Visualizing and Predicting Heart Diseases with an Interactive Dashboard

NALAIYA THIRAN PROJECT REPORT

2022

Team ID : PNT2022TMID48518

SUBMITTED BY

Sivasangari B   920219106030

Sarubala P   920219106027

Monisha C   920219106304

Vanishree M   920219106305

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1.INTRODUCTION

1.1 Project Overview

Heart is one the most vital organs in the human body. When we talk about heart diseases, we can have multiple conditions where the heart is not working the way it should be like blockage in blood vessels. According to many researches that have been conducted through a period of time have found out that heart failure and heart disease has been the cruel cause of death in human beings. What aggravates this situation is that most of these diseases are being diagnosed at later stages at which it is very difficult to control. But if somehow, we can diagnose these diseases at its early stage, then we can surely cure the disease. Data analytics is the process of analyzing current and historical industry data to predict trends, improve outreach, and even better manage the spread of diseases. The field covers a broad range of businesses and offers insights on both the macro and micro level.

1.2 Purpose

Heart disease is one of the biggest causes of morbidity and mortality
among the population of the 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. According to a news article, heart disease proves to be the leading cause of death for both women and men. This makes heart disease a major concern to be dealt with. But it is difficult to identify heart disease because of several contributory risk factors such as diabetes, high blood pressure, high cholesterol, abnormal pulse rate, and many other factors. The objective of this project is to check whether the patient is likely to be diagnosed with any cardiovascular heart diseases based on their medical attributes such as gender, age, chest pain, fasting sugar level, etc. A dataset is selected from the UCI repository with the patient's medical history and attributes.

2. LITERATURE SURVEY

Literature survey is a survey of scholarly sources on a specific topic. It provides an overview of current knowledge, allowing you to identify relevant theories, methods, and gaps in the existing research.

2.1 Existing problem

A major challenge faced by healthcare organizations, such as hospitals and medical centers, is the provision of quality services at affordable costs.The quality service implies diagnosing patients properly and administering effective treatments.

2.2 References

Effective heart disease prediction system using data mining techniques

The experiment was carried out on a publicly available database for heart disease. The dataset contains a total of 303 records that were divided into two sets, training set (40%) and testing set (60%). A data mining tool named Weka 3.6.11 was used for the experiment. Additionally, a multilayer perceptron neural network (MLPNN) with back propagation (BP) was used as the training algorithm.
MLPNN is one of the most significant models in artificial neural networks. The MLPNN consists of one input layer, one or more hidden layers and one output layer. In MLPNN, the input nodes pass values to the first hidden layer, and then nodes of the first hidden layer pass values to the second and so on till producing outputs.
The BP algorithm has served as a useful methodology to train multilayer perceptrons for a wide range of applications. The BP network calculates the difference between real and predicted values, which is circulated from output nodes backwards to nodes in the previous layer. The BP learning algorithm can be divided into two phases, propagation and weight update

Heart disease prediction by using novel optimization algorithm:

The algorithm uses this same logic to try to group the elements that are close to each other. There are two basic types of data mining techniques; Predictive methods and descriptive methods Descriptive Methods: These methods identify the current situation, describe the common belongings of the data in the dataset, and emphasize the

understanding and interpretation of the feature.

Predictive Methods: These methods by learning the past simulate the feature. They use data with the help of known results to develop a model that could predict the values of other data.

Prediction of Heart Disease Using a Combination of Machine Learning and Deep Learning

There are two ways a deep learning approach can be applied. One is using a sequential model and another is a functional deep learning approach. In this particular research, the first one is used. A sequential model with a fully connected dense layer is used, with the flatten and dropout layers to prevent the over fitting and the results are compared of the machine learning and deep learning and variations in the learning including computational time and accuracy can be analyzed and can be seen in the figures further discussed in the Results section .For the evaluation process, confusion matrix, accuracy score, precision, recall, sensitivity, and F1 score are used. A confusion matrix is a
table-like structure in which there are true values and predicted values, called true positive and true negative. It is defined in four parts: the first one is true positive (TP) in which the values are identified as true and, in reality, it is also true. The second one is false positive (FP) in which the values identified are false but are identified as true. Thethird one is false negative (FN) in which the value was true but was identified as negative. The fourth one is true negative (TN) in which the value was negative and was truly identified as negative.

Android Heart Disease Prediction App

This Heart Disease Prediction Android App has been designed to help users with assessing their cardiovascular health. Based on a number of factors such as the user's age, gender, blood sugar, cholesterol levels, blood pressure, etc. this system generates a prediction about the disease that the user might be suffering from. Moreover, apart from assessing their cardiovascular health, users can also find contact details of various doctors on this application. The user can search for doctors by filtering them based on their specialty.

Admin is the sole user who manages the training data and can actively change or update any values. Admin is also the person who will manage the doctor & their clinic details, view users & view their feedback. Users on the other hand have to create an account to use the prediction services. Users will have to enter 13 data to get a prediction which

system uses Random Forest algorithm to predict. Users can also update their profile and change the password. Random Forest Algorithm is written in Asp.net with C# and hosted.

2.3 Problem Statement Definition

The main purpose of the problem statement is to identify and explain the problem. This includes describing the existing environment, where the problem occurs, and what impacts it has on users, finances, and ancillary activities. Additionally, the problem statement is used to explain what the expected environment looks like .The major challenge in heart disease is its detection. There are instruments available which can predict heart disease but either they are expensive or are not efficient to calculate the chance of heart disease in humans. Early detection of cardiac diseases can decrease the mortality rate and overall complications. 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 patience, time and expertise. Since we have a good amount of data in today's world, we can use various machine learning algorithms to analyze the data for hidden patterns. The hidden patterns can be used for health diagnosis in medicinal data.
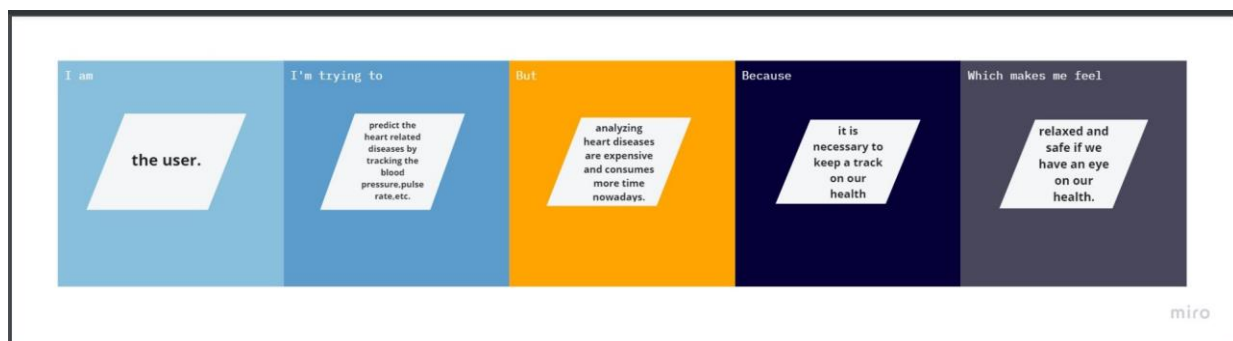
3. IDEATION & PROPOSED SOLUTION

Ideation refers to the process of developing and conveying prescriptive ideas to others, typically in a business setting. It describes the sequence of thoughts, from the original concept to implementation. Ideations can spring forth from past or present knowledge, external influences, opinions & principles. Ideation can be expressed in written, or verbal terms .Ideas and the act of ideating can come from anyone tangentially or directly associated with a business or organization, including low-level employees, managers, customers, partners, and stakeholders.

3.1 Empathy Map Canvas

An empathy map is a collaborative tool teams can use to gain a deeper insight into their customers. Much like a user persona, an empathy map can represent a group of users, such as a customer segment.
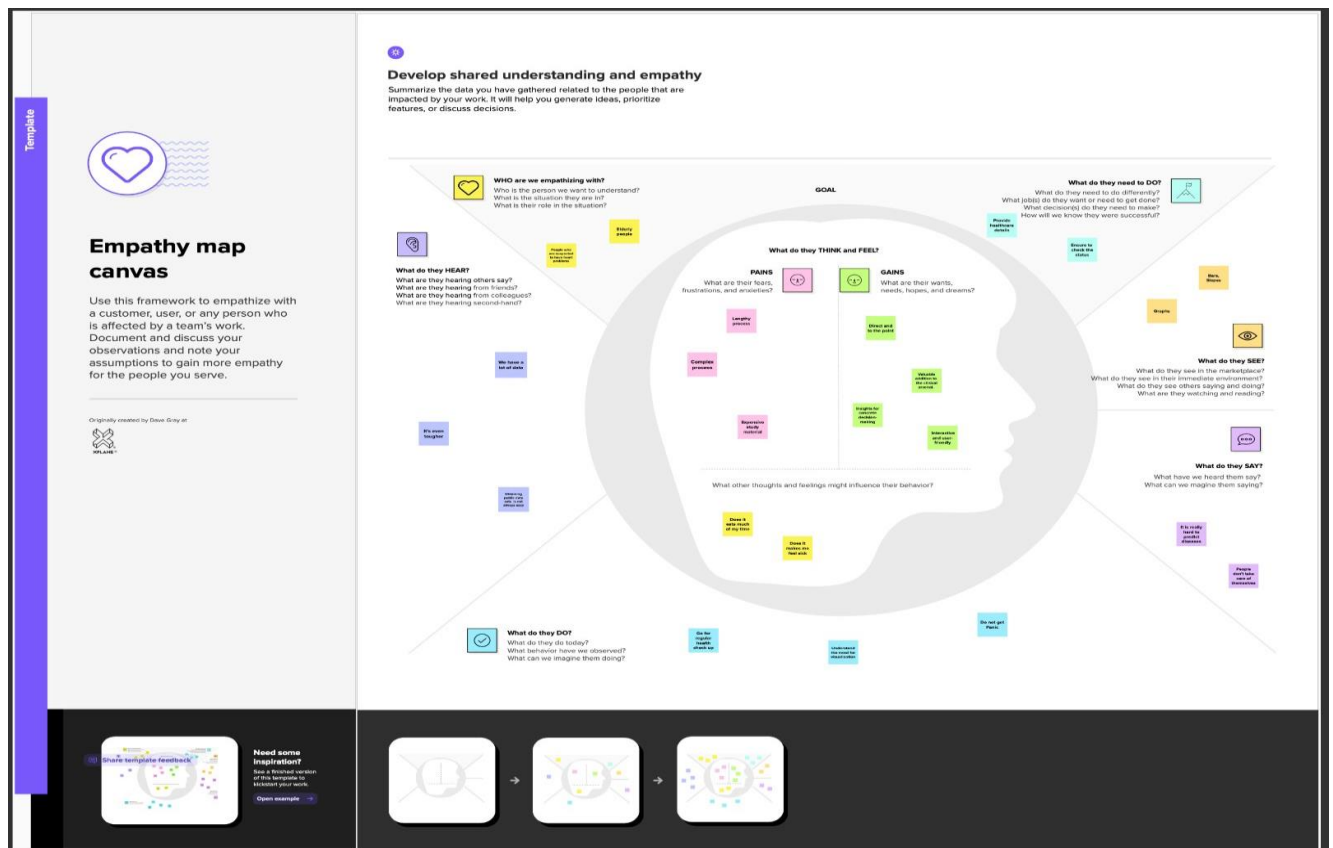
3.2 Ideation & Brainstorming

Ideation is often closely related to the practice of brainstorming, a specific technique that is utilized to generate new ideas. A principal difference between ideation and brainstorming is that ideation is commonly more thought of as being an individual pursuit, while brainstorming is almost always a group activity.
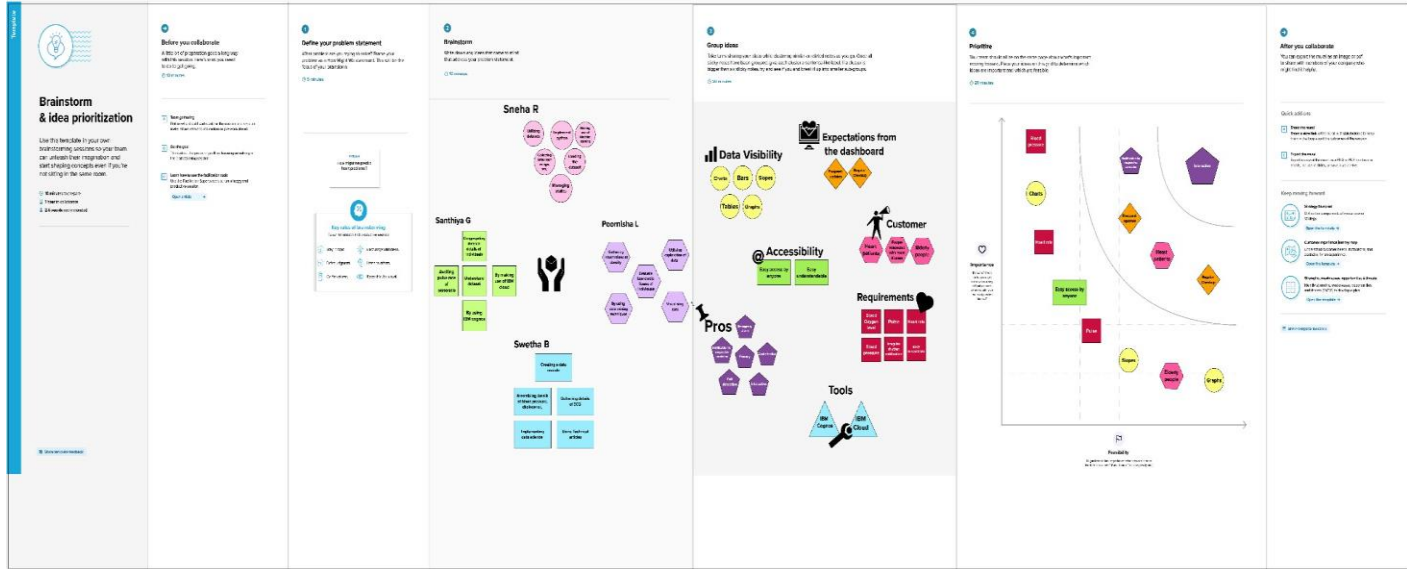
3.3 Proposed Solution

Proposed Solution means the technical solution to be provided by the Implementation agency in response to the requirements and the objectives of the Project.
It means the Proposed System with modifications that meet the Agency's requirements as set forth in this RFP.

Project Design Phase-I
Proposed Solution Template

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Based on the analytics we can analyze which patients are most likely to suffer from heart disease in the near future and based on the patients details we will take decisions to cure them.
2.	Idea / Solution description	The idea is the early detection of the heart disease through the variations in the heart rhythm using an interactive dashboard in this technological world through the web application.
3.	Novelty / Uniqueness	This offers unique insights that it monitor the user's heart rhythms at the specific instance and collects the datas to predict about the user's health condition.
4.	Social Impact / Customer Satisfaction	It saves lives and health monitoring.
5.	Business Model (Revenue Model)	It generates revenue by selling dashboards to hospitals, diagnostics and clinical centers. Smartwatch companis can use this dashboard as an application.
6.	Scalability of the Solution	The solution can be saluted based on large number of user response. The dashboard will provide conclusive,accurate, reliable and predicted results.

3.4 Problem Solution fit

The Problem-Solution Fit simply means that you have found a problem with your customer and that the solution you have realized for it actually solves the customer's problem.

4. REQUIREMENT ANALYSIS

4.1 Functional requirement

These are the requirements for big data solutions which need to be developed including all the functional features, business rules, system capabilities, and processes along with assumptions and constraints.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Web page	→ Preface of the Heart disease and the dashboard → Registration for new user and → Sign in for registered user
FR-2	User Registration	→ Registration through Gmail by entering the required details for registering
FR-3	User Confirmation	→ Confirmation via Email
FR-4	User Login	→ The user will enter his/her email id and password used while registering
FR-5	Upload other details	→ Upload the other clinical and non-clinical details that are asked for
FR-6	Result	→ POSITIVE- The result along with alert notification. → NEGATIVE- The result along with precautionary measures

4.2 Non-Functional requirements

Non-Functional Requirements are the constraints or the requirements imposed on the system. They specify the quality attribute of the software. Non-Functional Requirements deal with issues like scalability, maintainability, performance, portability, security, reliability, and many more.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	User friendly to access the dashboard.
NFR-2	Security	Login details are shared via email on every login for confidentiality
NFR-3	Reliability	Highly reliable because predictions are made using the authorized clinical reports.
NFR-4	Performance	Low latency and high throughput.
NFR-5	Availability	Exhibits good availability to all types of browsers.
NFR-6	Scalability	It is highly scalable because it is an interactive dashboard and the website is also maintained uninterrupted.

5. PROJECT DESIGN

5.1 Data Flow Diagrams

A data flow diagram is a graphical or visual representation using a standardized set of symbols and notations to describe a business's operations through data movement. They are often elements of a formal methodology such as Structured Systems Analysis and Design Method (SSADM).

Data Flow Diagram:
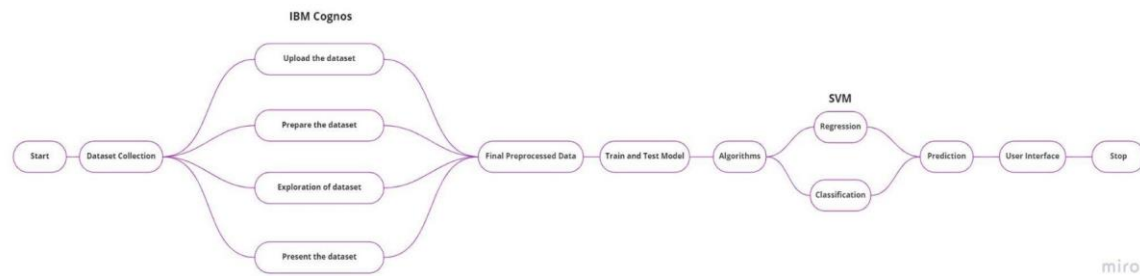
5.2 Solution & Technical Architecture

Solution architecture:

The Solution Architecture Definition (SAD) describes the technical architecture of the solution through different views to expose the concepts, constraints, and mechanics behind it.
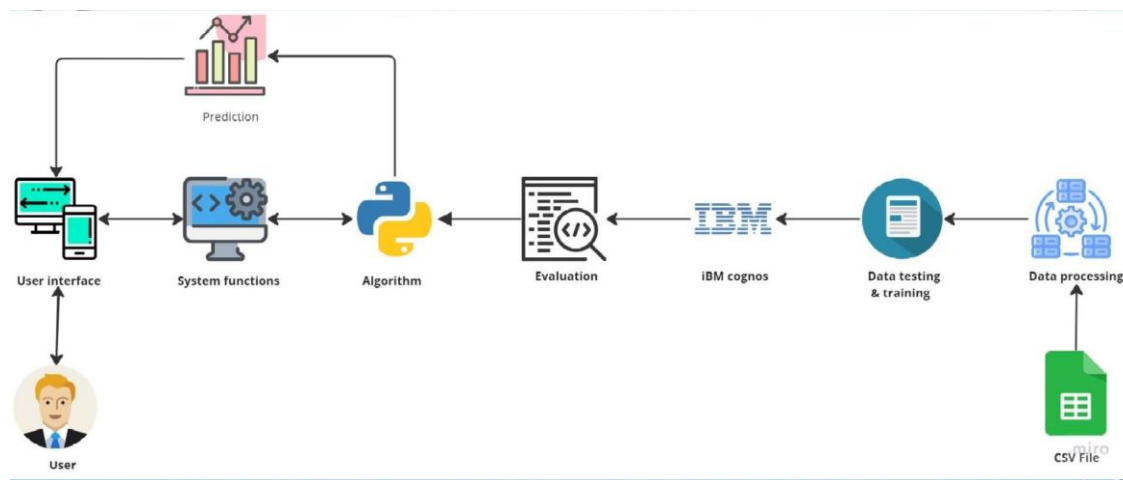
Technical architecture:

Technical Architecture (TA) is a form of IT architecture that is used to design computer systems. It involves the development of a technical blueprint with regard to the arrangement, interaction, and interdependence of all elements so that system-relevant requirements are met.
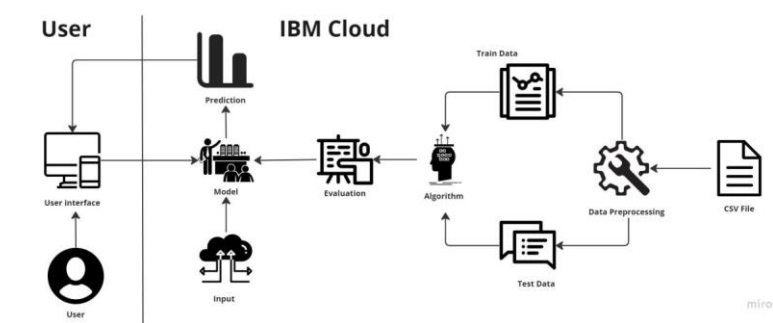
Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App.	HTML, CSS, Python
2.	Application Logic-1-Register	If new user,the user needs to register with the requested credentials	Python
3.	Application Logic-2-Login	On clicking the login button the user is directed to the login page,if already a registered user.	Python
4.	Database	Data Type - alphanumeric	MySQL
5.	Cloud Database	Database Service on Cloud is being provided to the admin for future requirements.	IBM Cloud
6.	File Storage	Storing files that are necessary for prediction	Local File system
7.	Machine Learning Model	Support Vector Machine(SVM) algorithm is used for classification and regression models along with data processing	Data Recognition Model, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	International Business Machines.	Python,IBM Cloud
2.	Security Implementations	Access permissions for the login page using CAPTCHA.	IBM Cloud services
3.	Scalable Architecture	It supports higher workloads without any fundamental changes to it.	Scalable databases
4.	Availability	Available for all users.	Load Balancers,Distributed servers
5.	Performance	The system should be able to manage a large number of users at a time.	Load Balancers

5.3 User Stories

A user story is an informal, general explanation of a software feature written from the perspective of the end user or customer.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register for the web page by entering my email, password, and confirming my password.	I can access my account / dashboard	High	Sprint-1
	Authentication	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
		USN-3	As a user, I can register for the application through Gmail	I can login using the login credentials	Medium	Sprint-1
	Login	USN-4	As a user, I can log into the application by entering email & password	I can check whether the login credentials are correct	High	Sprint-1
	Dashboard	USN-5	If entering the registered email id, I can access the dashboard	I will be able to view the dashboard of the user	High	Sprint-1
Customer Care Executive	Support	USN-6	If the I faces any issues,then I can report it to their email address	Report and feedback option will be accessible	High	Sprint-2

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
	Accessing dashboard	USN-7	The user uses his/her personal email id to access the dashboard	There is very less chance for other users to access my details	High	Sprint-2
Administrator	Validation	USN-8	The administrator will be able to login with their login ids	He/she will be able to validate the user details	High	Sprint-3

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

Sprint planning is an event in the Scrum framework where the team determines the product backlog items they will work on during that sprint and discusses their initial plan for completing those product backlog items.

| Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	16	6 Days	24 Oct 2022	29 Oct 2022	16	29 Oct 2022
Sprint-2	10	6 Days	31 Oct 2022	05 Nov 2022	10	05 Nov 2022
Sprint-3	06	6 Days	07 Nov 2022	12 Nov 2022	06	12 Nov 2022
Sprint-4	06	6 Days	14 Nov 2022	19 Nov 2022	06	19 Nov 2022

6.2 Sprint Delivery Schedule

Sprint is a one time boxed iteration of a continuous development cycle. Within a Sprint, a planned amount of work has to be completed by the team and made ready for review. The term is mainly used in Scrum Agile methodology but the somewhat basic idea of Kanban continuous delivery is also the essence of Sprint Scrum.

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Registration	USN-1	As a user, I can register for the web page by entering my email, password, and confirming my password.	3	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-1	Authentication	USN-2	As a user, I will receive a confirmation email once I have registered for the application.	3	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-1	Authentication	USN-3	As a user, I can register for the application through Gmail.	2	Medium	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-1	Login	USN-4	As a user, I can log into the application by entering email & password.	3	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-1	Dashboard	USN-5	On entering the registered email id,I can access the dashboard.	3	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-1	Support	USN-6	If I face any issues,then I can report it to their email address.	2	Medium	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-2	Accessing dashboard	USN-7	The user uses his/her personal email id to access the dashboard	4	Medium	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-2	Prediction Page	USN-8	The user can view the prediction.	6	High	Sivasangari B Sarubala p Vanishree M Monisha C

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	Validation	USN-9	The administrator will be able to login with their login IDs.	6	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint-4	Result	USN-10	The user will get the output.	6	High	Sivasangari B Sarubala p Vanishree M Monisha C

6.3 Reports from JIRA
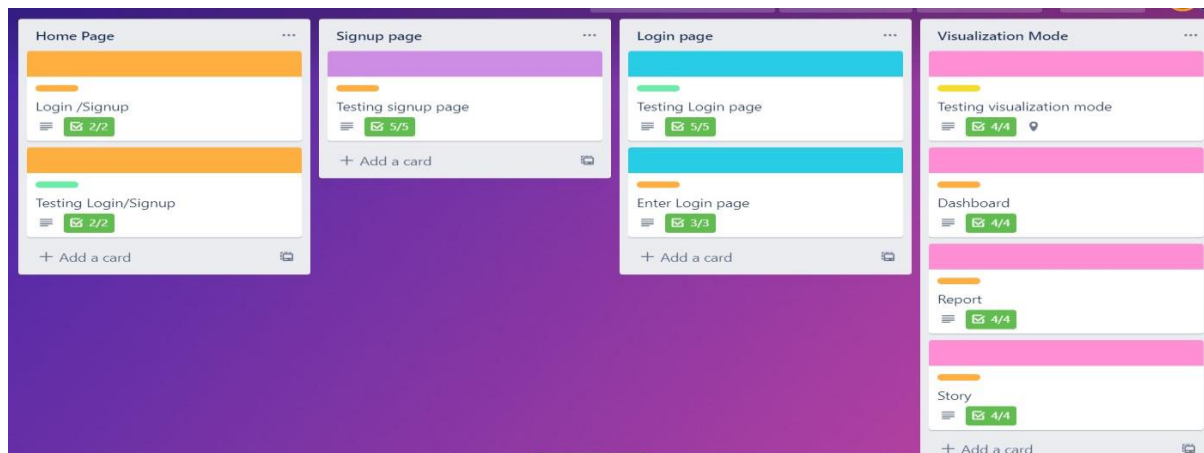
7. CODING & SOLUTIONING

HTML CSS :

HTML, or Hypertext Markup Language, is a markup language for the web that defines the structure of web pages .It is one of the most basic building blocks of every website .This structure alone is not enough to make a web page look good and interactive. So you'll use assisted technologies such as CSS to make your HTML beautiful. They are like a human body.HTML is the skeleton, CSS is the skin. You can also look at HTML,CSS this way: HTML is the structure of a house, CSS is the interior and exterior

decor.

Hypertext: text (often with embeds such as images, too) that is organized in order to connect related items

Markup: a style guide for typesetting anything to be printed in hardcopy or soft copy format.

Language: a language that a computer system understands and uses to interpret commands.

Front page.html

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Heart disease prediction</title>
    <link rel="stylesheet" href="Front page.css">
</head>
<body>

    <img
src="https://drlivingood.com/wp-content/uploads/2019/06/4-Heart-Disease-Si
gns.jpg"alt="avatar" width="1500" Height="600">
    <form>
        <h1>WELCOME</h1>
        <button><a href="Signup page.html">SIGN UP</button>
        <button><a href="Login page.html">LOGIN</button>
    </form>
</body>
</html>
```

Front page.css

```
@import
url('https://fonts.googleapis.com/css2?family=Poppins&display=swap');
```

```css
*{
    margin: 0;
    padding: 0;
    box-sizing: border-box;
    font-family: 'Poppins', sans-serif;
    cursor: pointer;
}
body{
    height: 100vh;
    width: 98%;
    display: flex;
    justify-content: right;
    background: linear-gradient(to right,#3f5efb,#fc466b);
}
form{
    width: 25rem;
    height: 28rem;
    display: flex;
    flex-direction: column;
}
h1{
    font-size: 50px;
    text-align: center;
    color: black;
    text-shadow: 2px 2px 4px rgba(0,0,0,.2);
    letter-spacing: 3px;
    margin-bottom: 5%;
    opacity: .7;
}

button{
    width: 80%;
    margin: 3% auto;
    color: rgb(227, 216, 216);
    font-size: 15px;
    opacity: .7;
    background: rgba(242, 238, 238, 0.97);
    padding: 10px 30px;
    border: none;
    outline: none;
    border-radius: 20px;
```

```css
    text-shadow: 2px 2px 4px rgba(255,255,255,0.2);
    box-shadow: 3px 3px 5px rgba(31,38,135,.37);
    border-left: 1px solid rgba(255,255,255,.3);
    border-top: 1px solid rgba(255,255,255,.3);
}
a{
    font-size: 12px;
    text-align: center;
    color: black;
    opacity: 1;
}
```

Signup page.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Heart Disease Prediction Dashboard</title>
    <link rel="stylesheet" href="Signup page.css">
</head>

<body>
    <img
src="https://partheniumprojects.com/wp-content/uploads/2018/12/heart-disea
se-prediction-3.png"alt="avatar" width="1500" Height="600">
    <form>
    <h2>WELCOME<br>SIGN UP</h2>
    <label>Email ID</label>
    <input type="text">
    <label>Password</label>
    <input type="password">
    <label>Confirm password</label>
    <input type="password">
    <button><a href="visualizations.html">SUBMIT</button>
    <a>Already having an account?</a>
    <button><a href="Login page.html">LOGIN</button>
    </form>
```

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

Signup page.css

```
@import
url('https://fonts.googleapis.com/css2?family=Poppins&display=swap');

*{
    margin: 0;
    padding: 0;
    box-sizing: border-box;
    font-family: 'Poppins', sans-serif;
    cursor: pointer;
}
body{
    height: 100vh;
    width: 98%;
    display: flex;
    justify-content: right;
    background: linear-gradient(to right,#3f5efb,#fc466b);
}
form{
    width: 25rem;
    height: 28rem;
    display: flex;
    flex-direction: column;
}
h2{
    font-size: 50px;
    text-align: right;
    color: black;
    text-shadow: 2px 2px 4px rgba(0,0,0,.2);
    letter-spacing: 3px;
    margin-bottom: 5%;
    opacity: .7;
}
label{
    font-size: 20px;
```

```css
    color: white;
    margin-left: 10%;
    opacity: .8;
    text-shadow: 2px 2px 4px rgba(0,0,0,.2);
}
input{
    width: 80%;
    margin: 5% auto;
    margin-bottom: 8%;
    border: none;
    outline: none;
    background: transparent;
    color: white;
    border-bottom: 1px solid rgba(255,255,255,0.6);
    opacity: .8;
}
button{
    width: 50%;
    margin: 3% auto;
    color: white;
    font-size: 15px;
    opacity: .55;
    background: rgb(255, 255, 255);
    padding: 10px 30px;
    border: none;
    outline: none;
    border-radius: 20px;
    text-shadow: 2px 2px 4px rgba(255,255,255,0.2);
    box-shadow: 3px 3px 5px rgba(31,38,135,.37);
    border-left: 1px solid rgba(255,255,255,.3);
    border-top: 1px solid rgba(255,255,255,.3);
}
a{
    font-size: 12px;
    text-align: center;
    color: black;
    opacity: .7;
}
```

Login page.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Heart Disease Prediction Dashboard</title>
    <link rel="stylesheet" href="Login page.css">
</head>

<body>
    <form>
        <h1>LOGIN</h1>
        <label>Username</label>
        <input type="text">
        <label>Password</label>
        <input type="password">
        <button><a href="visualizations.html">Login</button>
        <a>Forget Password?</a>
    </form>

</body>
</html>
```

Login page.css

```css
@import
url('https://fonts.googleapis.com/css2?family=Poppins&display=swap');

*{
    margin: 0;
    padding: 0;
    box-sizing: border-box;
    font-family: 'Poppins', sans-serif;
    cursor: pointer;
}
body{
    height: 100vh;
    width: 100%;
```

```css
    display: flex;
    justify-content: center;
    align-items: center;
    background: linear-gradient(to right,#3f5efb,#fc466b);
}
form{
    width: 25rem;
    height: 28rem;
    display: flex;
    flex-direction: column;
    background: rgba(255,255,255,0.06);
    box-shadow: 0 8px 32px 0 rgba(255,255,255,.3);
    border-radius: 30px;
    border-left: 1px solid rgba(255,255,255,.3);
    border-top: 1px solid rgba(255,255,255,.3);
}
form::before{
    content: '';
    position: absolute;
    bottom: 3%;
    right: 28%;
    width: 200px;
    height: 200px;
    background: magenta;
    border-radius: 50%;
    z-index: -1;
    opacity: .8;
}
form::after{
    content: '';
    position: absolute;
    top: 8%;
    left: 32%;
    width: 120px;
    height: 120px;
    background: magenta;
    border-radius: 50%;
    z-index: -1;
    opacity: .8;
}
```

```css
h1{
    font-size: 50px;
    text-align: center;
    color: white;
    text-shadow: 4px 4px 8px rgba(0,0,0,.2);
    letter-spacing: 3px;
    margin-bottom: 5%;
    opacity: .7;
}

label{
    font-size: 20px;
    color: white;
    margin-left: 10%;
    opacity: .8;
    text-shadow: 2px 2px 4px rgba(0,0,0,.2);
}
input{
    width: 80%;
    margin: 5% auto;
    margin-bottom: 8%;
    border: none;
    outline: none;
    background: transparent;
    color: white;
    border-bottom: 1px solid rgba(255,255,255,0.6);
    opacity: .8;
}
button{
    width: 50%;
    margin: 3% auto;
    color: white;
    font-size: 15px;
    opacity: .55;
    background: rgba(255, 255, 255, 0.993);
    padding: 10px 30px;
    border: none;
    outline: none;
    border-radius: 20px;
    text-shadow: 2px 2px 4px rgba(255,255,255,0.2);
    box-shadow: 3px 3px 5px rgba(31,38,135,.37);
```

```css
    border-left: 1px solid rgba(255,255,255,.3);
    border-top: 1px solid rgba(255,255,255,.3);
}
a{
    font-size: 12px;
    text-align: center;
    color: rgb(20, 3, 3);
    opacity: .7;
}
}
```

Visualizations.html

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta http-equiv="X-UA-Compatible" content="IE=edge">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Heart disease prediction</title>

    <link rel="stylesheet" href="visualizations.css">
</head>
<body>
    <form>
        <button>
            <a
href="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathR
ef=.my_folders%2FDashboard&amp;closeWindowOnLastView=true&amp;ui_appbar=fa
lse&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;mode=da
shboard&amp;subView=model00000184661611e0_00000003">Dashboard
            </a>
        </button>
        <br>

        <button>
            <a
href="https://us1.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FNew%2Brep
ort%2B1&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=f
```

```
alse&amp;shareMode=embedded&amp;action=run&amp;format=HTML&amp;prompt=fals
e">Report
            </a>
        </button>
        <br>

        <button>
            <a
href="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.
my_folders%2FNew%2Bstory%2B1&amp;closeWindowOnLastView=true&amp;ui_appbar=
false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;scene
Id=model00000184681cbd72_00000003&amp;sceneTime=0">Story
            </a>
        </button>
    </form>
</body>
</html>
```

Visualizations.css
```css
@import
url('https://fonts.googleapis.com/css2?family=Poppins&display=swap');

*{
    margin: 0;
    padding: 0;
    box-sizing: border-box;
    font-family: 'Poppins', sans-serif;
    cursor: pointer;
}
body{
    height: 100vh;
    width: 100%;
    display: flex;
    justify-content: center;
    align-items: center;
    background: linear-gradient(to right,#3f5efb,#fc466b);
}
form{
```

```
    width: 25rem;
    height: 28rem;
    display: flex;
    flex-direction: column;
    background: rgba(255,255,255,0.06);
    box-shadow: 0 8px 32px 0 rgba(255,255,255,.3);
    border-radius: 30px;
    border-left: 1px solid rgba(255,255,255,.3);
    border-top: 1px solid rgba(255,255,255,.3);
}
a{
    font-size: 50px;
    text-align: center;
    color: black;
    text-shadow: 2px 2px 4px rgba(0,0,0,.2);
    letter-spacing: 3px;
    margin-bottom: 5%;
    opacity: .7;
}
button{
    width: 90%;
    margin: 3% auto;
    color: white;
    font-size: 15px;
    opacity: .55;
    background: rgba(255, 255, 255, 0.985);
    padding: 10px 30px;
    border: none;
    outline: none;
    border-radius: 20px;
    text-shadow: 2px 2px 4px rgba(255,255,255,0.2);
    box-shadow: 3px 3px 5px rgba(31,38,135,.37);
    border-left: 1px solid rgba(255,255,255,.3);
    border-top: 1px solid rgba(255,255,255,.3);
}
```

8.TESTING

Test Report is a document which contains a summary of all test activities and final test results of a testing project. Test report is an assessment of how well the Testing is performed. Based on the test report, stakeholders can evaluate the quality of the tested product and make a decision on the software release.

8.1 Test Cases

The webpage needs to satisfy some test cases. Only after passing those
cases the webpage can be admitted as a valid web page .The test cases are of following
1.Verify user is able to view the front page?
2.Verify user is able to login to webpage or not?
3.Verify user is able to navigate to create your signup page?
4.Verify login page elements?

8.2 User Acceptance Testing

User acceptance testing is the final testing stage in software development before production. It's used to get feedback from users who test the software and its user interface(UI). UAT is usually done manually, with users creating real-world situations and testing how the software reacts and performs. Test-case scenarios can also be automated, simulating a user experience .As its name suggests, UAT is used to determine if end-users accept software before it's made public. Client or business requirements determine whether it fulfills the expectations originally set in its development.

8.3 UAT Report:

2. Defect Analysis

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

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	3	2	2	1	8
Duplicate	1	2	0	2	5
External	2	3	0	1	6
Fixed	5	2	3	2	12
Not Reproduced	0	0	1	0	1
Skipped	0	0	0	1	1
Won't Fix	0	0	0	1	1
Totals	11	9	6	8	34

3. Test Case Analysis

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

Section	Total Cases	Not Tested	Fail	Pass
Client Application	7	0	0	7
Speed	2	0	0	2
Security	2	0	0	2
Interaction	3	0	0	3
Predicted Visualizations	11	0	0	11
Accuracy	10	0	0	10
Final Report Output	3	0	0	3

8.4 User Acceptance Testing :
UAT Initiation, UAT Design, UAT Execution :

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint - 1	Registration	USN - 1	As a User, I can register for the web	3	High	Sivasangari B Sarubala p Vanishree M Monisha C

			page by entering my email, password, and confirming my password.			Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 1	Authentica tion	USN - 2	As a User, I will receive a confirmation email once I have registered for the application.	3	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 1	Authentica tion	USN - 3	As a User, I can register for the application through Gmail.	2		Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 1	Login	USN - 4	As a User, I can log into the application by entering email & password.	3	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 1	Dashboar d	USN - 5	On entering the registered email id, I can access the dashboard.	3	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 1	Support	USN - 6	If I face any issues, then I can report it to their email address.	2		Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 2	Accessing dashboard	USN - 7	The user uses his/her personal email id to access the dashboard.	4		Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 2	Prediction page	USN - 8	The user can view the prediction	6	High	Sivasangari B Sarubala p Vanishree M Monisha C
Sprint - 3	Validation	USN - 9	The administrator will be able to login with their login IDs.	6	High	Sivasangari B Sarubala p Vanishree M Monisha C

Sprint - 4	Result	USN - 10	The user will get the output.	6	High	Sivasangari B Sarubala p Vanishree M Monisha C

8.6 UAT Report Submission:

Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	16	6 Days	24 Oct 2022	29 Oct 2022	16	29 Oct 2022
Sprint-2	10	6 Days	31 Oct 2022	05 Nov 2022	10	05 Nov 2022
Sprint-3	06	6 Days	07 Nov 2022	12 Nov 2022	06	12 Nov 2022
Sprint-4	06	6 Days	14 Nov 2022	19 Nov 2022	06	19 Nov 2022

	Home Page	Signup page	Login page	Visualization Mode

Home Page ···

Login /Signup
☑ 2/2

Testing Login/Signup
☑ 2/2

+ Add a card

Signup page ···

Testing signup page
☑ 5/5

+ Add a card

Login page ···

Testing Login page
☑ 5/5

Enter Login page
☑ 3/3

+ Add a card

Visualization Mode ···

Testing visualization mode
☑ 4/4 📍

Dashboard
☑ 4/4

Report
☑ 4/4

Story
☑ 4/4

+ Add a card

Cards per list ···

Sprints   Doing   Done

Cards per due date ···

Complete   Due soon   Due later   Overdue   No due date

2022 ∨   < Today >   Quarter ∨   List ∨

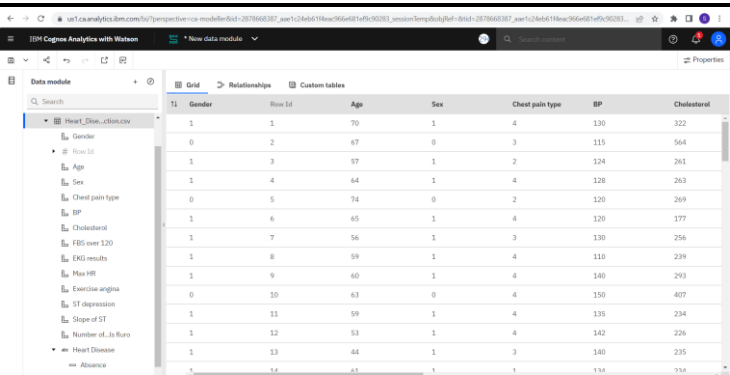|	OCTOBER	NOVEMBER	DECEMBER
Sprints			
Doing			
Done	Sprint 1 Sprint 2	Sprint 3 Sprint 4	

+ Add
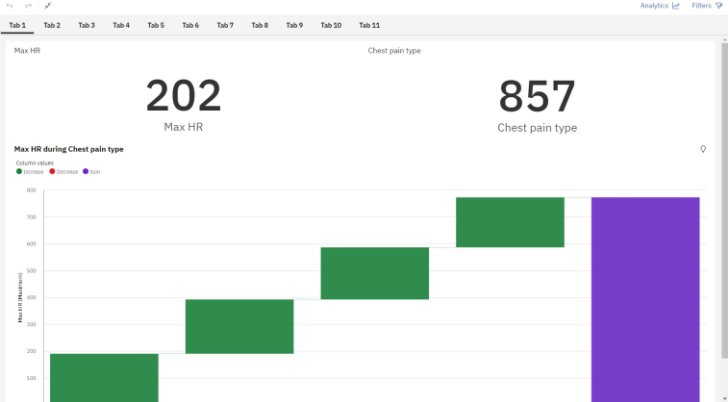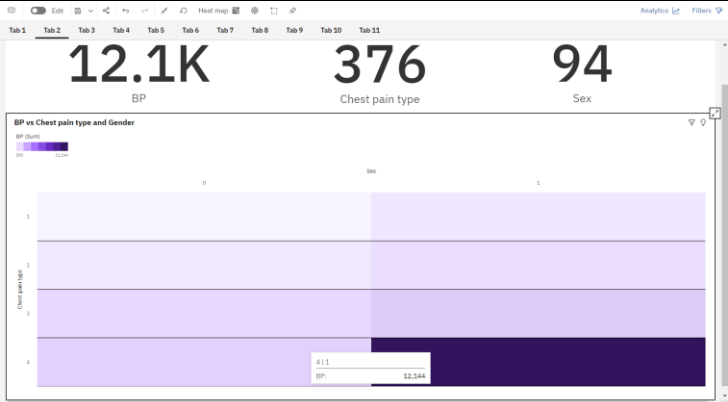
9. RESULTS
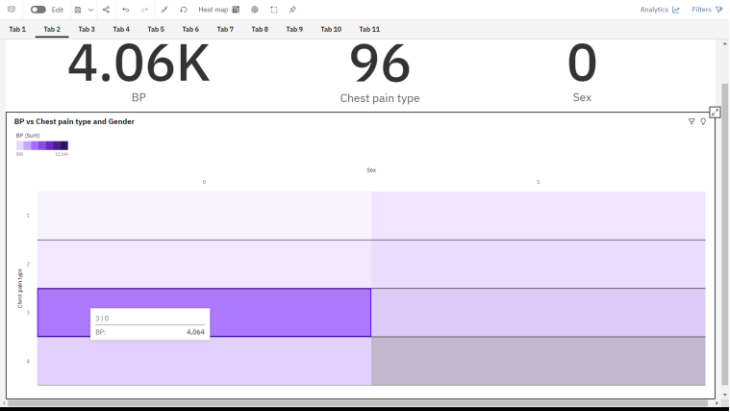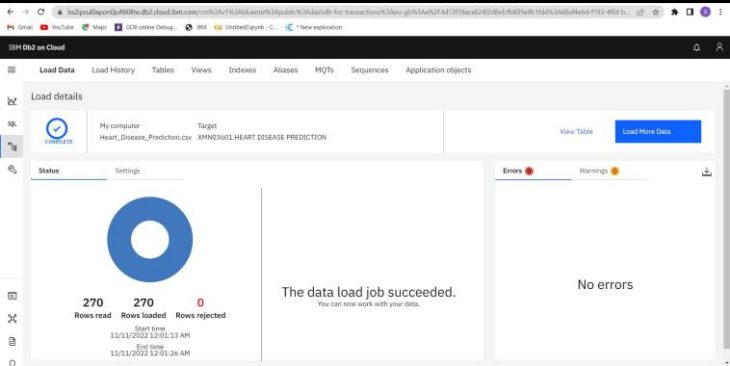
9.1 Performance Metrics

Performance metrics are data used to track processes within a business. This isachieved using activities, employee behavior, and productivity as key metrics.
These metrics are then used by employers to evaluate performance.

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	**No of Visualizations / Graphs - 11**
2.	Data Responsiveness	

3.	**Amount Data to Rendered (DB2 Metrics)**	
4.	**Utilization of Data Filters**	
5.	**Effective User Story**	**No of Scene Added - 11**
6.	**Descriptive Reports**	**No of Visualizations / Graphs - 11**

10. ADVANTAGES & DISADVANTAGES

Advantages:

● This is one of the fastest ways to determine if a person is likely to suffer from a heart disease or not.

● Useful for medical practitioners to easily classify their patients.

● User Friendly

● Easy to understand

● Secure

● Dashboard provides insightful informations

Disadvantages:

● Needs work

● Users need to know all the fields

● Does Not take null value as input

● Does not provide suggestions to user

11. CONCLUSION

The webpage is successfully created and all the predicted visualizations are made viewable with great accuracy. The webpage was tested very well and the errors were properly debugged. Testing also concluded that the performance of the system is satisfactory. All the necessary output is generated. This system thus provides an easy wayto automate all the functionalities of consumption. If this application is implemented in a few ways, it will be helpful.

The impact of data analytics in healthcare has already made a substantial difference in the ability of healthcare providers to offer patients high-quality care in an efficient, cost-effective manner. However, the role of data analytics in improving patient outcomes and healthcare processes continues to grow and expand as more types of data become available and new tools are developed that make the results of the analytics clear and

easy for healthcare professionals to access. Therefore using these tools will substantially help the users to give more importance to their health.

12. FUTURE SCOPE

Like the saying goes "Prevention is better than cure". We have to look into methods to prevent heart diseases altogether other than just predicting it in early stages. To use this website we need to take a lot of tests beforehand. So it would be better if we require less attributes and still give an effective result.

13. APPENDIX

Source Code :
https://github.com/IBM-EPBL/IBM-Project-364661660295237/tree/main/Final%20Deliverables/FINAL%20CODE

GitHub Link :
https://github.com/IBM-EPBL/IBM-Project-36466-1660295237.git

Project Demo Link :
https://youtu.be/00z5axdln8Q