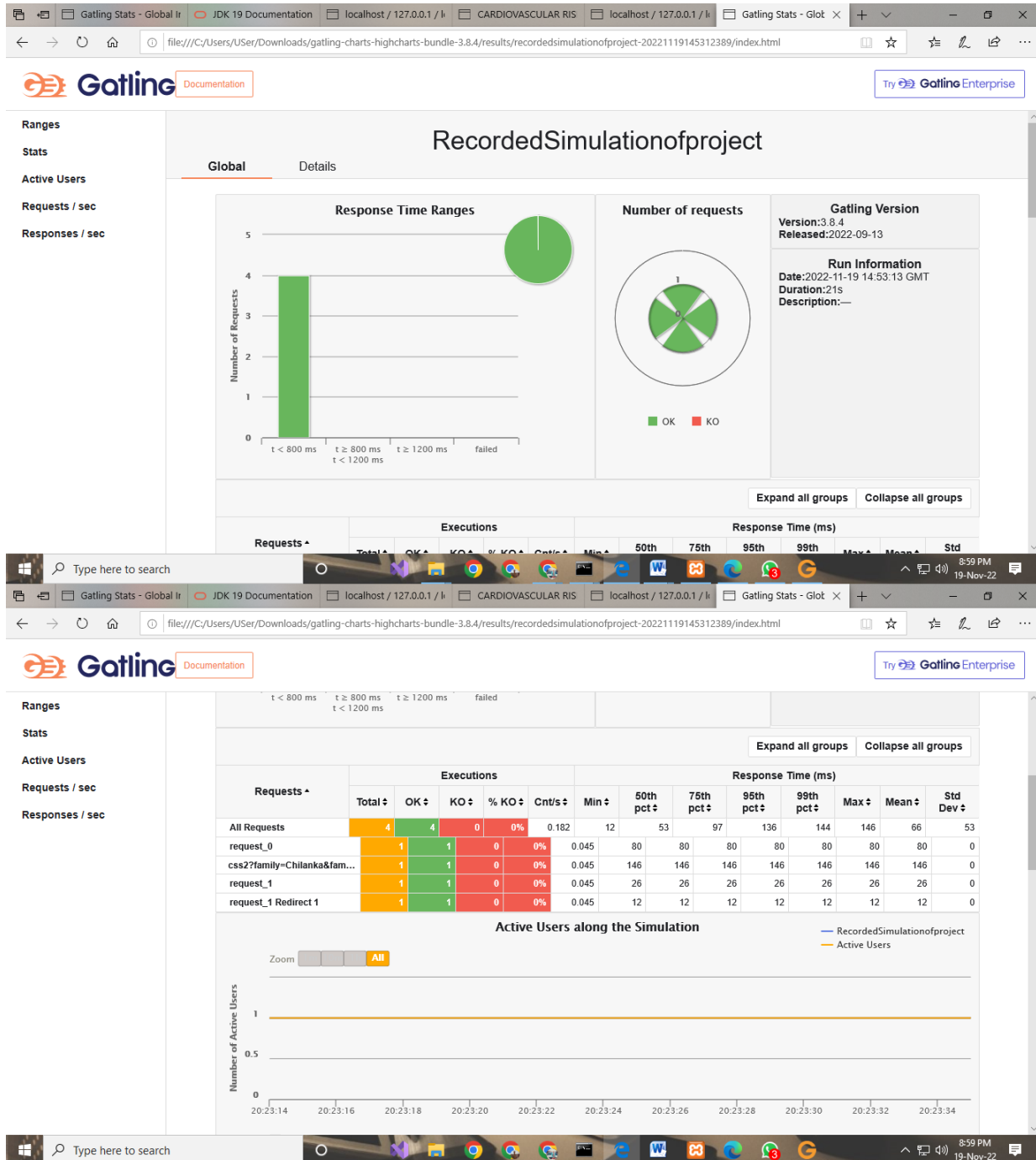
Section	Total Cases	Not Tested	Fail	Pass
Print Engine	5	0	0	5
Client Application	51	0	0	51
Security	2	0	0	2
Outsource Shipping	3	0	0	3
Exception Reporting	9	0	0	9
Final Report Output	4	0	0	4
Version Control	2	0	0	2

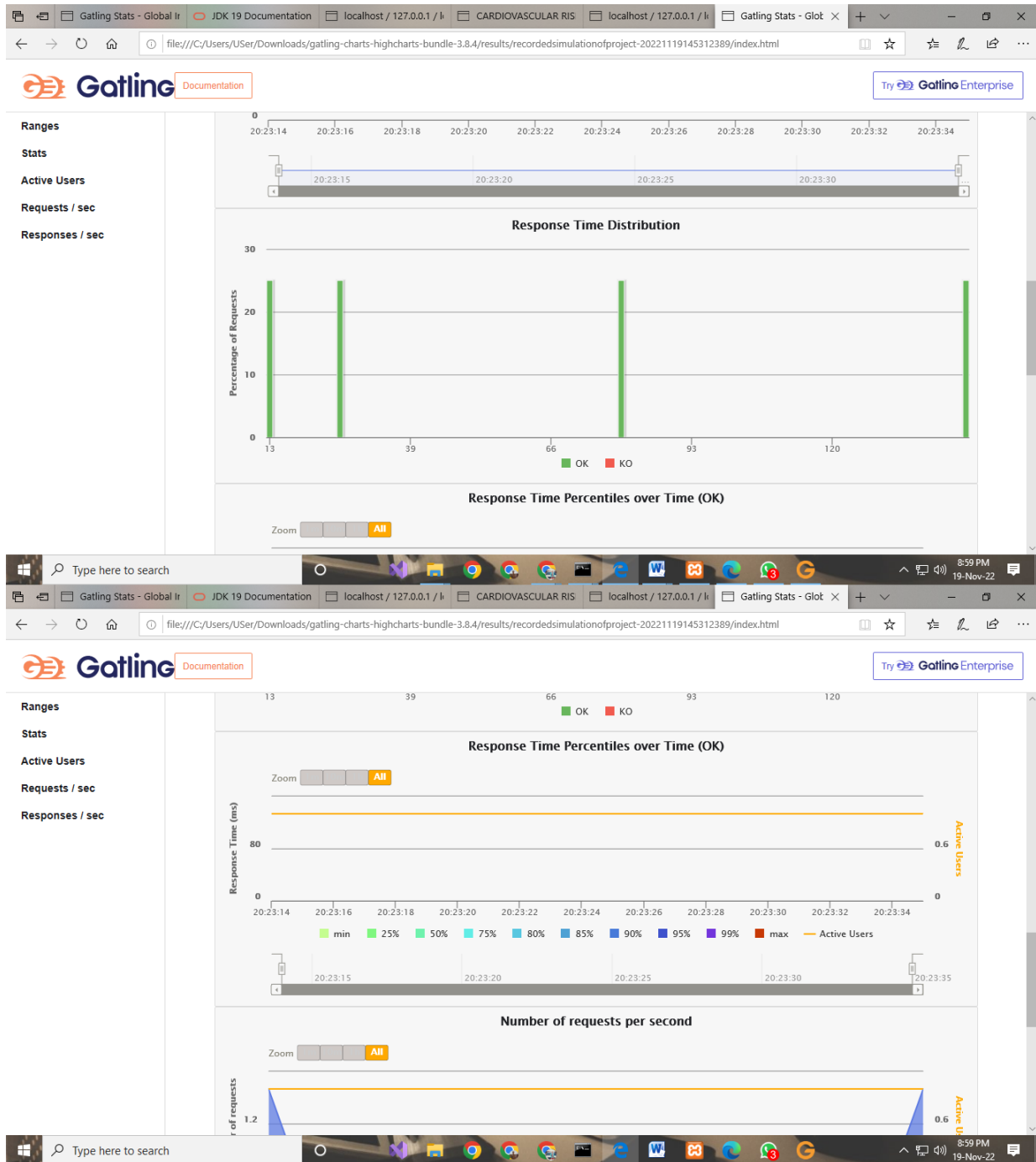
8.2 User Acceptance Testing

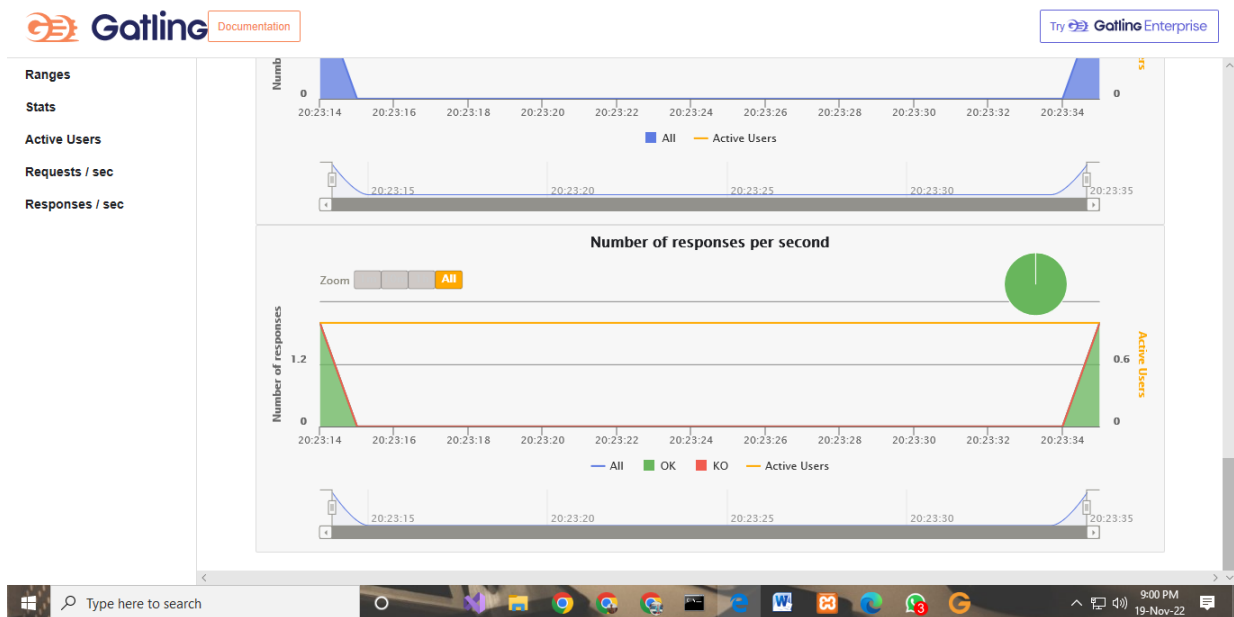
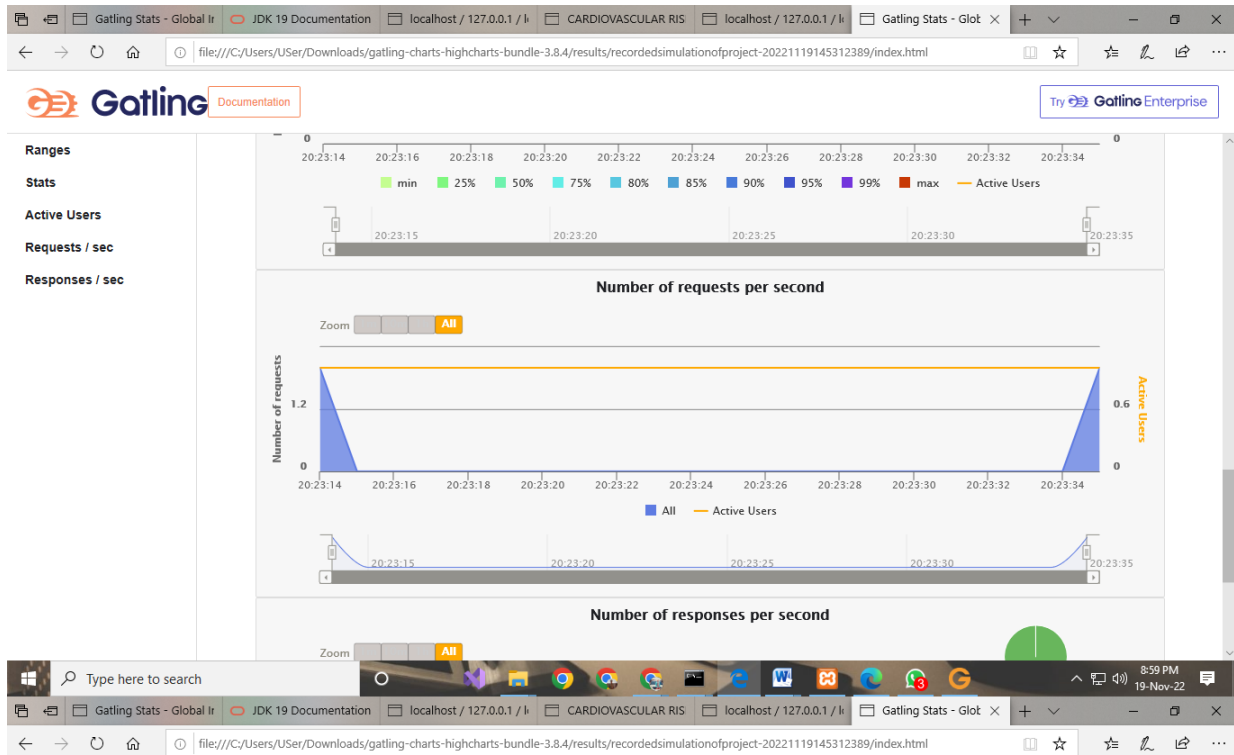
- This report shows the number of resolved or closed bugs at each severity level, and how they were resolved.

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	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

9.1 Performance Metrics







request_0

css2?family=Chilan...

request_1

request_1 Redirect 1

RecordedSimulationofproject

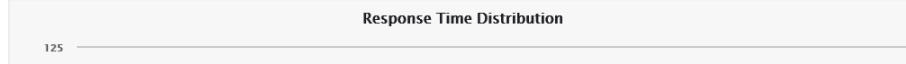
Global Details



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	-



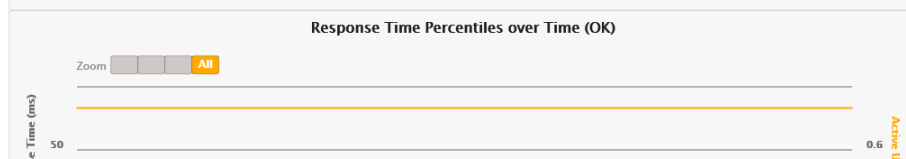
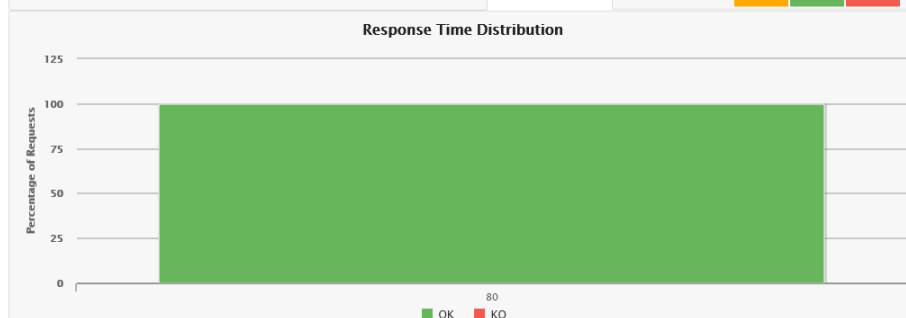
request_0

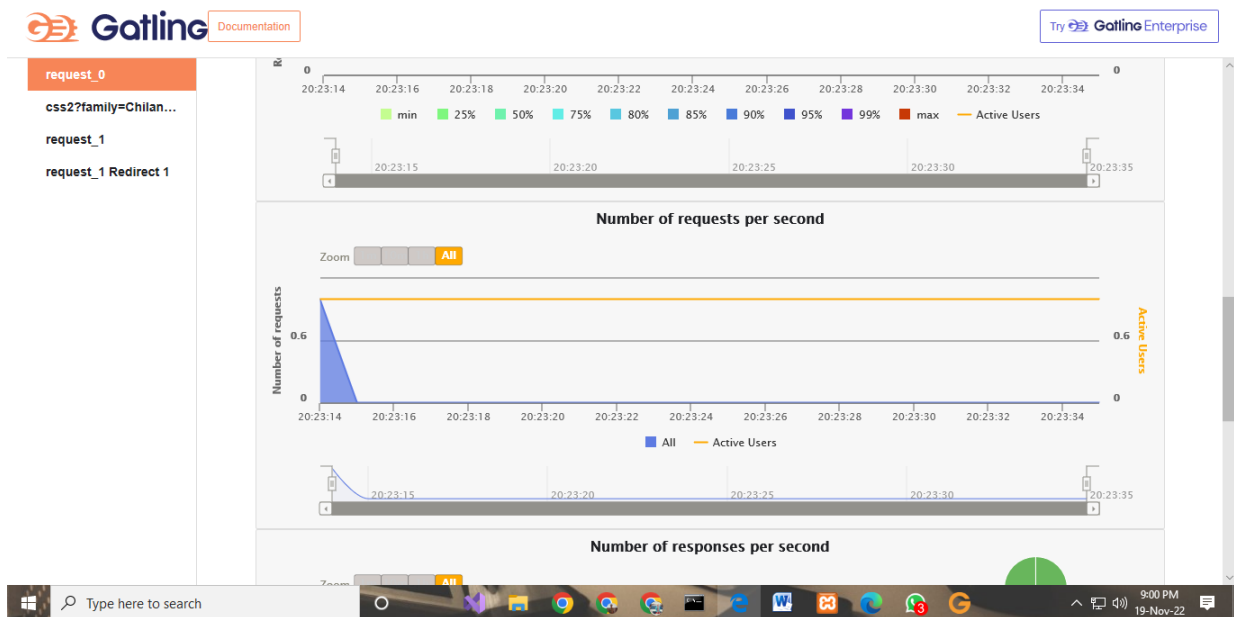
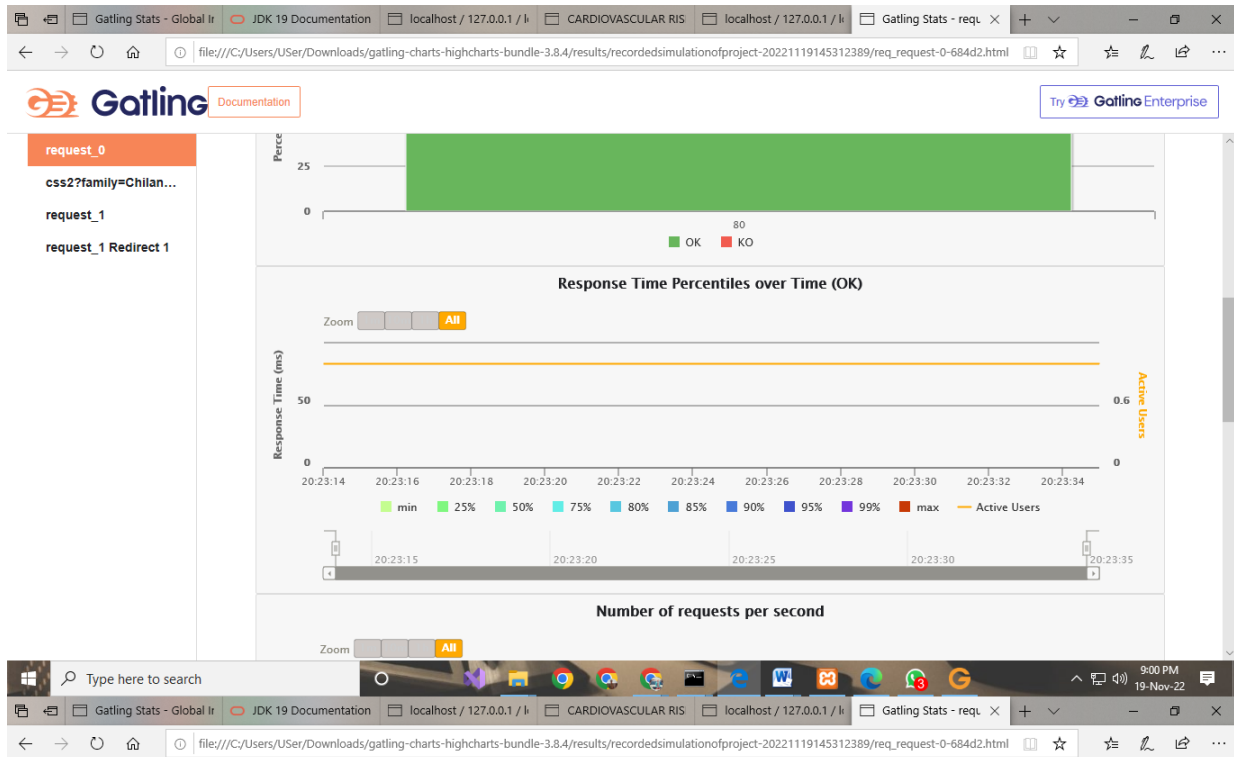
css2?family=Chilan...

request_1

request_1 Redirect 1

	Mean	OK	KO
Standard Deviation	80	80	-



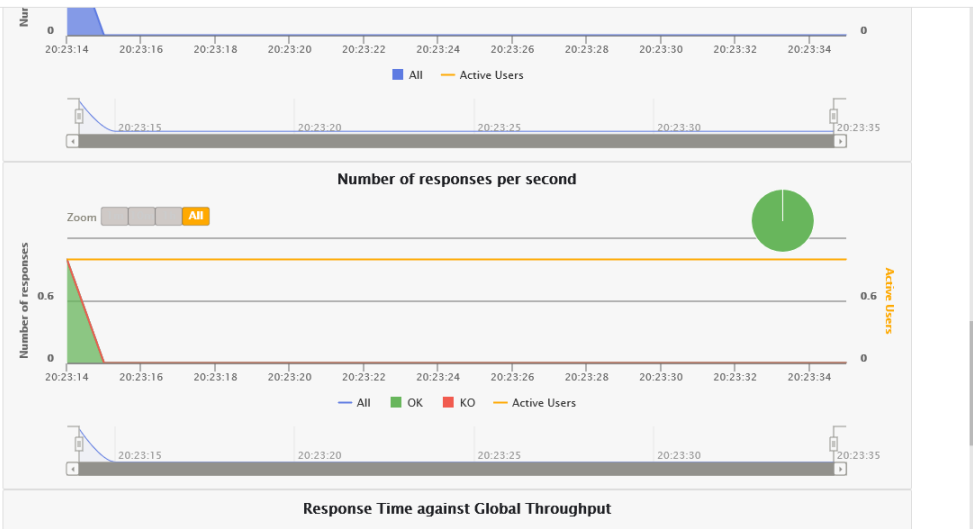


request_0

css2?family=Chilan...

request_1

request_1 Redirect 1

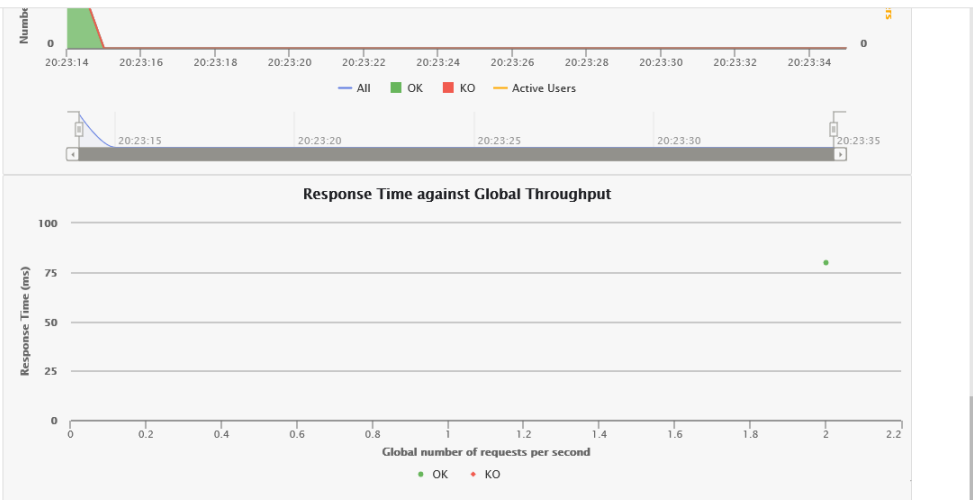


request_0

css2?family=Chilan...

request_1

request_1 Redirect 1



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-3847-1658652967>

PROJECT DEMO LINK

<https://drive.google.com/file/d/1KHg3C29oKwsmtY14tYgHdJeTTB1iJBoH/view?usp=sharing>