# ***VISUALIZING AND PREDICTING HEART DISEASE USING INTERACTIVE DASHBOARD***

## ***PROJECT REPORT***

# 1. INTRODUCTION

## 1.1 PROJECT OVERVIEW

According to the World Health Organization, every year 12 million deaths occur worldwide due to heart disease. 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 data analysis. The load of cardiovascular disease is rapidly increasing all over the world from the past few years.

Many researches have been conducted in attempt to pinpoint the most influential factors of heart disease as well as accurately predict the overall risk. Heart Disease is even highlighted as a silent killer which leads to the death of the person without obvious symptoms.

The early diagnosis of heart disease plays a vital role in making decisions on lifestyle changes in high-risk patients and in turn reduces the complications. Data analytics proves to be effective in assisting in making decisions and predictions from the large quantity of data produced by the health care industry. This project aims to predict future heart disease by analysing data of patients which classifies whether they have heart disease or not using machine-learning algorithm.

Data analytics techniques can be a boon in this regard. Even though heart disease can occur in different forms, there is a common set of core risk factors that influence whether someone will ultimately be at risk for heart disease or not.

By collecting the data from various sources, classifying them under suitable headings & finally analysing to extract the desired data we can say that this technique can be very well adapted to do the prediction of heart disease.

## 1.2 PURPOSE

The main objective of this project is to visualize heart disease prediction and create an interactive dashboard. The system can discover and extract hidden knowledge associated with disease from a historical heart dataset.

Heart disease prediction system aims to exploit machine learning on medical dataset to assist in the prediction of the heart disease.

- Provides new approach to concealed patterns in the data.
- Helps avoid human biasness.
- Reduce the cost of medical tests

## 2. LITERATURE SURVEY

### 2.1 EXISTING SOLUTIONS

- Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques" proposed by Senthil Kumar Mohan, Chandrasegar Thirumalai et al. (2019) was efficient technique using hybrid machine learning methodology. The hybrid approach is combination of random forest and linear method. The dataset and subsets of attributes were collected for prediction.The subset of some attributes was chosen from the pre-processed knowledge(data) set of cardiovascular disease. After prep processing, the hybrid techniques were applied and diagnosis the cardiovascular disease.
- K. Prasanna Lakshmi, Dr. C.R.K. Reddy (2015) designed "Fast Rule□ Based Heart Disease Prediction using Associative Classification Mining". In the proposed Stream Associative Classification Heart Disease Prediction (SACHDP), we used associative classification mining over landmark window of data streams. This paper contains two phases: one is generating rules from associative classification mining and next one is pruning the rules using chi square testing and arranging the rules in an order to form a classifier. Using these phases to predict the heart disease easily.
- M.Satish, et al. (2015) used different Data Mining techniques like Rule based, Decision Tree, Naive Bayes, and Artificial Neural Network. An efficient approach called pruning classification association rule (PCAR) was used to generate association rules from cardiovascular disease warehouse for prediction of Heart Disease. Heart attack data warehouse was used for pre-processing for mining.
- Lokanath Sarangi, Mihir Narayan Mohanty, Srikanta Pattnaik (2015) "An Intelligent Decision Support System for Cardiac Disease Detection", designed a cost-efficient model by using genetic algorithm optimizer technique. The weights were optimized and fed as an input to the given network. The accuracy achieved was 90% by using the hybrid technique of GA and neural networks.
- "Prediction and Diagnosis of Heart Disease by Data Mining Techniques" designed by Boshra Bahrami, Mirsaeid Hosseini Shirvani. This paper uses various classification methodology for diagnosing cardiovascular disease. Classifiers like KNN, SVO classifier and Decision Tree are used to divide the datasets. Once the classification and performance evaluation the Decision tree is examined as the best one for cardiovascular disease prediction from the dataset

## 2.2 REFERENCES


- A study of predicting heart disease, https://www.irjet.net/archives/V7/i5/IRJET-V7I5579.
- K. Prasanna Lakshmi, Dr. C.R.K. Reddy, “Fast Rule-Based Heart Disease Prediction using Associative Classification Mining”, IEEE International Conference on Computer, Communication and Control (IC4-2015)
- M. Satish, D Sridhar, “Prediction of Heart Disease in Data Mining Technique”, International Journal of Computer Trends & Technology (IJCTT), 2015.
- Lokanath Sarangi, Mihir Narayan Mohanty, Srikanta Pattnaik, “An Intelligent Decision Support System for Cardiac Disease Detection”, IJCTA, International Press 2015.
- Boshra Bahrami, Mirsaeid Hosseini Shirvani, “Prediction and Diagnosis of Heart Disease by Data Mining Techniques”, Journal of Multidisciplinary Engineering Science and Technology (JMEST) ISSN: 3159-0040 Vol. 2 Issue 2, February–2015.

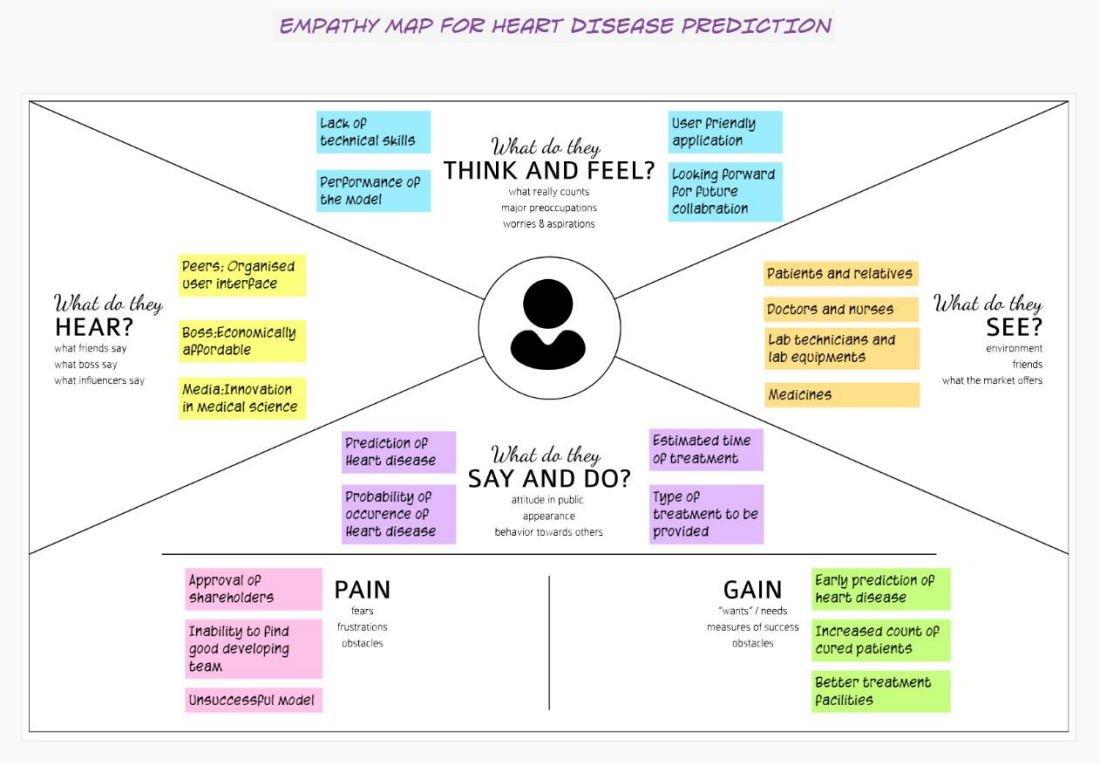

## 2.3 PROBLEM STATEMENT

Heart disease can be managed effectively with a combination of lifestyle changes, medicine and, in some cases, surgery. With the right treatment, the symptoms of heart disease can be reduced and the functioning of the heart improved. The predicted results can be used to prevent and thus reduce cost for surgical treatment and other expensive. Objective of this project is to develop an interactive dashboard to predict the heart disease accurately with few tests and attributes the presence of heart disease.

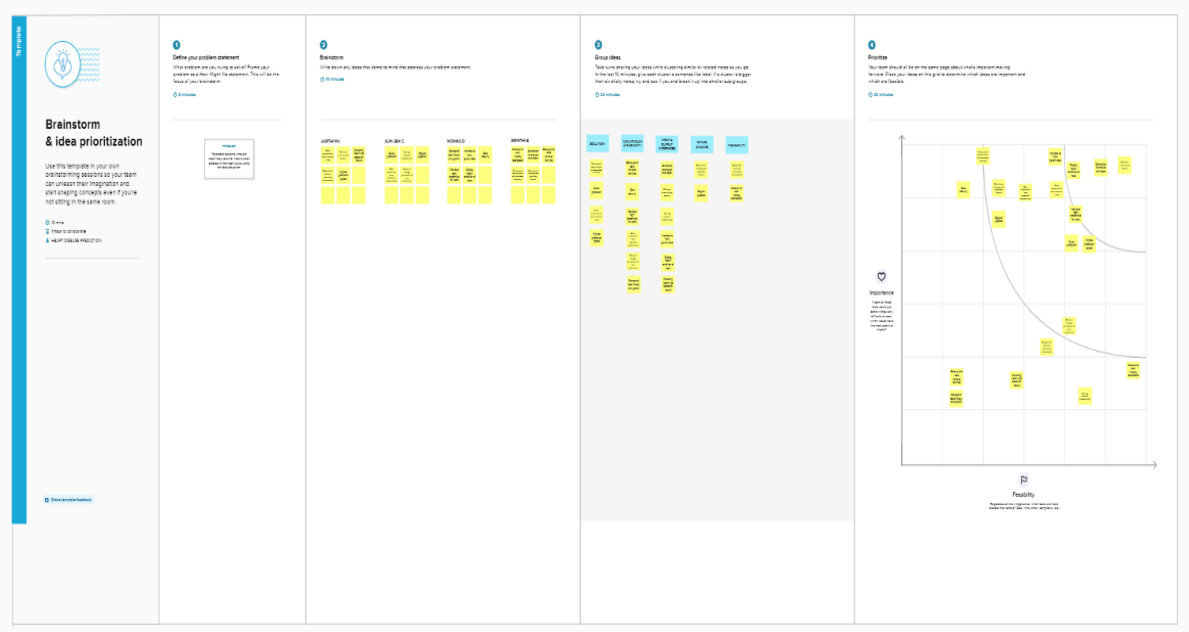
- The healthcare environment is still “information rich” but “knowledge poor”. There is a wealth of data available within the healthcare systems. However, there is a lack of effective analysis tools to discover hidden relationships and trends.
- Attributes considered form the primary basis for tests and give accurate results more or less. Many more input attributes can be taken but our goal is to predict with few attributes and faster efficiency the risk of having heart disease.
- Data analytics holds great potential for the healthcare industry to enable health systems to systematically use data and analytics to identify inefficiencies and best practices that improve care and reduce costs.

# 3. IDEATION & PROPOSED SOLUTION

## 3.1 EMPATHY MAP CANVAS



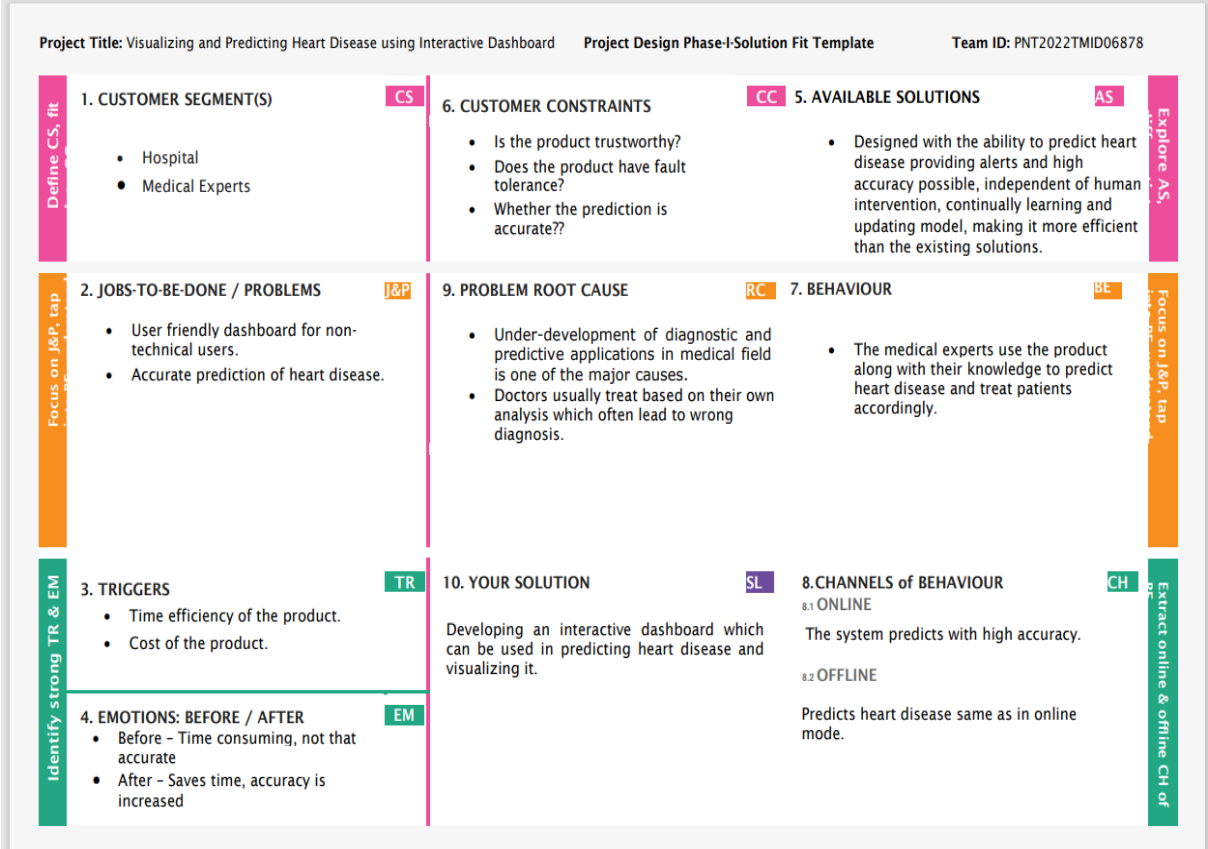

## 3.2 IDEATION & BRAINSTORMING



## 3.3 PROPOSED SOLUTION

| S.No | Parameter | Description |
|---|---|---|
| 1. | Problem Statement (Problem to besolved) | ➢ To develop an interactive dashboard to predict the heart disease accurately withfew tests and attributes the presence of heart disease. |
| 2. | Idea / Solution description | ➢ Analyzing data and identifying the heart disease using Cognos analysis. |
| 3. | Novelty / Uniqueness | ➢ Hoping to achieve maximum accuracy toprovide prior treatment to the patients and reduce the fatality rate. |
| 4. | Social Impact / Customer Satisfaction | ➢ Saving lives, User friendlyinteractive dashboard.<br>➢ Reduces the exorbitant medical cost of the patients.<br>➢ Reduces the biases and mistakes caused by the decisions of doctors basedon their intuitions and experiences. |
| 5. | Business Model (Revenue Model) | ➢ Data security.<br>➢ Easy to use.<br>➢ Constant updates according tonecessity. |
| 6. | Scalability of the Solution | ➢ Can be used in any platform(Windows, mac, etc,.)<br>➢ Adding new feature doesn't affect the performance of the system.<br>➢ Scalable dataset. |

## 3.4 PROBLEM SOLUTION FIT




# 4. REQUIREMENT ANALYSIS

## 4.1 FUNCTIONAL REQUIREMENT

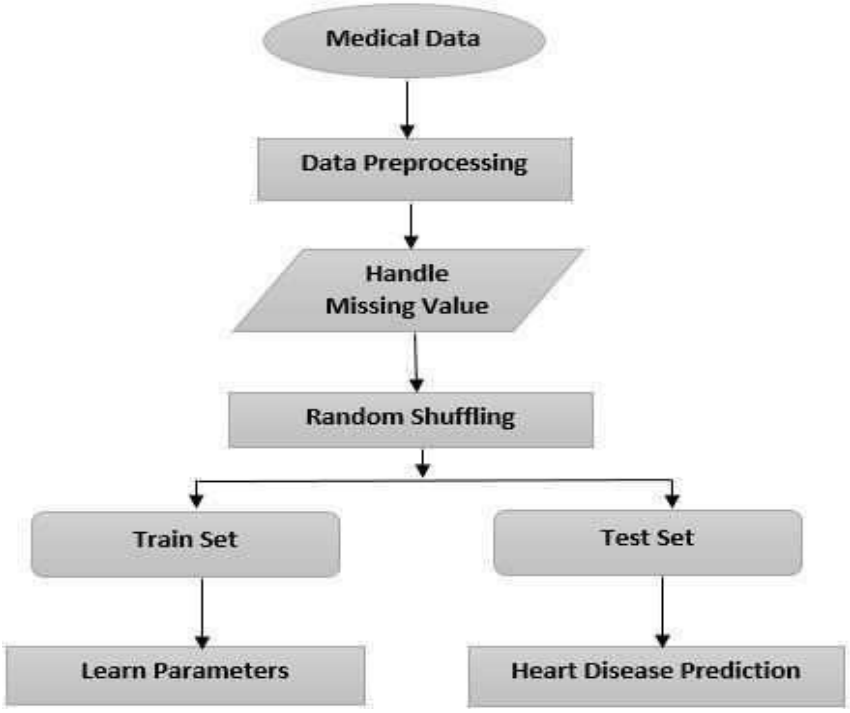
| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|---|---|---|
| FR-1 | User Registration | Registration through form, Gmail and LinkedIN |
| FR-2 | User Login | Confirmation of Gmail/username<br>Confirmation of password |
| FR-3 | Cyber attack | Immediate system shutdown in case of any malware<br>attack |
| FR-4 | Backup and storage | Patient data can be backed up into cloud server.<br>Backup can be scheduled for regularity. |
| FR-5 | Prediction generation | The analysis and prediction can be downloaded in<br>various formats. |

## 4.2 NON-FUNCTIONAL REQUIREMENT

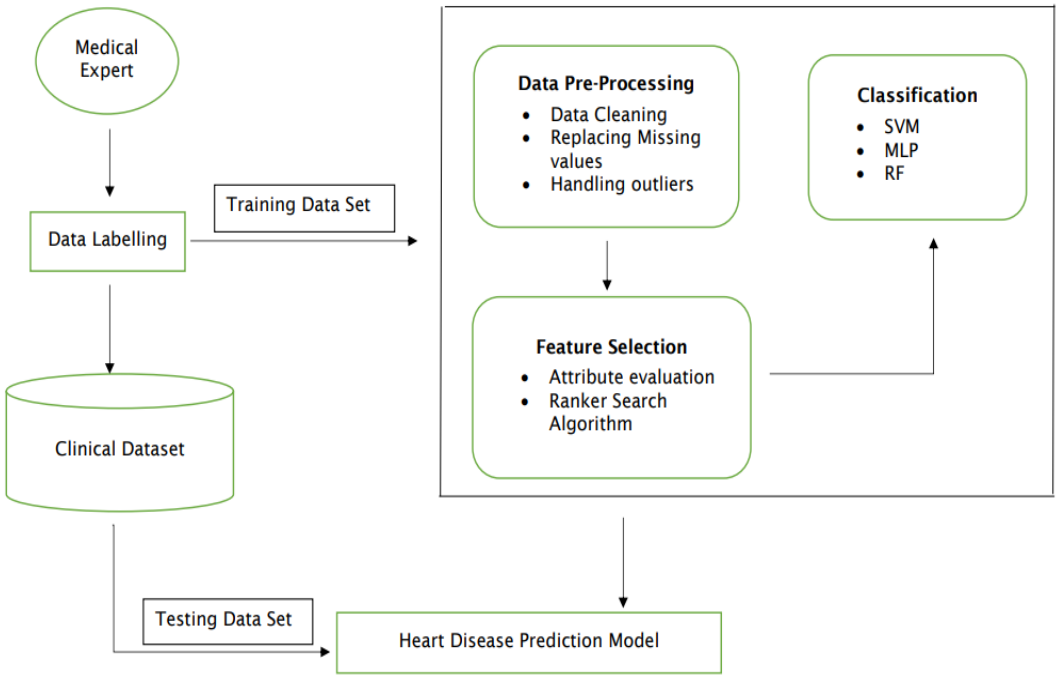
| FR No. | Non-Functional Requirement | Description |
|---|---|---|
| NFR-1 | Usability | Clear user interface for easy navigation which enables easy understanding of the contents of the product. |
| NFR-2 | Security | Security of the patient data will be ensured by use ofvarious measures like firewall, security questions and account locking in case of multiple incorrect passwords. |
| NFR-3 | Reliability | Product will have same efficiency even afterextensive use.<br>Percentage of probability of failure will be less.<br>Time between critical failures will be high. |
| NFR-4 | Performance | Each page of the product will load within 2 secs. Prediction will take less than 5 secs and the generation of the analysis report will be less than 3 secs. |
| NFR-5 | Availability | All product modules will be highly available and canbe accessed with PC and internet. |
| NFR-6 | Scalability | The scalability will be to improve 10% of annual<br>patient in the hospital |

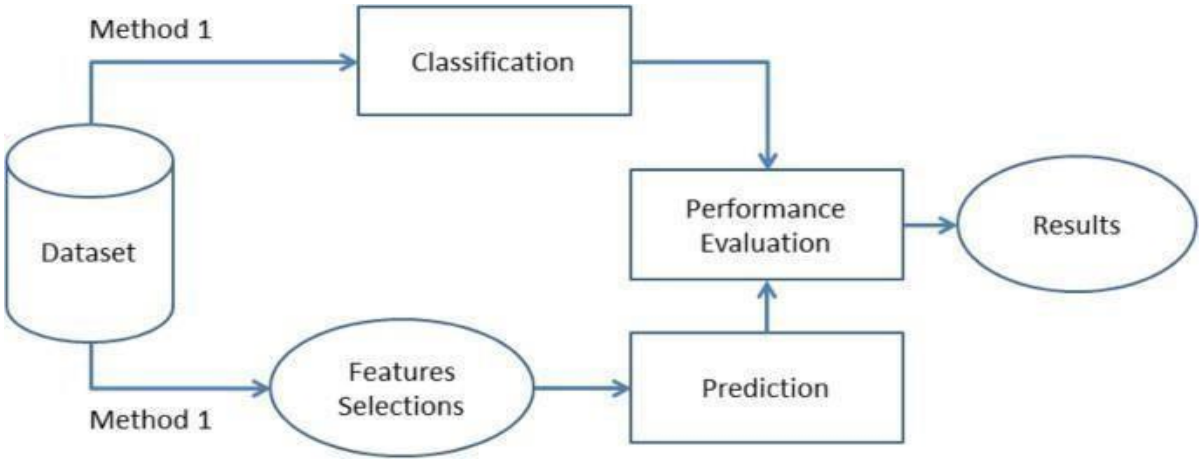
# 5. PROJECT DESIGN

## 5.1 DATA FLOW DIAGRAM




## 5.2 SOLUTION & TECHNICAL ARCHITECTURE






| S.No | Component | Description | Technology |
|---|---|---|---|
| 1. | Importing data | Data Import lets you upload data from external sources and combine it with data you collect via Analytics | Python, numpy ,pandas. |
| 2. | Data Cleaning | Data cleaning is a process by which inaccurate,poorly formatted, or otherwise messy data is organized and corrected | Python |
| 3. | Data Preprocessing | Data preprocessing, a component of data preparation, describes any type of processing performed on raw data to prepare it for another data processing procedure | Python |
| 4. | Training data | Training data is the part of original data that is usedto train the machine learning model | python |
| 5. | Testing data | Test data is data which has been specifically usedfor testing the model | Python. |
| 6. | Machine learning model | A machine learning model is a file that has been trained to recognize certain types of patterns. Youtrain a model over a set of data, providing it an algorithm that it can use to reason over and learn from those data | Python. |
| 7. | Improve model performance | Accuracy is one metric for evaluating classification Models. Informally, accuracy is the fraction of predictions our model got right. | Python. |

### 5.3 USER STORIES

| User Type | Functional Requirement(Epic) | User Story Number | User Story / Task | Acceptance criteria | Priority | Release |
|---|---|---|---|---|---|---|
| Customer (Mobile user) | Registration | USN-1 | As a user, I can register for the application by entering my email, password, and confirmingmy 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 |
| | | USN-3 | As a user, I can register for the applicationthrough Facebook | I can register & access the dashboard with Facebook Login | Low | Sprint-2 |
| | | USN-4 | As a user, I can register for the applicationthrough Gmail | I can register & access the dashboard with Gmail Login | Medium | Sprint-1 |
| | Login | USN-5 | As a user, I can log into the application byentering email & password | I can register & access the dashboard with Gmail Login | High | Sprint-1 |
| | Dashboard | USN-6 | Profile - view & update your profile | I can see the profile. | High | Sprint-1 |
| | | USN-7 | Change Password - user | I can able to change | High | Sprint-1 |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | | can change the password | the password . | | |
| | | USN-8 | Home - Analyze your Heart | I can detect the health condition from where ever I want. | High | Sprint-1 |
| | | USN-9 | The user will have to fill in the below 13 fields for the system to predict a disease -Age in Year -Gender -Chest Pain Type -Fasting Blood Sugar - Resting Electrographic Results(Restecg) -Exercise Induced | These are the categories available in that application . | High | Sprint-2 |

## 6. PROJECT PLANNING AND SCHEDULING

### 6.1 SPRINT PLANNING & ESTIMATION

| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Point | Priority | Team Members |
|---|---|---|---|---|---|---|
| Sprint-1 | Working with Dataset | USN-1 | As a user, I can collect the details of the patients and store the data in a csv file. Uploading the csv file for heart disease prediction to IBM Cognos Analytics . | 5 | Medium | Srinithi B, Aarthi M V |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sprint-1 | | USN-2 | As an analyst, I will check the dataset and clean it for null values and duplicates to get an efficient heart disease prediction model. | 5 | Medium | Alin Jeni C, Monika D |
| Sprint-1 | | USN-3 | As an Analyst I will also correct the raw data and create a data module forthe dataset. | 5 | Medium | Alin Jeni C, Monika D |
| Sprint-2 | Exploring and Visualizing the dataset using Cognos | USN-4 | As an analyst, I will explorethe dataset by visualizing in Cognos analytics. | 5 | Medium | Srinithi B, Aarthi M V |
| Sprint-2 | | USN-5 | As an analyst, I will get the inference of the visualization of the dataset. | 5 | Medium | Alin Jeni C, Monika D |
| Sprint-3 | Visualizing thedataset using story card, and python | USN-6 | As an analyst, I will visualize the dataset using story card and python to get insightsof the dataset. | 5 | Medium | Alin Jeni C, Monika D |
| Sprint-3 | Creation of interactive Dashboard | USN-7 | As an analyst, I can monitor the events and activities at a glance by providing key insights and analysis about the dataset. | 5 | Medium | Srinithi B, Aarthi M V |

| | | | | | | |
|---|---|---|---|---|---|---|
| Sprint-4 | Web user interface creation | USN-8 | As an analyst, I will use HTML, CSS to develop a login page and user interface to access the dashboard, story and reportfor analysis. | 10 | High | Alin Jeni C, Monika D |
| Sprint-4 | Report generation in Cognos Analytics | USN-9 | As an analyst I will be developing a report on theused dataset for analysis and predicting heart disease. | 10 | High | Srinithi B, Aarthi M V |

### 6.2 SPRINT DELIVERY SCHEDULE

| Sprint | Total Story Points | Duration | Sprint Start Date | Sprint EndDate (Planned) | Story Points Completed (as on Planned EndDate) | Sprint Release Date (Actual) |
|---|---|---|---|---|---|---|
| Sprint-1 | 20 | 6 Days | 24 Oct 2022 | 29 Oct 2022 | 20 | 29 Oct 2022 |
| Sprint-2 | 20 | 6 Days | 31 Oct 2022 | 05 Nov 2022 | 20 | 05 Nov 2022 |
| Sprint-3 | 20 | 6 Days | 07 Nov 2022 | 12 Nov 2022 | 20 | 12 Nov 2022 |
| Sprint-4 | 20 | 6 Days | 14 Nov 2022 | 19 Nov 2022 | 20 | 19 Nov 2022 |

## 7. CODING & SOLUTION

Content.html

```
<!DOCTYPE html>
<html>
        <head>
                <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART
DISEASE USING INTERACTIVE DASHBOARD</title>
                <link rel="stylesheet"
href="https://fonts.googleapis.com/css?family=Roboto">
        </head>
        <style>
                html,body{
                margin:0;
                width:100%;
                height:100%;
                font-family:Roboto;
                display: flex;
                flex-direction: column;
  background-repeat:no-repeat;
  background-position: center;
  background-size: cover;
  }
                .header{
                position: fixed;
                top: 0px;
                width:100%;
                height:100px;
                display: flex;
                flex-direction: row;
                align-items: center;
                justify-content: space-between;
                }
                #heading{
                padding:10px;
                color:white;
                font-size:25px;
                font-style: italic
                }
                #option1{
                margin-right:2px;
                padding:10px;
                color:black;
```

```
font-size:20px;
}
.options{
display: flex;
margin-right:25px;
}
a{
text-decoration:none;
color:black;
}

.content{
margin-right: 1055px;
margin-left: 100px;
}
.frm{
margin-top: 100px;
border:2px solid black;
padding:30px;
border-radius:5px;
align:center;
}
.inputs{
padding:10px;
border-radius:5px;
outline:0;
width:250px;
}
.btn{
cursor: pointer;
width:250px;
}
.si:hover{
        color:white;
        background-color:dimgrey;
}
img{
height:60px;
width:60px;
border-radius:50%;
}
</style>
```

```
        <body background=
"https://api.parashospitals.com/uploads/2021/03/Prevention-of-Heart-
Disease.png">
                <div class="header">
                        <p id="heading"></p>
                        <div class="options">
                                <p id="heading">VISUALIZING AND PREDICTING HEART
DISEASE USING INTERACTIVE DASHBOARD</a></p>
                        </div>
                </div>
                <div class="content">
   <center><p style="color: blue;"></p></center><br>
                        <form class="frm">
                                <h3><center><img
src="https://domf5oio6qrcr.cloudfront.net/medialibrary/4563/silent-heart-
attacks.png"alt="loginimg"></center></h3>
      <button type="submit" class="inputs btn si" ><a
href="dashboard.html">DASHBOARD</a></button><br><br>
      <button type="submit" class="inputs btn si" ><a
href="story.html">STORY</a></button><br><br>
                                <button type="submit" class="inputs btn si" ><a
href="report.html">REPORT</a></button><br><br>
                                        <br><br>
                        </form>
                </div>
        </body>
</html>

Dashboard.html
<!DOCTYPE html>
<html>
        <head>
                <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART
DISEASE USING INTERACTIVE DASHBOARD</title>
                <link rel="stylesheet"
href="https://fonts.googleapis.com/css?family=Roboto">
        </head>
        <style>
   html,body{
                margin:0;
                width:100%;
                height:100%;
                font-family:Roboto;
```

```
        display: flex;
        flex-direction: column;
        background-repeat:no-repeat;
background-position: center;
background-size: cover;
        }
        .header{
        position: fixed;
        top: 0px;
        width:100%;
        height:100px;
        display: flex;
        flex-direction: row;
        align-items: center;
        justify-content: space-between;
        }
        #heading{
        padding:10px;
        color:black;
        font-size:25px;
        font-style: italic
        }
        #option1{
        margin-right:10px;
        padding:10px;
        color:white;
        font-size:20px;
        }
        .options{
        display: flex;
        }
        a{
        text-decoration:none;
        color:white;
        }
#option1:hover{
        border:1px solid white;
        border-radius:10px;
        background-color:black;
        }
        .container{
        display:flex;
        justify-content:center;
```

```
                align-items: center
                flex-direction:row;
                }
                #imgs{
                margin-top:100px;
                height: 300px;
                width: 60vw;
                }
                #subhead{
                font-size: 30px;
                color: black;
                text-align: center;
                }
                th, td {
                width:40vw;
                padding: 15px;
                }
                th{
                color:black;
                text-decoration-line: underline;
                }
                td{
                color:black;
                text-align:justify;
                }
                table
                {
                        background-color: white;
                        opacity: 70%;
                        margin-left: 120px;
                }
                #content
                {
                        margin-top: 80px;
    margin-right: 200px;
                }

                </style>
        <body background=
"https://api.parashospitals.com/uploads/2021/03/Prevention-of-Heart-
Disease.png">
                <div class="header">
                        <p id="heading">DASHBOARD VISUALIZATION</p>
```

```
                    <div class="options">
      <p id="option1"><a href="content.html">EXIT</a></p>

                    </div>
                </div>
                <div id ="content">
    <p><iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folders%2FHeart%2Bdisease%2Bprediction&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;mode=dashboard" width="1518" height="610" frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe></p>
   </div>

        </body>
</html>
```

Story.html

```
<!DOCTYPE html>
<html>
        <head>
                <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART
DISEASE USING INTERACTIVE DASHBOARD</title>
                <link rel="stylesheet"
href="https://fonts.googleapis.com/css?family=Roboto">
        </head>
        <style>
   html,body{
                margin:0;
                width:100%;
                height:100%;
                font-family:Roboto;
                display: flex;
                flex-direction: column;
                background-repeat:no-repeat;
   background-position: center;
   background-size: cover;
                }
                .header{
                position: fixed;
                top: 0px;
                width:100%;
                height:100px;
```

```
        display: flex;
        flex-direction: row;
        align-items: center;
        justify-content: space-between;
        }
        #heading{
        padding:10px;
        color:black;
        font-size:25px;
        font-style: italic
        }
        #option1{
        margin-right:10px;
        padding:10px;
        color:white;
        font-size:20px;
        }
        .options{
        display: flex;
        }
        a{
        text-decoration:none;
        color:white;
        }
#option1:hover{
        border:1px solid white;
        border-radius:10px;
        background-color:black;
        }
        .container{
        display:flex;
        justify-content:center;
        align-items: center
        flex-direction:row;
        }
        #imgs{
        margin-top:100px;
        height: 300px;
        width: 60vw;
        }
        #subhead{
        font-size: 30px;
        color: black;
```

```
                text-align: center;
                }
                th, td {
                width:40vw;
                padding: 15px;
                }
                th{
                color:black;
                text-decoration-line: underline;
                }
                td{
                color:black;
                text-align:justify;
                }
                table
                {
                        background-color: white;
                        opacity: 70%;
                        margin-left: 120px;
                }
                #content
                {
                        margin-top: 80px;
    margin-right: 200px;
                }

                </style>
        <body background=
"https://api.parashospitals.com/uploads/2021/03/Prevention-of-Heart-
Disease.png">
                <div class="header">
                        <p id="heading">STORY VISUALIZATION</p>
                        <div class="options">
     <p id="option1"><a href="content.html">EXIT</a></p>

                        </div>
                </div>
                <div id ="content">
    <p><iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_fold
ers%2FHeart%2Bdisease%2Bprediction%2Bstory&amp;closeWindowOnLastView=tru
e&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;a
ction=view&amp;sceneId=model000001847b557ecf_00000002&amp;sceneTime=0"
```

```
width="1518" height="610" frameborder="0" gesture="media" allow="encrypted-
media" allowfullscreen=""></iframe></p>
  </div>

      </body>
</html>
```

Report.html

```
<!DOCTYPE html>
<html>
      <head>
            <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART
DISEASE USING INTERACTIVE DASHBOARD</title>
            <link rel="stylesheet"
href="https://fonts.googleapis.com/css?family=Roboto">
      </head>
      <style>
  html,body{
            margin:0;
            width:100%;
            height:100%;
            font-family:Roboto;
            display: flex;
            flex-direction: column;
            background-repeat:no-repeat;
  background-position: center;
  background-size: cover;
            }
            .header{
            position: fixed;
            top: 0px;
            width:100%;
            height:100px;
            display: flex;
            flex-direction: row;
            align-items: center;
            justify-content: space-between;
            }
            #heading{
            padding:10px;
            color:black;
            font-size:25px;
            font-style: italic
```

```
        }
        #option1{
        margin-right:10px;
        padding:10px;
        color:white;
        font-size:20px;
        }
        .options{
        display: flex;
        }
        a{
        text-decoration:none;
        color:white;
        }
#option1:hover{
        border:1px solid white;
        border-radius:10px;
        background-color:black;
        }
        .container{
        display:flex;
        justify-content:center;
        align-items: center
        flex-direction:row;
        }
        #imgs{
        margin-top:100px;
        height: 300px;
        width: 60vw;
        }
        #subhead{
        font-size: 30px;
        color: black;
        text-align: center;
        }
        th, td {
        width:40vw;
        padding: 15px;
        }
        th{
        color:black;
        text-decoration-line: underline;
        }
```

```
                td{
                color:black;
                text-align:justify;
                }
                table
                {
                        background-color: white;
                        opacity: 70%;
                        margin-left: 120px;
                }
                #content
                {
                        margin-top: 80px;
    margin-right: 200px;
                }

                </style>
        <body background=
"https://api.parashospitals.com/uploads/2021/03/Prevention-of-Heart-
Disease.png">
                <div class="header">
                        <p id="heading">REPORT VISUALIZATION</p>
                        <div class="options">
     <p id="option1"><a href="content.html">EXIT</a></p>

                        </div>
                </div>
                <div id ="content">
    <p><iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FHeart%2Bdisease
%2Breport&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_nav
bar=false&amp;shareMode=embedded&amp;action=edit" width="1518"
height="610" frameborder="0" gesture="media" allow="encrypted-media"
allowfullscreen=""></iframe></p>
  </div>

        </body>
</html>
```

# 8. TESTING

## 8.1 TEST CASES

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | Date | 18-Nov-22 | | | | | | | | |
| | | | | Team ID | PNT2022TMID06878 | | | | | | | | |
| | | | | Project Name | Project – Visualizing and Predicting Heart Diseases with an Interactive Dash Board | | | | | | | | |
| | | | | Maximum Marks | 4 marks | | | | | | | | |
| **Test case ID** | **Feature Type** | **Component** | **Test Scenario** | **Pre-Requisite** | **Steps To Execute** | **Test Data** | **Expected Result** | **Actual Result** | **Status** | **Commnets** | **TC for Automation(Y/N)** | **BUG ID** | **Executed By** |
| BP | Dashboard/Report/Story | Cognos Analytics | Verify the dataset for accurate performance | A quality dataset | 1. Upload the dataset<br>2. Explore the data<br>3. Create dashboard/Report/Story | https://github.com/IBM-EPBL/IBM-Project-3802-1658639787/blob/main/Final%20Deliverables/Heart_Disease_Prediction.csv | Accurate prediction | Working as expected | Pass | Cognos analytics to accurate prediction of patients with BP | Yes | High | Srinithi B |
| Cholesterol | Dashboard/Report/Story | Cognos Analytics | Verify the dataset for accurate performance | A quality dataset | 1. Upload the dataset<br>2. Explore the data<br>3. Create dashboard/Report/Story | https://github.com/IBM-EPBL/IBM-Project-3802-1658639787/blob/main/Final%20Deliverables/Heart_Disease_Prediction.csv | Accurate prediction | Working as expected | Pass | Cognos analytics to accurate prediction of patients with Cholesterol | Yes | High | Aarthi MV |
| Thallium | Dashboard/Report/Story | Cognos Analytics | Verify the dataset for accurate performance | A quality dataset | 1. Upload the dataset<br>2. Explore the data<br>3. Create dashboard/Report/Story | https://github.com/IBM-EPBL/IBM-Project-3802-1658639787/blob/main/Final%20Deliverables/Heart_Disease_Prediction.csv | Accurate prediction | Not working as expected | Fail | Some data not accurate | No | Low | Alin Jeni C |
| ECG | Dashboard/Report/Story | Cognos Analytics | Verify the dataset for accurate performance | A quality dataset | 1. Upload the dataset<br>2. Explore the data<br>3. Create dashboard/Report/Story | https://github.com/IBM-EPBL/IBM-Project-3802-1658639787/blob/main/Final%20Deliverables/Heart_Disease_Prediction.csv | Accurate prediction | Working as expected | Pass | Cognos analytics to accurate prediction of patients based on ECG | Yes | High | Monika D |
| Obesity | Dashboard/Report/Story | Cognos Analytics | Verify the dataset for accurate performance | A quality dataset | 1. Upload the dataset<br>2. Explore the data<br>3. Create dashboard/Report/Story | https://github.com/IBM-EPBL/IBM-Project-3802-1658639787/blob/main/Final%20Deliverables/Heart_Disease_Prediction.csv | Accurate prediction | Not working as expected | Fail | Some data not accurate | No | Medium | Srinithi B |
| ST Depression | Dashboard/Report/Story | Cognos Analytics | Verify the dataset for accurate performance | A quality dataset | 1. Upload the dataset<br>2. Explore the data<br>3. Create dashboard/Report/Story | https://github.com/IBM-EPBL/IBM-Project-3802-1658639787/blob/main/Final%20Deliverables/Heart_Disease_Prediction.csv | Accurate prediction | Working as expected | Pass | Cognos analytics to accurate prediction of patients with ST depressionYes | Yes | High | Aarthi MV |

## 8.2 USER ACCEPTANCE TESTING

Defect Analysis

| Resolution | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Subtotal |
|---|---|---|---|---|---|
| BP | 10 | 4 | 2 | 3 | 19 |
| Cholesterol | 10 | 7 | 3 | 4 | 24 |
| Thallium | 2 | 3 | 0 | 1 | 6 |
| ECG | 11 | 2 | 4 | 20 | 37 |
| Obesity | 9 | 6 | 1 | 0 | 16 |
| St depression | 3 | 4 | 1 | 1 | 9 |
| Totals | 45 | 21 | 11 | 29 | 111 |

Test case Analysis

| Section | Total Cases | Not Tested | Fail | Pass |
|---|---|---|---|---|
| BP | 22 | 0 | 0 | 22 |
| Cholesterol | 31 | 0 | 0 | 31 |
| Thallium | 4 | 0 | 0 | 4 |
| ECG | 51 | 0 | 0 | 51 |
| Obesity | 9 | 0 | 0 | 9 |
| St depression | 2 | 0 | 0 | 2 |

## 9. RESULTS

### 9.1 PERFORMANCE METRICS

The expected visualization of the heart disease dataset was successfully completed using IBM Cognos Analytics and the prediction was completed by creating an interactive dashboard.

The performance of the dashboard and is up to the level of expectation with the presence of active internet connection.

## 10. ADVANTAGES & DISADVANTAGES

### 10.1 ADVANTAGES

1. User can search for doctor's help at any point of time.
2. User can talk about their heart disease and get instant diagnosis.
3. Doctors get more clients online.
4. Very useful in case of emergency.

### 10.2 DISADVANTAGES

1. Prediction of cardiovascular disease results is not accurate.
2. Data mining techniques does not help to provide effective decision making.
3. Cannot handle enormous datasets for patient records.

## 11. CONCLUSION

Heart diseases are a major killer in India and throughout the world, application of promising technology like machine learning to the initial prediction of heart diseases will have a profound impact on society. The early prognosis of heart disease can aid in making decisions on lifestyle changes in high-risk patients and in turn reduce the complications, which can be a great milestone in the field of medicine. The number of people facing heart diseases is on a raise each year. This prompts for its early diagnosis and treatment. The utilization of suitable technology support in this regard can prove to be highly beneficial to the medical fraternity and patients.

## 12. FUTURE SCOPE

Future enhance of the HDPS is to predict a specific HD type such Heart attracts, CVD, CAD, etc. the potential of the HDPS in a different area are hospital, Clinic, smartphone, smart wear, hospital/police emergency system and integrate with fitness mobile application. We will integrate this model in hospital and clinic system to predict heart disease. We will implement this HDP Model into smart wears to detect essential attributes of HD and suggest to the precaution of HD. we will also apply this model into a mobile app to easily test ourselves HD. we will integrate smart wear to the hospital and police emergency system to save the life of the patient at the emergency condition.

## 13. APPENDIX

### HTML

HTML is an acronym which stands for Hyper Text Markup Language which is used for creating web pages and web applications.

Hyper Text: Hypertext simply means "Text within Text." A text has a link within it, is a hypertext. Whenever you click on a link which brings you to a new webpage, you have clicked on a hypertext. Hypertext is a way to link two or more web pages (HTML documents) with each other.

Markup language: A markup language is a computer language that is used to apply layout and formatting conventions to a text document. Markup language makes text more interactive and dynamic. It can turn text into images, tables, links, etc.

Web Page: A web page is a document which is commonly written in HTML and translated by a web browser. A web page can be identified by entering an URL. A Web page can be of the static or dynamic type. With the help of HTML only, we can create static web pages

### CSS

CSS stands for Cascading Style Sheets. It is a style sheet language which is used to describe the look and formatting of a document written in markup language. It provides an additional feature to HTML. It is generally used with HTML to change the style of web pages and user interfaces. It can also be used with any kind of XML documents including plain XML, SVG and XUL.

CSS is used along with HTML and JavaScript in most websites to create user interfaces for web applications and user interfaces for many mobile applications. CSS style definitions are saved in external CSS files so it is possible to change the entire website by changing just one file.

**COGNOS ANALYTICS**

IBM Cognos Analytics is a set of business intelligence tools available on cloud or on-premise. The primary focus is in the area of Descriptive Analytics, to help users see the information in your data through dashboards, professional reporting and self-service data exploration.

New exploration features in the program now highlight interesting relationships within the data, helping users to find insights they may not even be looking for, allowing users to not only see what has happened with Descriptive Analytics but allows them to understand why it happened with Diagnostic Analytics.

**PYTHON**

Python is an interpreted, high-level, general purpose programming language created by Guido Van Rossum and first released in 1991, Python's design philosophy emphasizes code Readability with its notable use of significant White space. Its language constructs and object-oriented approach aim to help programmers write clear, logical code for small and large-scale projects. Python is dynamically typed and garbage collected. It supports multiple programming paradigms, including procedural, object-oriented, and functional programming.

**NUMPY**

NumPy is a library for the python programming language, adding support for large, multidimensional arrays and matrices, along with a large collection of high-level mathematical functions to operate on these arrays. The ancestor of NumPy, Numeric, was originally created by Jim with contributions from several other developers. In 2005, Travis created NumPy by incorporating features of the competing Numarray into Numeric, with extensive modifications. NumPy is open-source software and has many contributors.

**MATPLOTLIB**

Matplotlib is a plotting library for the Python programming language and its numerical mathematics extension NumPy. It provides an object-oriented API for embedding plots into applications using general-purpose GUI toolkits like Tkinter, wxPython, Qt, or GTK. There is also a procedural "pylab" interface based on a statemachine (like OpenGL), designed to closely resemble that of MATLAB, though its use is discouraged.

**Source code:**

Content.html

```
<!DOCTYPE html>
<html>
    <head>
        <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART DISEASE USING INTERACTIVE DASHBOARD</title>
        <link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Roboto">
    </head>
    <style>
        html,body{
        margin:0;
        width:100%;
        height:100%;
        font-family:Roboto;
        display: flex;
        flex-direction: column;
  background-repeat:no-repeat;
  background-position: center;
  background-size: cover;
  }
        .header{
        position: fixed;
        top: 0px;
        width:100%;
        height:100px;
        display: flex;
        flex-direction: row;
        align-items: center;
        justify-content: space-between;
        }
        #heading{
        padding:10px;
        color:white;
```

```
        font-size:25px;
        font-style: italic
        }
        #option1{
        margin-right:2px;
        padding:10px;
        color:black;
        font-size:20px;
        }
        .options{
        display: flex;
margin-right:25px;
        }
        a{
        text-decoration:none;
        color:black;
        }

        .content{
margin-right: 1055px;
margin-left: 100px;
        }
        .frm{
        margin-top: 100px;
        border:2px solid black;
        padding:30px;
        border-radius:5px;
align:center;
        }
        .inputs{
        padding:10px;
        border-radius:5px;
        outline:0;
        width:250px;
        }
```

```
.btn{
cursor: pointer;
width:250px;
}
.si:hover{
        color:white;
        background-color:dimgrey;
}
img{
height:60px;
width:60px;
border-radius:50%;
}
</style>
  <body background= "https://api.parashospitals.com/uploads/2021/03/Prevention-of-Heart-Disease.png">
        <div class="header">
                <p id="heading"></p>
                <div class="options">
                        <p id="heading">VISUALIZING AND PREDICTING HEART DISEASE USING INTERACTIVE DASHBOARD</a></p>
                </div>
        </div>
        <div class="content">
 <center><p style="color: blue;"></p></center><br>
                <form class="frm">
                        <h3><center><img src="https://domf5oio6qrcr.cloudfront.net/medialibrary/4563/silent-heart-attacks.png"alt="loginimg"></center></h3>
    <button type="submit" class="inputs btn si" ><a href="dashboard.html">DASHBOARD</a></button><br><br>
    <button type="submit" class="inputs btn si" ><a href="story.html">STORY</a></button><br><br>
                        <button type="submit" class="inputs btn si" ><a href="report.html">REPORT</a></button><br><br>
                                <br><br>
```

```
                </form>
            </div>
    </body>
</html>
```

Dashboard.html

```
<!DOCTYPE html>
<html>
    <head>
        <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART DISEASE USING INTERACTIVE DASHBOARD</title>
        <link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Roboto">
    </head>
    <style>
   html,body{
        margin:0;
        width:100%;
        height:100%;
        font-family:Roboto;
        display: flex;
        flex-direction: column;
        background-repeat:no-repeat;
   background-position: center;
   background-size: cover;
        }
        .header{
        position: fixed;
        top: 0px;
        width:100%;
        height:100px;
        display: flex;
        flex-direction: row;
        align-items: center;
        justify-content: space-between;
```

```
        }
        #heading{
        padding:10px;
        color:black;
        font-size:25px;
        font-style: italic
        }
        #option1{
        margin-right:10px;
        padding:10px;
        color:white;
        font-size:20px;
        }
        .options{
        display: flex;
        }
        a{
        text-decoration:none;
        color:white;
        }
#option1:hover{
        border:1px solid white;
        border-radius:10px;
        background-color:black;
        }
        .container{
        display:flex;
        justify-content:center;
        align-items: center
        flex-direction:row;
        }
        #imgs{
        margin-top:100px;
        height: 300px;
        width: 60vw;
```

```
        }
        #subhead{
        font-size: 30px;
        color: black;
        text-align: center;
        }
        th, td {
        width:40vw;
        padding: 15px;
        }
        th{
        color:black;
        text-decoration-line: underline;
        }
        td{
        color:black;
        text-align:justify;
        }
        table
        {
                background-color: white;
                opacity: 70%;
                margin-left: 120px;
        }
        #content
        {
                margin-top: 80px;
    margin-right: 200px;
        }

        </style>
    <body background= "https://api.parashospitals.com/uploads/2021/03/Prevention-
of-Heart-Disease.png">
        <div class="header">
                <p id="heading">DASHBOARD VISUALIZATION</p>
```

```
                    <div class="options">
      <p id="option1"><a href="content.html">EXIT</a></p>

                    </div>
                </div>
                <div id ="content">
    <p><iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=dashboard&amp;pathRef=.my_folders%2FHeart%2Bdisease%2Bprediction&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;mode=dashboard" width="1518" height="610" frameborder="0" gesture="media"
allow="encrypted-media" allowfullscreen=""></iframe></p>
  </div>


    </body>
</html>
```

Story.html

```
<!DOCTYPE html>
<html>
    <head>
        <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART DISEASE
USING INTERACTIVE DASHBOARD</title>
        <link rel="stylesheet"
href="https://fonts.googleapis.com/css?family=Roboto">
    </head>
    <style>
  html,body{
        margin:0;
        width:100%;
        height:100%;
        font-family:Roboto;
        display: flex;
        flex-direction: column;
        background-repeat:no-repeat;
  background-position: center;
```

```
background-size: cover;
        }
        .header{
        position: fixed;
        top: 0px;
        width:100%;
        height:100px;
        display: flex;
        flex-direction: row;
        align-items: center;
        justify-content: space-between;
        }
        #heading{
        padding:10px;
        color:black;
        font-size:25px;
        font-style: italic
        }
        #option1{
        margin-right:10px;
        padding:10px;
        color:white;
        font-size:20px;
        }
        .options{
        display: flex;
        }
        a{
        text-decoration:none;
        color:white;
        }
#option1:hover{
        border:1px solid white;
        border-radius:10px;
        background-color:black;
```

```
}
.container{
display:flex;
justify-content:center;
align-items: center
flex-direction:row;
}
#imgs{
margin-top:100px;
height: 300px;
width: 60vw;
}
#subhead{
font-size: 30px;
color: black;
text-align: center;
}
th, td {
width:40vw;
padding: 15px;
}
th{
color:black;
text-decoration-line: underline;
}
td{
color:black;
text-align:justify;
}
table
{
        background-color: white;
        opacity: 70%;
        margin-left: 120px;
}
```

```
        #content
        {
            margin-top: 80px;
    margin-right: 200px;
        }

        </style>
    <body background= "https://api.parashospitals.com/uploads/2021/03/Prevention-of-Heart-Disease.png">
        <div class="header">
            <p id="heading">STORY VISUALIZATION</p>
            <div class="options">
     <p id="option1"><a href="content.html">EXIT</a></p>
            </div>
        </div>
        <div id ="content">
    <p><iframe src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2FHeart%2Bdisease%2Bprediction%2Bstory&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=view&amp;sceneId=model000001847b557ecf_00000002&amp;sceneTime=0" width="1518" height="610" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe></p>
  </div>  </body>
</html>
```

Report.html

```
<!DOCTYPE html>
<html>
    <head>
        <title>PNT2022TMID06878 VISUALIZING AND PREDICTING HEART DISEASE USING INTERACTIVE DASHBOARD</title>
    <link rel="stylesheet" href="https://fonts.googleapis.com/css?family=Roboto">
</head><style>
    html,body{
        margin:0;
```

```
        width:100%;
        height:100%;
        font-family:Roboto;
        display: flex;
        flex-direction: column;
        background-repeat:no-repeat;
background-position: center;
background-size: cover;
        }
        .header{
        position: fixed;
        top: 0px;
        width:100%;
        height:100px;
        display: flex;
        flex-direction: row;
        align-items: center;
        justify-content: space-between;
        }
        #heading{
        padding:10px;
        color:black;
        font-size:25px;
        font-style: italic
        }
        #option1{
        margin-right:10px;
        padding:10px;
        color:white;
        font-size:20px;
        }
        .options{
        display: flex;
        }
        a{
```

```
        text-decoration:none;
        color:white;
        }
#option1:hover{
        border:1px solid white;
        border-radius:10px;
        background-color:black;
        }
        .container{
        display:flex;
        justify-content:center;
        align-items: center
        flex-direction:row;
        }
        #imgs{
        margin-top:100px;
        height: 300px;
        width: 60vw;
        }
        #subhead{
        font-size: 30px;
        color: black;
        text-align: center;
        }
        th, td {
        width:40vw;
        padding: 15px;
        }
        th{
        color:black;
        text-decoration-line: underline;
        }
        td{
        color:black;
        text-align:justify;
```

```
            }
            table
            {
                background-color: white;
                opacity: 70%;
                margin-left: 120px;
            }
            #content
            {
                margin-top: 80px;
    margin-right: 200px;
            }

            </style>
    <body background= "https://api.parashospitals.com/uploads/2021/03/Prevention-of-Heart-Disease.png">
            <div class="header">
                <p id="heading">REPORT VISUALIZATION</p>
                <div class="options">
     <p id="option1"><a href="content.html">EXIT</a></p></div>
            </div>
            <div id ="content">
    <p><iframe src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FHeart%2Bdisease%2Breport&amp;closeWindowOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp;action=edit" width="1518" height="610" frameborder="0" gesture="media" allow="encrypted-media" allowfullscreen=""></iframe></p>
    </div>
</body>
</html>
```

**GitHub link:** https://github.com/IBM-EPBL/IBM-Project-3802-1658639787

**Demo video link:**
https://drive.google.com/file/d/1IG1k86u_pSmOOcvYjgEVeef8mtBKlwy3/view?usp=sharing