

**VISUALIZING AND PREDICTING HEART DISEASES WITH
AN INTERACTIVE DASHBOARD**

NALAIYA THIRAN PROJECT REPORT

Submitted By

TEAM LEAD

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1. INTRODUCTION

1.1 Project Overview

The leading cause of death in the developed world is heart disease. Therefore, there needs to be work done to help prevent the risks of having a heart attack or stroke. This project aims to create an interactive Dashboard using IBM Cognos Tool and dataset to predict which patients are most likely to suffer from a heart disease in the near future using the features given.

1.2 Purpose

Heart disease (HD) is a major cause of mortality in modern society. Medical diagnosis is an extremely important but complicated task that should be performed accurately and efficiently. Cardiovascular disease is difficult to detect due to several risk factors, including high blood pressure, cholesterol, and an abnormal pulse rate. 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 patient details we will make decisions to cure them.

2. LITERATURE SURVEY

2.1 Existing Problem

Healthcare industries generate enormous amount of data, so called big data that accommodates hidden knowledge or pattern for decision making. The huge volume of data is used to make decision which is more accurate than intuition. Exploratory Data Analysis (EDA) detects mistakes, finds appropriate data, checks assumptions and determines the correlation among the explanatory variables. In the context, EDA is considered as analysing data that excludes inferences and statistical modelling. Analytics is an essential technique for any profession as it forecast the future and hidden pattern. Data analytics is considered as a cost effective technology in the recent past and it plays an essential role in healthcare which includes new research findings, emergency situations and outbreaks of disease. The use of analytics in healthcare improves care by facilitating preventive care and EDA is a vital step while analysing data.

2.2 References

"Predicting The Risk Of Heart Failure With EHR Sequential Data Modelling"
Bo Jin, Chao Che et al (2018).

Bo Jin, Chao Che et al. (2018) proposed a "Predicting the Risk of Heart Failure With EHR Sequential Data Modeling" model designed by applying neural network. This paper used the electronic health record (EHR) data from

real-world datasets related to congestive heart disease to perform the experiment and predict the heart disease before itself. We tend to use one-hot encoding and word vectors to model the diagnosing events and foretold coronary failure events victimization the essential principles of an extended memory network model. By analyzing the results, we tend to reveal the importance of respecting the sequential nature of clinical records.

**"Prediction And Diagnosis Of Heart Disease By Data Mining Techniques"
Boshra Bahrami, Mirsaeid Hosseini Shirvani(2015).**

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.

**"An Intelligent Decision Support System For Cardiac Disease
Detection" Lokanath Sarangi, Mihir Narayan Mohanty, Srikanta
Pattnaik(2015).**

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.

**"Fast Rule-Based Heart Disease Prediction Using Associative Classification
Mining"**

K.Prasanna Lakshmi, Dr. C.R.K.Reddy(2015).

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-

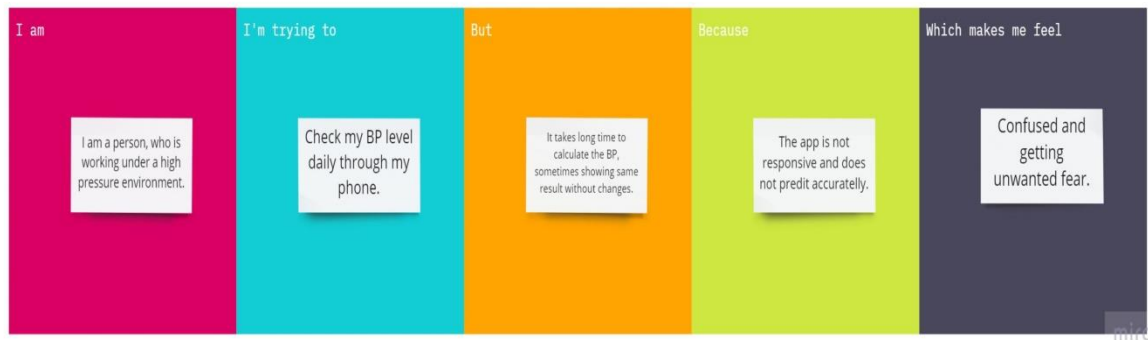
square testing and arranging the rules in an order to form a classifier. Using these phase to predict the heart disease easily.

"Applied Data Mining And Machine Learning Algorithms Namely Decision Tree (J48 algorithm), Naive Bayes And Artificial Neural Networks(ANN) For Heart Disease Prediction" A.Taneja(2013).

In 2013, A. Taneja, applied data mining and machine learning algorithms namely Decision Tree (J48 algorithm), Naive Bayes and Artificial Neural Networks (ANN) for heart disease prediction. A dataset of 7339 instance with 15 attributes has been taken from PGI Chandigarh. WEKA 3.6.4 tool was used for the experiment. For model training and testing 10-Fold Cross Validation techniques is used randomly. Best First Search method was used to select the best attributes from the already available 15 attributes and among them only 8 attributes has been selected. Each experiments was done on two different scenarios, first one containing all 15 attributes and the second case only 8 selected attributes. From all these experiments comparative results has been obtained and from these comparative results it has been found that J48 pruned in selected attributes case has performed best in accuracy with 95.56% and Naive Bayes with all attributes case gives less accuracy 91.96% but takes least time to build a model in the whole experiment.

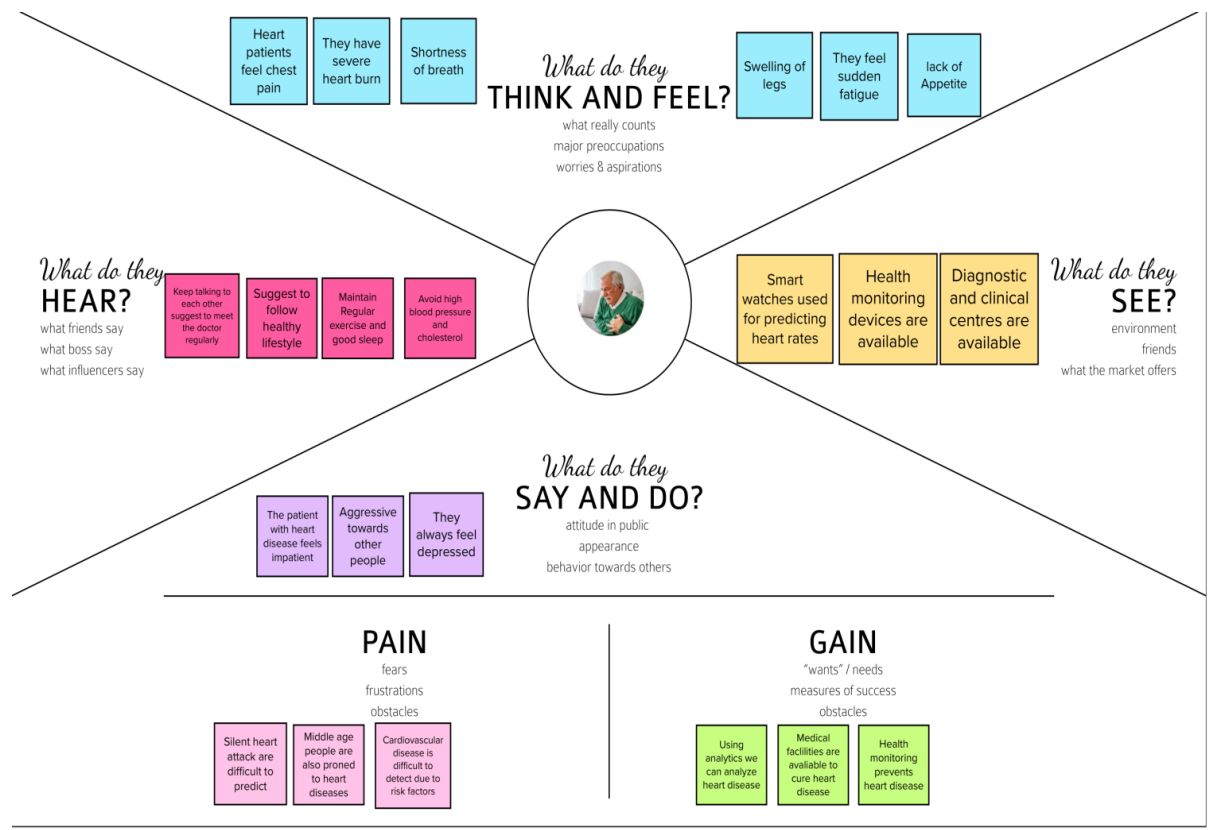
2.3 Problem Statement Definition





3. IDEATION AND PROPOSED SOLUTION


3.1 Empathy Map Canvas



3.2 Ideation and Brainstorming

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

Template



Brainstorm & idea prioritization

Use this template in your own brainstorming sessions so your team can unleash their imagination and start shaping concepts even if you're not sitting in the same room.

⌚ 10 minutes to prepare
🕒 1 hour to collaborate
👥 2-8 people recommended

➔

Before you collaborate

A little bit of preparation goes a long way with this session. Here's what you need to do to get going.

⌚ 10 minutes

A Team gathering
Define who should participate in the session and send an invite. Share relevant information or pre-work ahead.

B Set the goal
Think about the problem you'll be focusing on solving in the brainstorming session.

C Learn how to use the facilitation tools
Use the Facilitation Superpowers to run a happy and productive session.

[Open article](#) ➔

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

The major challenge in heart disease is its detection. Early detection of cardiac disease can decrease the mortality rate and over all complications, since we have a good amount of data in today's world we can use various analytics to analyze the data for hidden pattern.

Key rules of brainstorming

To run a smooth and productive session

- Stay in topic.
- Defer judgment.
- Go for volume.
- Encourage wild ideas.
- Listen to others.
- If possible, be visual.

Step 2: Brainstorm, Idea Listing and Grouping

2

Brainstorm

Write down any ideas that come to mind that address your problem statement.

⌚ 10 minutes

TIP
You can select a sticky note and tell the person (switch to editing) to start drawing!

| Person 1 | Person 2 | Person 3 | Person 4 |
|--|--|---|--|
| By using smart watches we measure heart rates and we can store in cloud. | Maintain regular exercise and healthy food diet to avoid heart diseases. | Preventive measures for heart diseases include regular checkups, healthy diet, regular exercise, and stress management. | Being overweight or obesity causes heart attack. |
| After a certain period of interval, go for regular health checkup. | By using apps we can calculate user's risk score for a heart disease. | Unusual swelling in the legs, feet, hands, or abdomen are the symptoms of heart disease. | Extreme stress can cause trigger of your heart. |
| | | Many smart sensors are available to predict heart rates. | Having high cholesterol and blood pressure leads to heart disease. |
| | | | Being overweight, especially around the middle of the body, increases the risk of heart disease. |
| | | | Having a family history of heart disease, especially if a close relative has had a heart attack or stroke, increases your risk of heart disease. |

3

Group ideas

Take turns sharing your ideas while clustering similar or related notes as you go. In the last 10 minutes, 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

Finally maintaining healthy food habits, controlling blood pressure can avoid heart disease.

Whenever the person feels like chest pressure or swelling, the person immediately rush out to the hospital to prevents from heart disease.

Based on analytics we can analyze which patients are most likely to suffer from heart disease in the near future.

Based on the patient details we will take decisions to cure them.

TIP
Add color-coded tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your board.

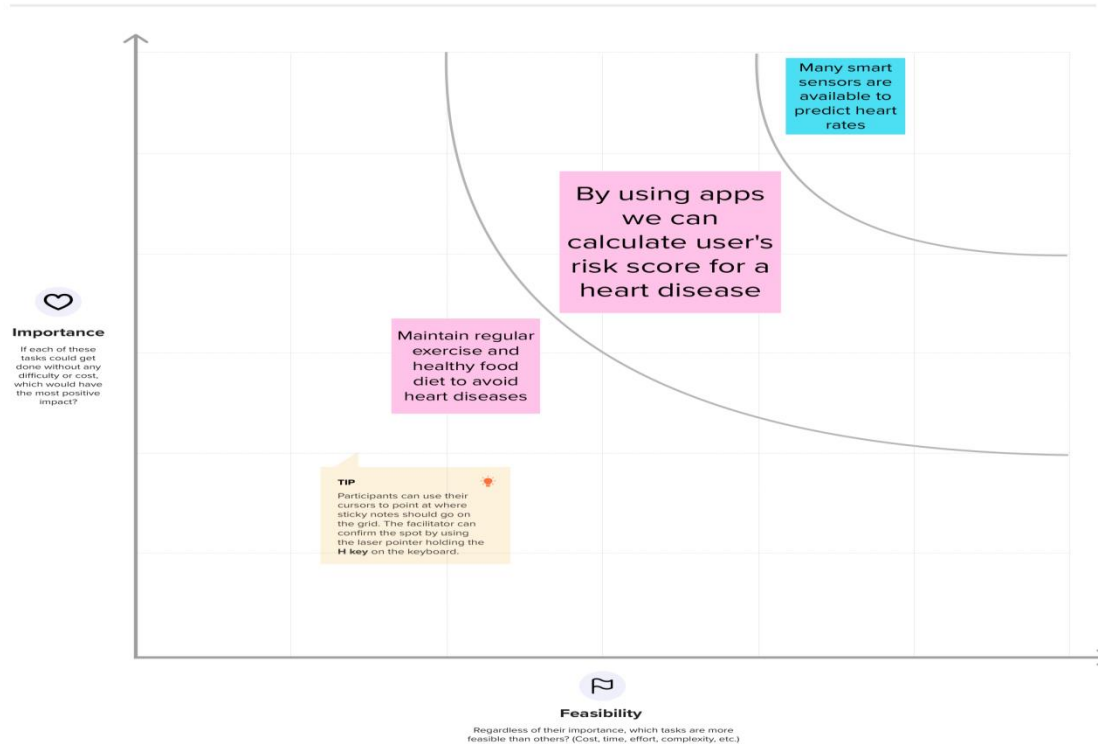
Step-3: Idea Prioritization

4

Prioritize

Your team should all be on the same page about what's important moving forward. Place your ideas on this grid to determine which ideas are important and which are feasible.

20 minutes



3.3 Proposed Solution

| S.No. | Parameter | Description |
|-------|--|--|
| 1. | Problem Statement (Problem to be solved) | To find Whether a person who is working under a high pressure environment is suffered from a heart disease and also to predict effectively. If the patient suffers from heart disease or not and to determine whether the patient should be diagnosed with heart Disease or not. |
| 2. | Idea / Solution description | The goal is to accurately create a data set about the Heart Patients and to store it in cloud, so the hospitals can use this information to easily analyse and predict the patient details. Based on that a |

| | | |
|----|---------------------------------------|--|
| | | informative and creative dashboard can be created to present the data and utilize it for future use. |
| 3. | Novelty / Uniqueness | Treatment can be easy for the doctors on the basis of the patient heart condition. Time can be saved. |
| 4. | Social Impact / Customer Satisfaction | By predicting, it helps the hospitals to know the health records of the heart patient. It will make the hospital to work efficiently and the patient can get immediate treatments. |
| 5. | Business Model (Revenue Model) | Ad based revenue model – Awareness can be created among the patient through ads. |
| 6. | Scalability of the Solution | Easy prediction of the heart disease with the patient details stored. Maintains best user experience. |

3.4 Problem Solution Fit

| | | | | |
|--|--|---|---|---------------------------|
| Define CS, fit into CC | 1. CUSTOMER SEGMENT(S) CS Who is your customer? i.e. working parents of 0-5 y.o. kids. A patient who is suffering from Heart Disease. | 6. CUSTOMER CONSTRAINTS CC What constraints prevent your customers from taking action or limit their choices of solutions? i.e. spending power, budget, no cash, network connection, available devices. The patient wants to predict the accuracy or presence of the heart disease by health monitoring devices. | 5. AVAILABLE SOLUTIONS AS Which solutions are available to the customers when they face the problem or need to get the job done? What have they tried in the past? What pros & cons do these solutions have? i.e. pen and paper is an alternative to digital notetaking. Healthy lifestyle habits – such as eating a low fat food, low salt diet, getting regular exercise and good sleep. | Explore AS, differentiate |
| | 2. JOBS-TO-BE-DONE / PROBLEMS J&P Which jobs-to-be-done (or problems) do you address for your customers? There could be more than one; explore different sides. Chest pain, chest tightness, chest pressure and chest discomfort (angina), shortness of breath. | 9. PROBLEM ROOT CAUSE RC What is the real reason that this problem exists? What is the back story behind the need to do this job? i.e. customers have to do it because of the change in regulations. The cause is due to age, obesity, poor diet etc., Complications of heart disease includes heart attack and stroke. You can reduce the risk of complications with early diagnosis and treatment | 7. BEHAVIOUR BE What does your customer do to address the problem and get the job done? i.e. directly related: find the right solar panel installer, calculate usage and benefits; indirectly associated: customers spend free time on volunteering work (i.e. Greenpeace) The patient should take effective blood pressure and diabetes test to analyse the prediction of heart disease. While if the patient has breathing problems the patient should consult with the doctor immediately. Be calm in every situation. | |
| Focus on J&P, fit into BE, understand RC | 3. TRIGGERS TR What triggers customers to act? i.e. seeing their neighbour installing solar panels, reading about a more efficient solution in the news. The patient should take necessary step to the prediction of disease. The patient should consult with other patient who suffered with the disease and should take necessary actions. | 10. YOUR SOLUTION SL If you are working on an existing business, write down your current solution first, fill in the canvas, and check how much it fits reality. If you are working on a new business proposition, then keep it blank until you fill in the canvas and come up with a solution that fits within customer limitations, solves a problem and matches customer behaviour. The patient should maintain healthy lifestyle. Maintain blood sugar level and manage stress. The patient should maintain regular exercise. Reduce your alcohol consumption. Keep your blood pressure under control. The person needs to be more physically active. The patient should take regular checkup to maintain low risk level. | 8. CHANNELS of BEHAVIOUR CH K1 ONLINE What kind of actions do customers take online? Extract online channels from #7. K2 OFFLINE What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development. Based on the analytics we can analyse which patients are most likely to suffer from heart disease in the near future and based on the patient details we will take decisions to cure them. | Identify strong TR & EM |
| | 4. EMOTIONS: BEFORE / AFTER EM How do customers feel when they face a problem or a job and afterwards? i.e. lost, insecure -> confident, in control - use it in your communication strategy & design. The patient feels very fear after knowing the presence of disease. If the accuracy level of the disease is low he might feel little calm but the risk is high, patient becomes frustrated and depressed. The patient may have fear of death. | | | |

4. REQUIREMENT ANALYSIS

4.1 Functional Requirement

Following are the functional requirements of the proposed solution.

| FR No. | Functional Requirement (Epic) | Sub Requirement (Story / Sub-Task) |
|--------|-------------------------------|--|
| FR-1 | User Registration | Enables user to make registration for the application through Gmail |
| FR-2 | User Confirmation | Once after registration, the user will get confirmation via Gmail |
| FR-3 | Data preparation | After user login they can upload a dataset and prepare the data. |
| FR-4 | Visualizing Data | User can visualize the trends on the heart disease through Dashboard created in IBM Cognos Analytics |
| FR-5 | Generating Report | User can view health reports and can make decisions accordingly. |

4.2 Non-Functional Requirement

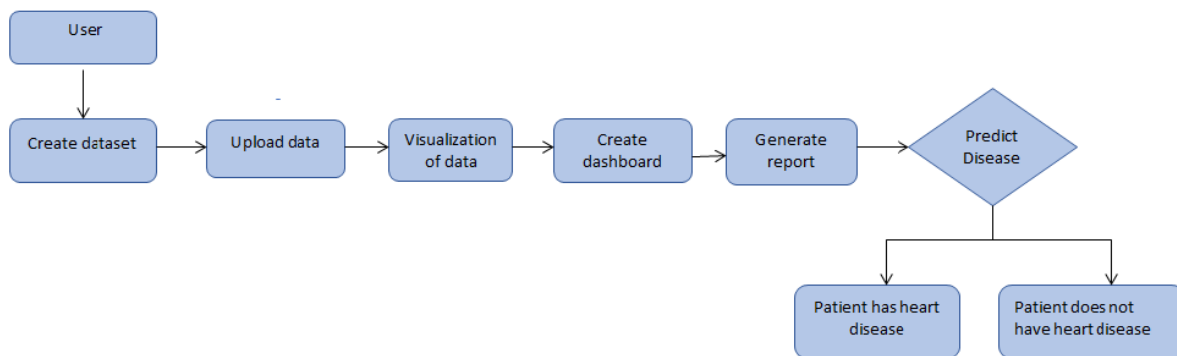
Following are the non-functional requirements of the proposed solution.

| FR No. | Non-Functional Requirement | Description |
|--------|----------------------------|--|
| NFR-1 | Usability | The application will have a simple and user-friendly graphical interface. Users will be able to understand and use all the features of the application easily. |
| NFR-2 | Security | For Security of application, data replication technique is used. So that all the important data should be kept safe. In case of crash, the system should be able to backup and recover the data. |
| NFR-3 | Reliability | The application must be reliable and strong in giving the functionalities. |

| | | |
|-------|---------------------|--|
| NFR-4 | Performance | Performance of the application depends on the response time and the speed of the data submission. The application is direct and faster which depends on the efficiency of implemented algorithm. |
| NFR-5 | Availability | The application will be available 24x7 for users without any interruption. |
| NFR-6 | Scalability | The application can withstand increase in number of users and able to develop higher versions in future. |

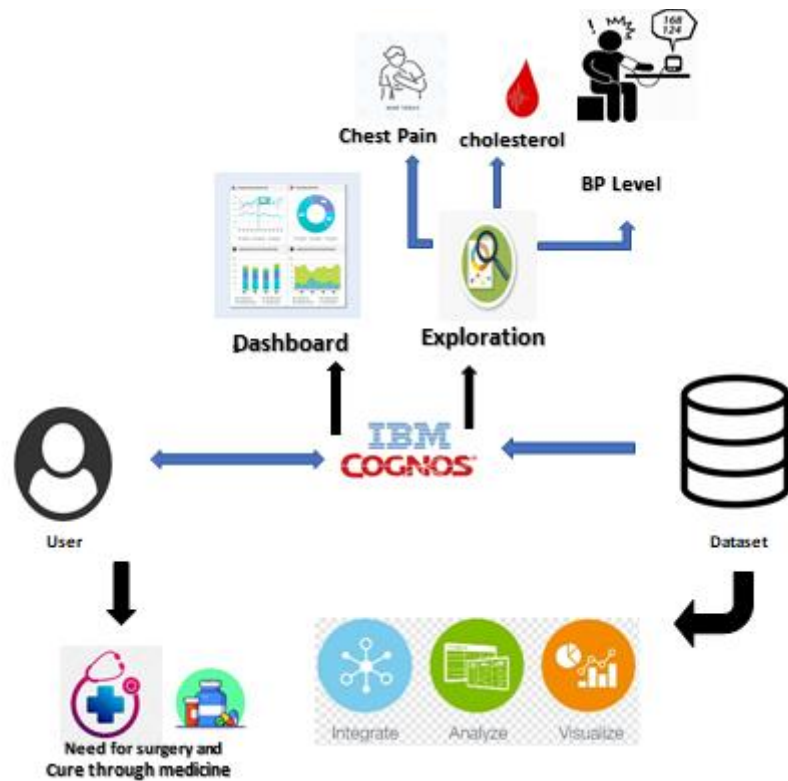
5. PROJECT DESIGN

5.1 Data Flow Diagram



5.2 SOLUTION & TECHNICAL ARCHITECTURE

Solution Architecture:



Technical Architecture:



5.3 User Stories

| 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 dashboard 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 dashboard. | I can receive confirmation email & click confirm | High | Sprint-1 |
| | Login | USN-3 | As a user, I can log into the dashboard by entering email & password. | I can register & access the dashboard | Low | Sprint-1 |
| | Dashboard | USN-4 | User can view his/her complete medical history. | I can view my medical history in the dashboard | Medium | Sprint-2 |
| | | USN-5 | As a user, they can predict the occurrence of heart disease. | I can view the accuracy of heart disease in dashboard | High | Sprint-2 |
| Customer Care Executive | Helpdesk | USN-6 | As a customer care executive, they can view the patient problems. | I can send my problems in the dashboard | High | Sprint-3 |
| | | USN-7 | As a customer care executive, they can cure the patient problems. | I can get help from the helpdesk | Medium | Sprint-3 |
| Administrator | User Profile | USN-8 | As an admin, they can add or delete the patient details. | I can access my dashboard | High | Sprint-4 |
| | | USN-9 | As an admin, they can update the health issues of the patient. | I can view my updated health details | High | Sprint-4 |
| | | USN-10 | As an admin, they can manage the patient details. | I can view my complete health details in dashboard | High | Sprint-4 |

6. PROJECT PLANNING & SCHEDULING

6.1 Sprint Planning & Estimation

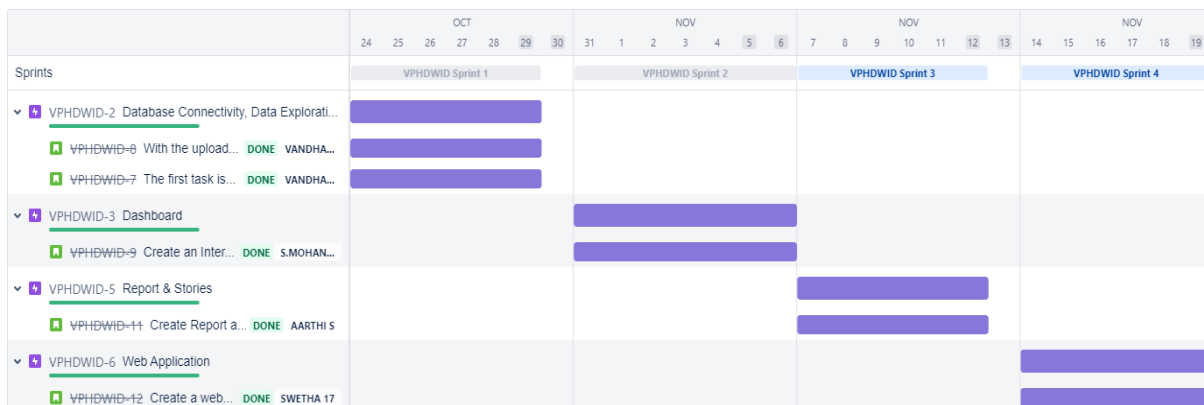
| Sprint | Functional Requirement (Epic) | User Story Number | User Story / Task | Story Points | Priority | Team Members |
|----------|---|-------------------|---|--------------|----------|---|
| Sprint-1 | Database Connectivity and Upload of dataset | USN-1 | The first task is to collect and fetch the dataset from the external API and connect with database using IBM Cognos and IBM Cloud, then upload the dataset. | 2 | High | V.VANDHANA S.AARTHI S.MOHANAPRIYA S.SWETHA |

| | | | | | | |
|----------|---------------------------------|-------|--|---|--------|---|
| Sprint-1 | Data Modules & Data Exploration | USN-2 | With the uploaded dataset we create a data module and perform data exploration by creating visualizations. | 1 | High | V.VANDHANA S.AARTHI S.MOHANAPRIYA S.SWETHA |
| Sprint-2 | Dashboard | USN-3 | Create an Interactive Dashboard after preparing the data exploration. | 2 | Low | V.VANDHANA S.AARTHI S.MOHANAPRIYA S.SWETHA |
| Sprint-3 | Report and Stories | USN-4 | Create Report and User stories based on the dashboard. | 2 | Medium | V.VANDHANA S.AARTHI S.MOHANAPRIYA S.SWETHA |
| Sprint-4 | Web Application UI | USN-5 | Create a web application for dashboard, report and user stories. | 1 | High | V.VANDHANA S.AARTHI S.MOHANAPRIYA S.SWETHA |

6.2 Sprint Delivery Schedule

| 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 | 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 |

6.3 Reports from JIRA



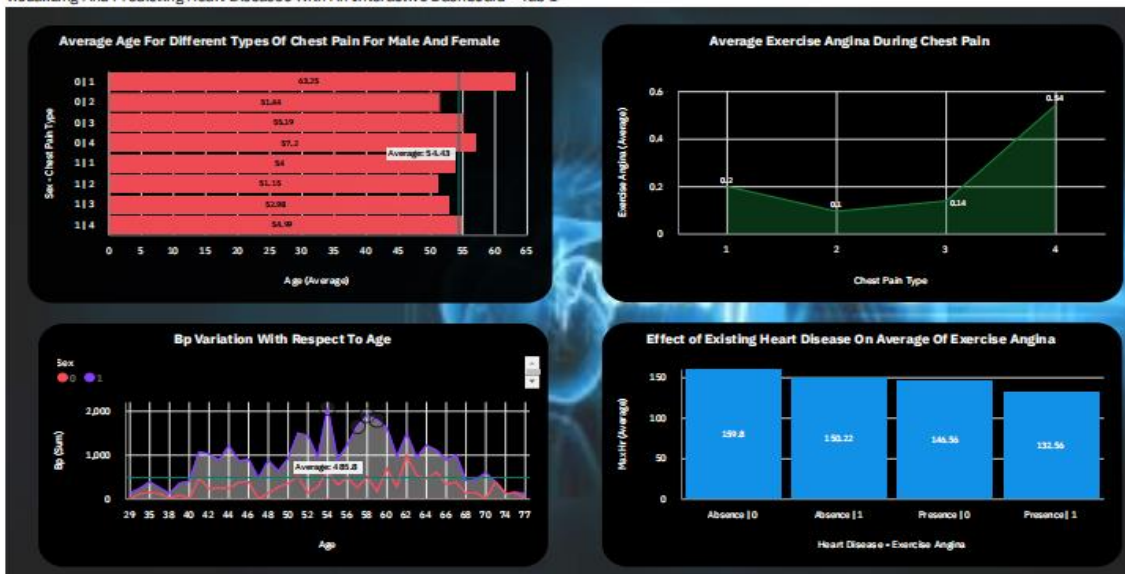
7. CODING & SOLUTIONING

7.1 Feature 1

Dashboard:

A dashboard for data analytics is a **tool used to multi-task, organize, visualize, analyze, and track data**. The overall purpose of a data analytics dashboard is to make it easier for data analysts, decision makers, and average users to understand their data, gain deeper insights, and make better data-driven decisions.

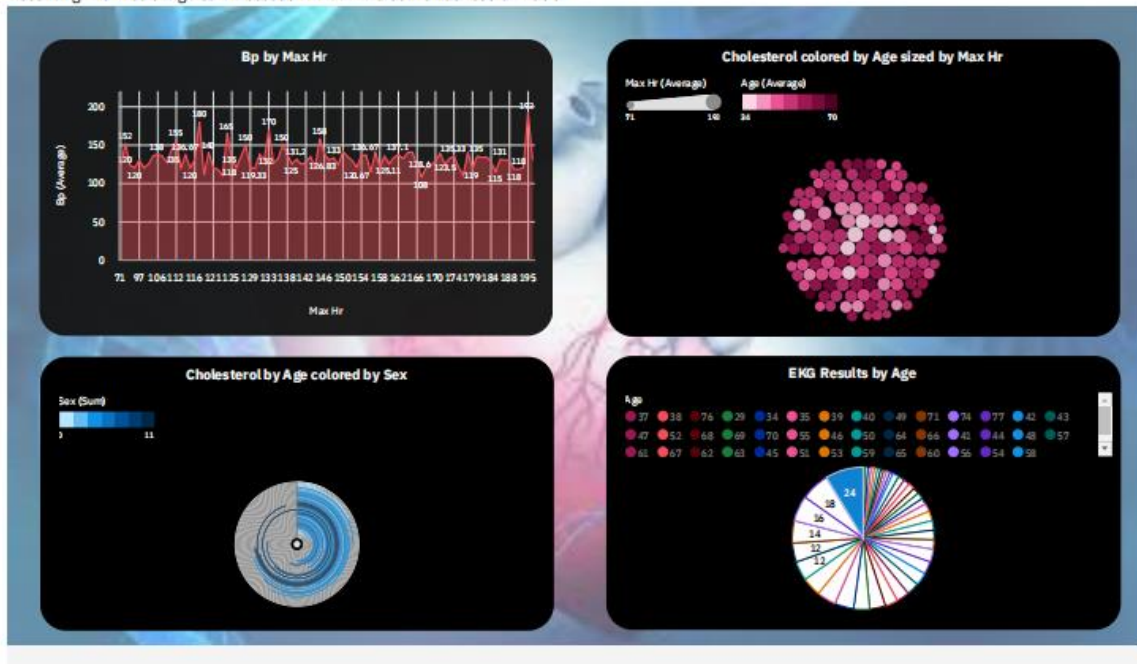
Visualizing And Predicting Heart Diseases With An Interactive Dashboard - Tab 1



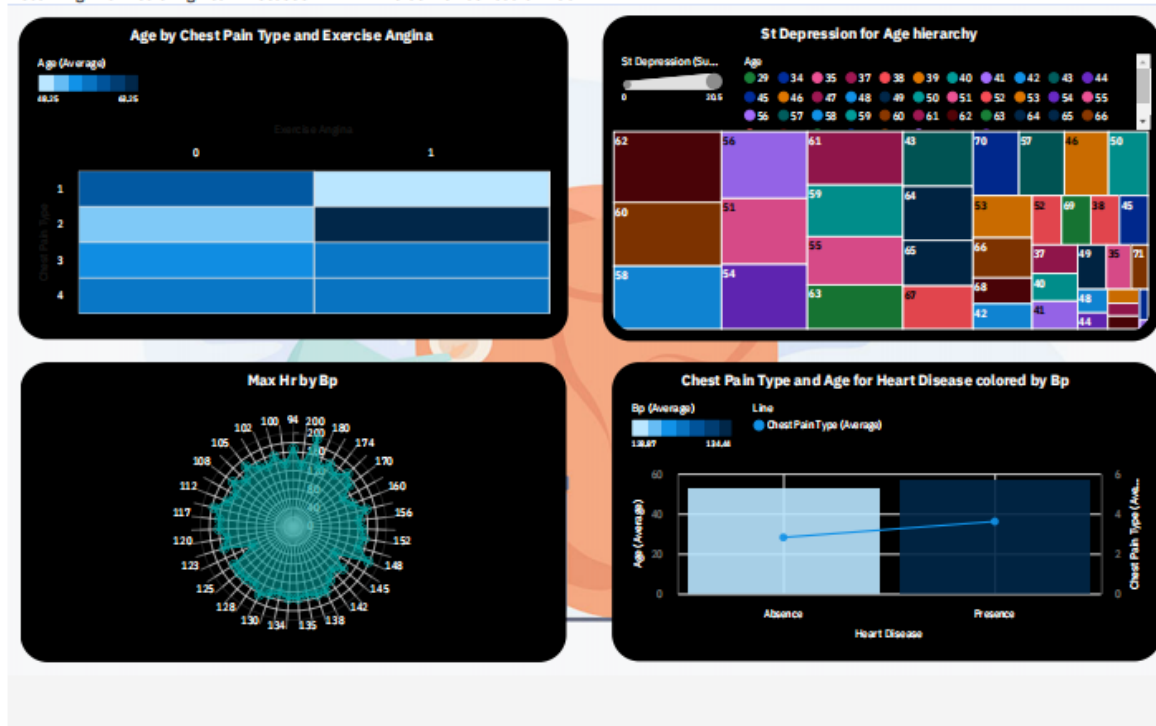
Visualizing And Predicting Heart Diseases With An Interactive Dashboard - Tab 2

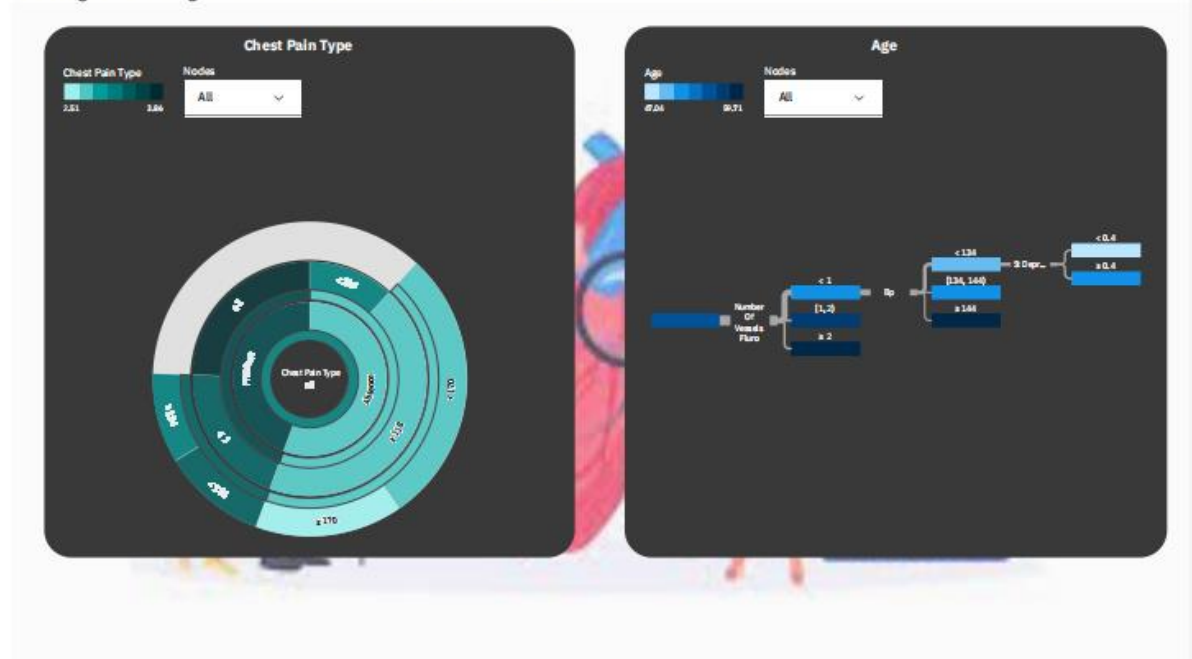


Visualizing And Predicting Heart Diseases With An Interactive Dashboard - Tab 3



Visualizing And Predicting Heart Diseases With An Interactive Dashboard - Tab 4





7.2 Feature 2

Working With Colab

```
import numpy as np
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
data=pd.read_csv("/content/Heart_Disease_Prediction.csv")
data
data.info
data.isnull().sum()
sns.countplot(x=data['Heart Disease'],hue='Sex',data=data)
sns.countplot(x=data['Heart Disease'],hue='Chest pain type',data=data)
sns.countplot(x=data['Sex'],hue='Chest pain type',data=data)
sns.barplot(x=data['Sex'],y=data['Cholesterol'],data=data)
sns.barplot(x=data['Sex'],y=data['BP'],data=data)
sns.barplot(x=data['Heart Disease'],y=data['Cholesterol'],data=data)
sns.barplot(x=data['Heart Disease'],y=data['BP'],data=data)
sns.lineplot(x=data['Age'],y=data['BP'],data=data)
sns.lineplot(x=data['Age'],y=data['Cholesterol'],data=data)
sns.lineplot(x=data['Age'],y=data['ST depression'],data=data)
sns.barplot(x=data['Heart Disease'],y=data['Exercise angina'],data=data)
sns.barplot(x=data['Heart Disease'],y=data['Number of vessels fluro'],data=data)
sns.barplot(x=data['Heart Disease'],y=data['Thallium'],data=data)
```

```
sns.barplot(x=data['Sex'],y=data['FBS over 120'],data=data)
```

```
sns.heatmap(data.corr())
```

```
from sklearn.preprocessing import LabelEncoder,StandardScaler  
le=LabelEncoder()  
data['Heart Disease']=le.fit_transform(data['Heart Disease'])
```

```
y=data['Heart Disease']  
x=data.drop(['Heart Disease'],axis=1)
```

```
from sklearn.model_selection import train_test_split  
x_train,x_test,y_train,y_test=train_test_split(x,y,random_state=0,test_size=0.2  
)
```

```
from sklearn.linear_model import LogisticRegression  
from sklearn.metrics import accuracy_score  
lr=LogisticRegression(max_iter=10000)  
lr.fit(x_train,y_train)  
pred_1=lr.predict(x_test)  
score_1=accuracy_score(y_test,pred_1)
```

```
score_1
```

```
from sklearn.ensemble import RandomForestClassifier  
rfc=RandomForestClassifier()  
rfc.fit(x_train,y_train)  
pred_2=rfc.predict(x_test)  
score_2=accuracy_score(y_test,pred_2)
```

```
score_2
```

```
from xgboost import XGBClassifier  
xgb=XGBClassifier()  
xgb.fit(x_train,y_train)  
pred_3=xgb.predict(x_test)  
score_3=accuracy_score(y_test,pred_3)
```

```
score_3
```

```

from sklearn.neighbors import KNeighborsClassifier
list_1=[]
for i in range(1,21):
    knn=KNeighborsClassifier(n_neighbors=1)
    knn.fit(x_train,y_train)
    preds=knn.predict(x_test)
    scores=accuracy_score(y_test,preds)
    list_1.append(scores)

max(list_1)

```

8. TESTING

8.1 Test Cases

```

x_train_prediction = model.predict(x_train)
training_data_accuracy = accuracy_score(x_train_prediction,y_train)

print("Accuracy of x train data:",training_data_accuracy)

Accuracy of x train data: 0.875

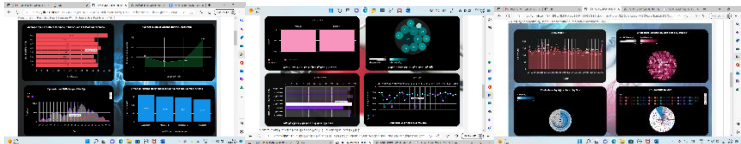
x_test_prediction = model.predict(x_test)
test_data_accuracy = accuracy_score(x_test_prediction,y_test)

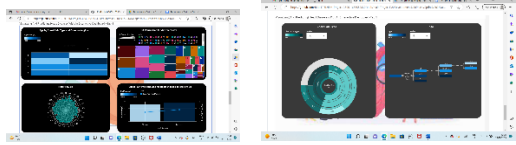

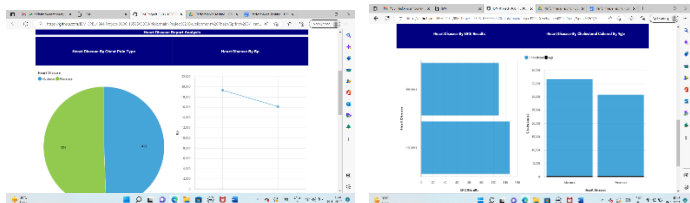
print(test_data_accuracy)

0.8333333333333334

```

8.2 Performance Testing

| S.No. | Parameter | Screenshot / Values |
|-------|------------------|--|
| 1. | Dashboard design | <p>No of Visulizations / Graphs – Eighteen Visulizations in Five Tabs</p>  |

| | | |
|----|---------------------------------------|--|
| | |  |
| 2. | Data Responsiveness | Data is Easily Identified, Change and Deletion of Data is Secured, Easily Identified and Adapted, Reliable and Scalable. |
| 3. | Amount Data to Rendered (DB2 Metrics) | All the data sets provided are rendered into visualization, graphs and dashboards. The dataset is trained and visualized using cognos and it connected with IBM Cloud. |
| 4. | Utilization of Data Filters | The datasets are examined and excluded, rearranged, data's are replaced easily, count of number data sets are recorded, dataset is evaluated. Visualizations are utilized in order to filter data. |
| 5. | Effective User Story | No of Scene Added – 2 Scene  |
| 6. | Descriptive Reports | No of Visualizations / Graphs – Visualizations=4/graphs=  |

9. RESULTS

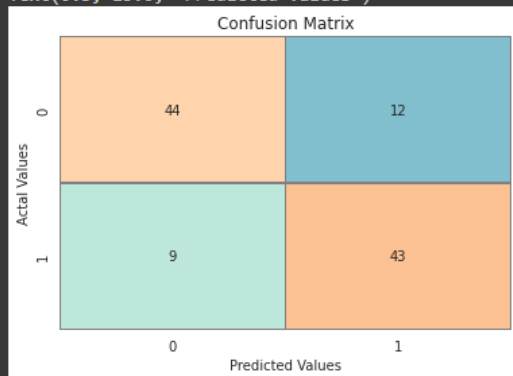
9.1 Performance Metrics

```
[23] cm = confusion_matrix(y_test,pred)
      print(classification_report(y_test,pred))
```

| | precision | recall | f1-score | support |
|--------------|-----------|--------|----------|---------|
| 0 | 0.83 | 0.79 | 0.81 | 56 |
| 1 | 0.78 | 0.83 | 0.80 | 52 |
| accuracy | | | 0.81 | 108 |
| macro avg | 0.81 | 0.81 | 0.81 | 108 |
| weighted avg | 0.81 | 0.81 | 0.81 | 108 |

```
[24] sns.heatmap(cm, annot = True, fmt = 'g', cbar = False, cmap = 'icefire', linewidths= 0.5, linecolor= 'grey')
plt.title('Confusion Matrix')
plt.ylabel('Actual Values')
plt.xlabel('Predicted Values')
```

```
Text(0.5, 15.0, 'Predicted Values')
```



```
print("Accuracy Score = {}".format(round(accuracy_score(y_test,pred),5)))
```

```
Accuracy Score = 0.80556
```

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
- Very useful in case of emergency.
- User Friendly
- Easy to understand
- Secure
- Dashboard provides insightful information

Disadvantages:

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

11. CONCLUSION

Heart diseases are a major killer in India and throughout the world, application of promising technology like dashboard in data analytics and 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

For the Future Scope more dashboard in data analytics and machine learning approach will be used for best analysis of the heart diseases and for earlier prediction of diseases so that the rate of the death cases can be minimized by the awareness about the diseases.

13. APPENDIX

Source Code:

Web Application:

Index.html

```
<html>
```

```
<head>
```

```
<title> HEART DISEASE PREDICTION </title>
```

```
<link rel="stylesheet" href="Style.css">
```

```
<style>
```

```
a:hover {
```

```
background-color: crimson;
```

```
}
```

</style>

</head>

<body>

<div class="menu-bar">

<li class="active">Home

Dashboard

Report

Story

</div>

<div class="content">

```
<h1>HEART DISEASE PREDICTION</h1>
```

```
<p>Let us have a look on Dashboard,Report and Story that is used for  
predicting the heart disease</p>
```

```
</div>
```

```
</body>
```

```
</html>
```

Style.css:

```
*{  
  
margin: 0;  
  
padding: 0;  
  
box-sizing: border-box;  
  
}  
  
body  
  
{  
  
background-image: url(Heart.jpg);  
  
background-size: cover;  
  
background-position: center;  
  
font-family: sans-serif;  
  
}  
  
.menu-bar  
  
{  
  
background: rgba(0,0,100);  
  
text-align: center;  
  
}
```



```
.menu-bar ul
```

```
{
```

```
display: inline-flex;
```

```
list-style: none;
```

```
color: #fff;
```

```
}
```

```
.menu-bar ul li
```

```
{
```

```
width: 200px;
```

```
margin: 15px;
```

```
padding: 20px;
```

```
}
```

```
.menu-bar ul li a
```

```
{
```

```
text-decoration: none;
```

```
color: #fff;
```

```
text-transform:uppercase;
```

```
font-family:Arial;
```

```
font-weight:bold;
```

```
}
```

```
.menu-bar ul li a: hover;
```

```
{
```

```
background-color: crimson;
```

```
}
```

```
.content
```

```
{
```

```
width:100%;
```

```
position:absolute;
```

```
top:50%;
```

```
transform:translateY(-50%);
```

```
text-align:center;
```

```
color:black;
```

```
border: 5px outset red;
```

```
background-color: lightblue;
```

```
text-align: center;
```

```
}
```

```
.content h1
```

```
{
```

```
font-size:7-px;
```

```
margin-top:80px;
```

```
}
```

```
.content p
```

```
{
```

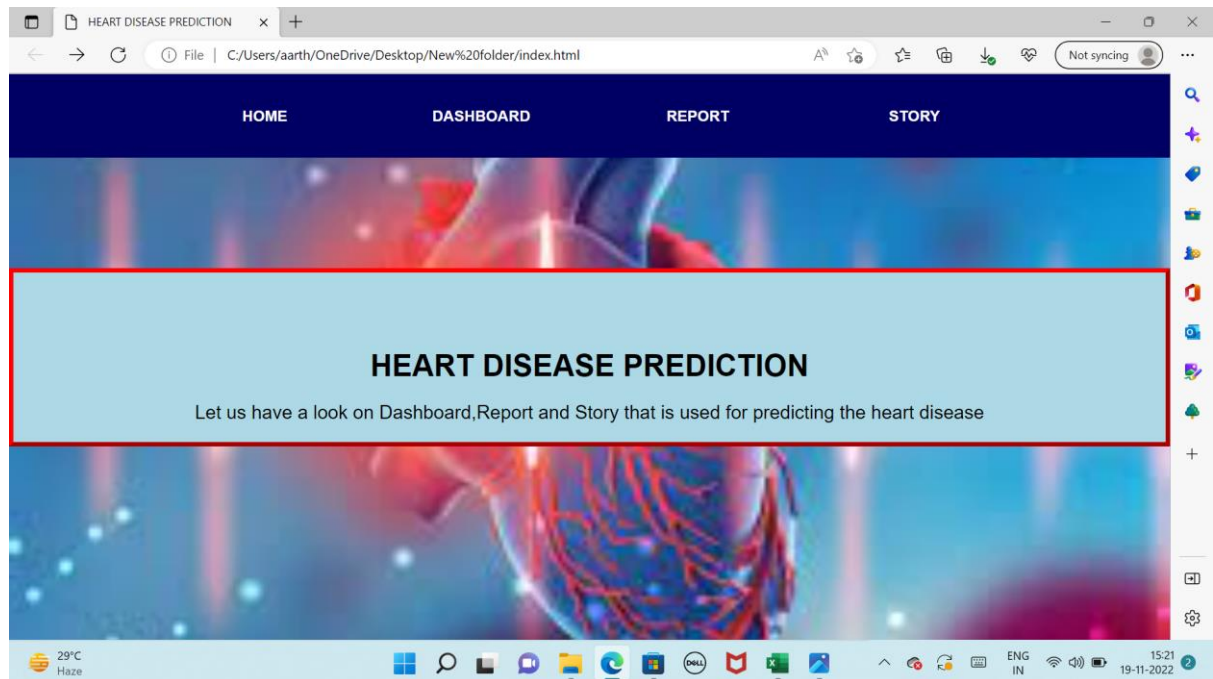
```
margin:20px auto;
```

```
font-weight:100;
```

```
line-weight:25px;
```

font-size:20px;

]



GitHub & Project Demo Link

GitHub Link: <https://github.com/IBM-EPBL/IBM-Project-3606-1658583330>

Demo Link:

https://drive.google.com/file/d/1KNWu411zrvLSpM54DJR1UGGb2juoJInP/view?usp=share_link