

Visualizing and Predicting Heart Diseases with an Interactive Dash Board

Team ID: PNT2022TMID27507

Team Members :

- | | |
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Introduction:

1.1 Project Overview :

Since heart diseases can be predicted based on various symptoms such as age, gender, pulse rate, etc. Data analysis in healthcare assists in predicting diseases, improving diagnosis, analyzing symptoms, providing appropriate medicines, improving the quality of care, minimizing cost, extending the lifespan and reduces the death rate of heart patients. This project is used to predict and visualize the heart diseases of the patient using the interactive dashboard. The data collected from the patients are used to analyze the patients health conditions. Based on the data collected, we will analyze the patients health conditions and come out with a report.

1.2 Purpose:

The purpose of this project is used to find the patients report on a period manner and it will avoid any mistake happen in the patient report. Using this dashboard, we will be able to analyze the patients health condition in a period manner and it will help to know about the patients details in a periodic manner.

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 analyzing data that excludes inferences and statistical modeling. 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 analyzing data.

2.2 References :

Heart Disease Prediction using Exploratory Data Analysis R. Indrakumari, T.Poongodi, Soumya Ranjan Jena : In this paper, the risk factors that causes heart disease is considered and predicted using K-means algorithm and the analysis is carried out using a publicly available data for heart disease. The dataset holds 209 records with 8 attributes such as age, chest pain type, blood pressure, blood glucose level, ECG in rest, heart rate and four types of chest pain. To predict the heart disease, K-means clustering algorithm is used along with data analytics and visualization tool. The paper discusses the pre-processing methods, classifier performances and evaluation metrics. In the result section, the visualized data shows that the prediction is accurate.

Prediction of heart disease at early stage using data mining and big data analytics: A survey N. K. Salma Banu, Suma Swamy : Several studies have been carried out for developing prediction model using individual technique and also by combining two or more techniques. This paper provides a quick and easy review and understanding of available prediction models using data mining from 2004 to 2016. The comparison shows the accuracy level of each model given by different researchers. A few investigations have been completed for creating expectation model utilizing individual procedure and furthermore by joining at least two strategies. This paper gives a speedy and simple survey and comprehension of accessible forecast models utilizing information mining from 2004 to 2016. The correlation shows the precision level of each model given by various analysts.

2.3 Problem Statement Definition:

Who does the problem affect?

People with unhealthy lifestyles, stress, depression, age above 40 and when their ancestors got heart disease (since heart disease is hereditary).

When does the issue occur?

The issue occurs for people with unhealthy lifestyles and age above 40.

Where is the issue occurring?

The issue is originating from an unhealthy lifestyle. It mostly occurs in the blood valves of the heart.

What would happen if we didn't solve the problem?

If we don't solve the problem, many people will die at a young age. The death rate due to heart disease will increase rapidly.

Why is it important to fix the problem?

We should predict the problem before giving treatment to the patients. As the problem is predicted early, we can solve it easily and early.

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

[Share template feedback](#)

➔

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 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.



Key rules of brainstorming

To run an smooth and productive session

🗣️ Stay in topic.

💡 Encourage wild ideas.

⏸️ Defer judgment.

👂 Listen to others.

🗨️ Go for volume.

👁️ If possible, be visual.



Need some inspiration?
See a finished version of this template to kickstart your work.

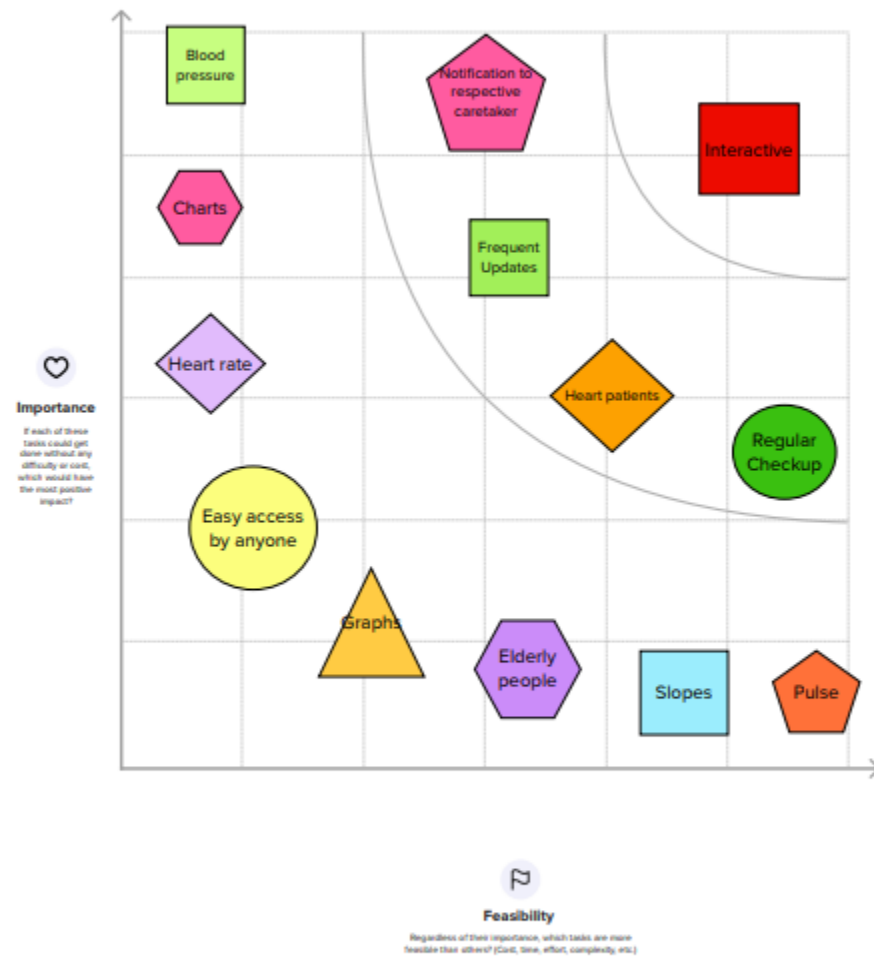
[Open example](#) ➔

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

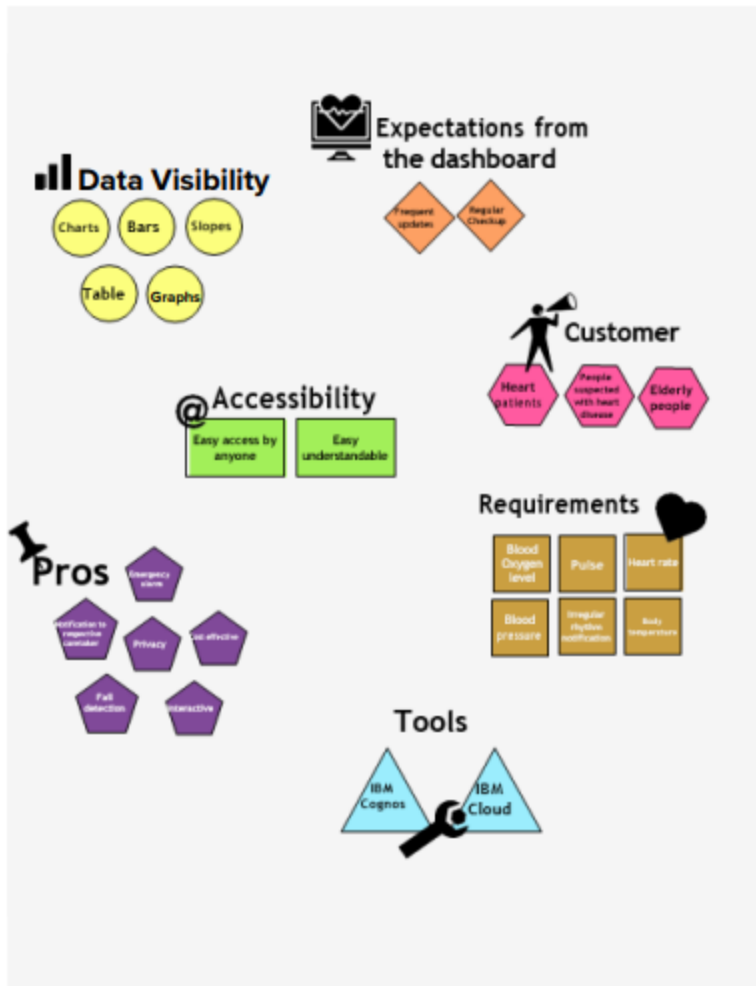


3

Group ideas

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

🕒 20 minutes





After you collaborate

You can export the mural as an image or pdf to share with members of your company who might find it helpful.

Quick add-ons



Share the mural

Share a view link to the mural with stakeholders to keep them in the loop about the outcomes of the session.



Export the mural

Export a copy of the mural as a PNG or PDF to attach to emails, include in slides, or save in your drive.

Keep moving forward



Strategy blueprint

Define the components of a new idea or strategy.

[Open the template →](#)



Customer experience journey map

Understand customer needs, motivations, and obstacles for an experience.

[Open the template →](#)



Strengths, weaknesses, opportunities & threats

Identify strengths, weaknesses, opportunities, and threats (SWOT) to develop a plan.

[Open the template →](#)



[Share template feedback](#)

3.3 Proposed Solution

Project team shall fill the following information in proposed solution template.

S.No.	Parameter	Description
1	Problem Statement (Problem to be solved)	➤ To develop an interactive dashboard to predict the heart disease accurately with few 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 to provide prior treatment to the patients and reduce the fatality rate.
4	Social Impact / Customer Satisfaction	➤ Saving lives, User friendly interactive dashboard. ➤ Reduces the exorbitant medical cost of the patients. ➤ Reduces the biases and mistakes caused by the decisions of doctors based on their intuitions and experiences.
5	Business Model (Revenue Model)	➤ Data security. ➤ Easy to use. ➤ Constant updates according to necessity.
6	Scalability of the Solution	➤ Can be used in any platform (Windows, mac, etc.,) ➤ Adding new feature doesn't affect the performance of the system. ➤ Scalable dataset.

3.4 Problem Solution Fit

Define CS, fit into CC	1. CUSTOMER SEGMENT(S) CS <ul style="list-style-type: none"> Hospitals Clinics WHO Any medical related agencies those prepare medicines or any kind of solutions inferring over the data of diseases. 	6. CUSTOMER CONSTRAINTS CC <p>The unawareness over the AI/ML technologies, collaborative dashboards, network connection, lack of data.</p>	5. AVAILABLE SOLUTIONS AS <p>The customers can prefer over a manual data visualization and prediction, which is very tedious job and requires the knowledge over the technologies of AI/ML.</p> <p>Hard mathematical formulae were created and the results were being calculated manually.</p>	Explore AS, differentiate

Focus on J&P, fit into BE, understand RC	2. JOBS-TO-BE-DONE / PROBLEMS J&P <p>Quality of Data: The quality of data should be accurate and reliable. Obviously, the outcome will solely depend on the data we put into the prediction. If the data is skewed, then the prediction which is dependent on it, will be skewed as well.</p>	9. PROBLEM ROOT CAUSE RC <ul style="list-style-type: none"> Difficulty of predicting a heart disease. Will not have a proper idea of relation between similar heart diseases. There is a chance of identifying every heart diseases as same. Reason of increase in heart disease will not be rootly identified. 	7. BEHAVIOUR BE <ul style="list-style-type: none"> Generation of legitimate and reliable datasets. Customers need to collect more number of datasets in order to obtain more accurate result. Must obtain knowledge of difference between datasets that is used for comparison. 	Focus on AS, fit into BE, understand RC

Identify strong TR & EM	3. TRIGGERS TR <ul style="list-style-type: none"> Insufficient ways of handling huge amounts of datasets and inferring the root cause of the heart disease cannot be found out. Similarity of heart disease has not been identifiable. 	10. YOUR SOLUTION SL <p>With the notable technology of AI/ML we are able to visualize and predict heart diseases and related diseases, by the ultimate power Cognos Analytics Tool we will be able to properly create a dashboard for the customers to work with and visualize and analyze the heart disease on their work with limited knowledge.</p>	8. CHANNELS of BEHAVIOR CH <p>8.1 ONLINE Visualizing the datasets. Exploration of data.</p> <p>8.2 OFFLINE Cleansing of datasets. Collection and noting the datasets.</p>	Identify strong TR & EM
	4. EMOTIONS: BEFORE / AFTER EM <p>Before -> It creates a huge ambiguity in knowing the proper or accurate reasons for a heart disease.</p> <p>After -> There is a large chance understanding of the heart disease and root cause of it, which makes a better solution and finding a preventive way over it.</p>			

4.1 Functional & Non-functional requirement :

Following are the functional requirements of the proposed solution.

- It includes registration confirmation conducting, result prediction through various forms through gmail linkedin, OTP.

Following are the non functional requirements of the proposed solution.

- It includes analysing various parameters such as usability, security, reliability, performance, availability, scalability of the project.

Project Design Phase-II Solution Requirements (Functional & Non-functional)

Date	03 October 2022
Team ID	PNT2022TMIDxxxxxx
Project Name	Project - xxx
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through Form Registration through Gmail Registration through LinkedIn
FR-2	User Confirmation	Confirmation via Email Confirmation via OTP
FR-3	USER CONSULTATION	Consultation via online
FR-4	USER RESULT	Result via online
FR-5	USER MEDICATION	Medication via online
FR-6	USER FOLLOW UP	Follow via online

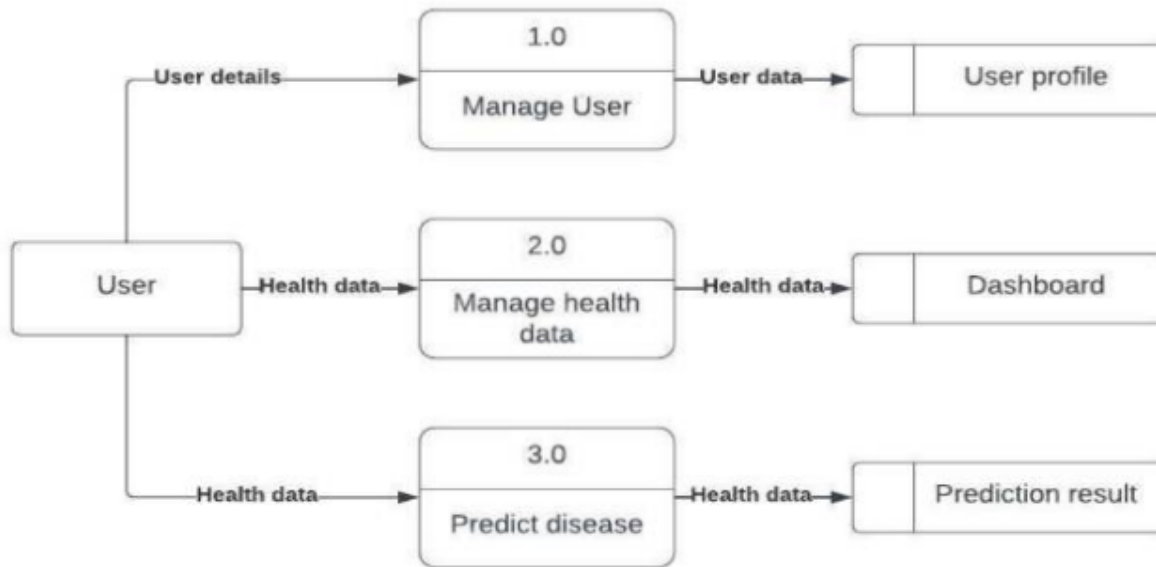
Non-functional Requirements:

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

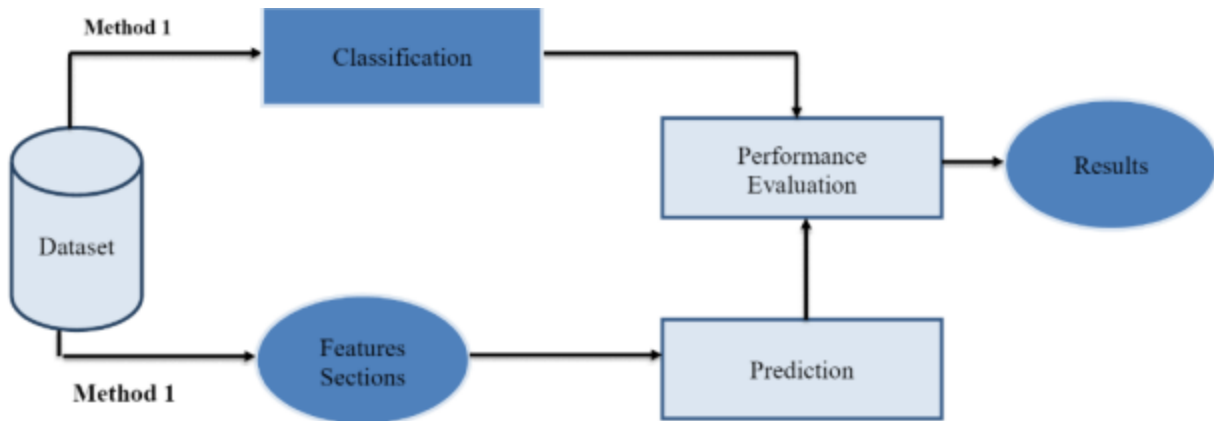
FR No.	Non-Functional Requirement	Description
NFR-1	Usability	The usability of the non requirement is feasible
NFR-2	Security	File is highly secured and cannot be misused
NFR-3	Reliability	It is highly reliable
NFR-4	Performance	It is accurate...and gives exact value
NFR-5	Availability	It is anytime accessible
NFR-6	Scalability	Through the given features this application can be taken into international business level

5. Project Design

5.1 Data Flow Diagram

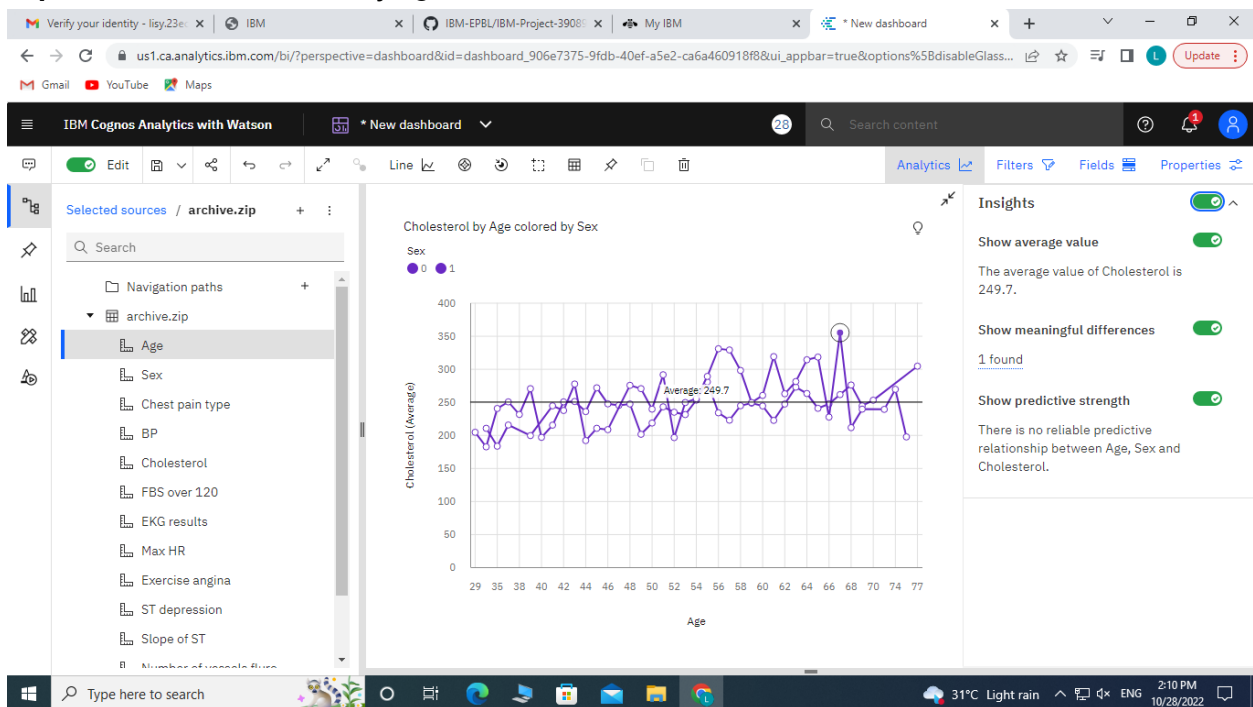


5.2 Solution and Technical Architecture

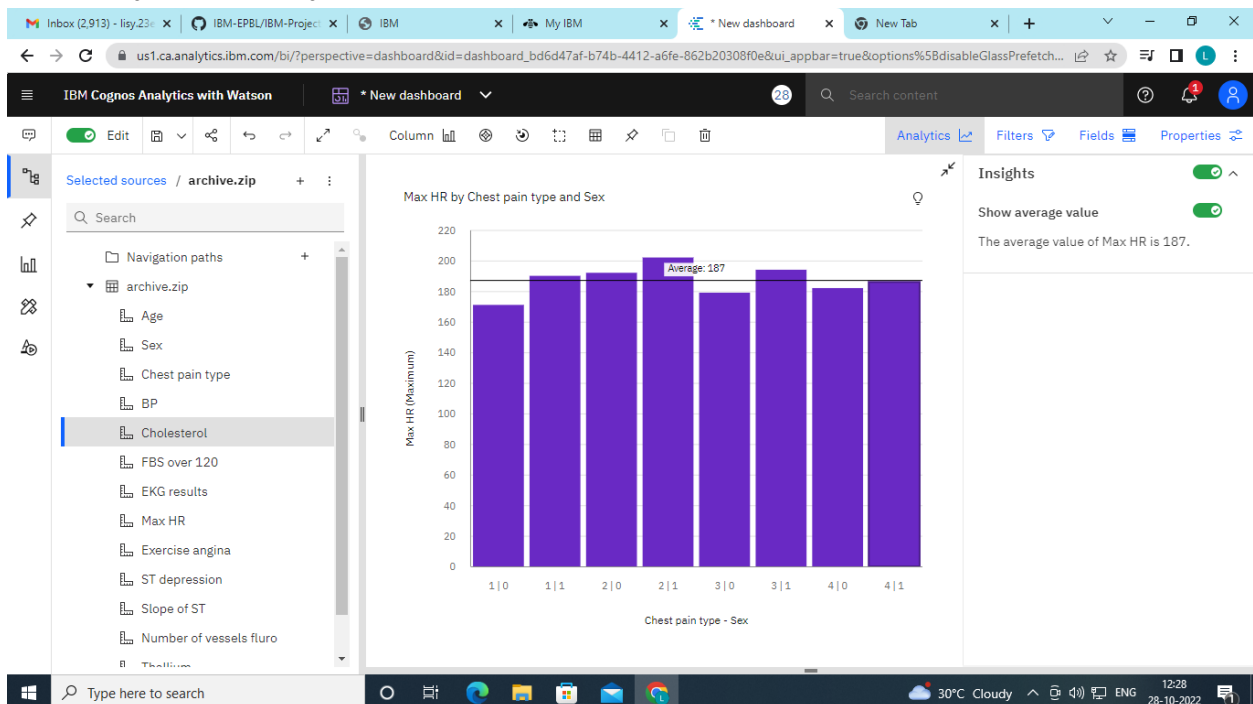


6. Dashboard :

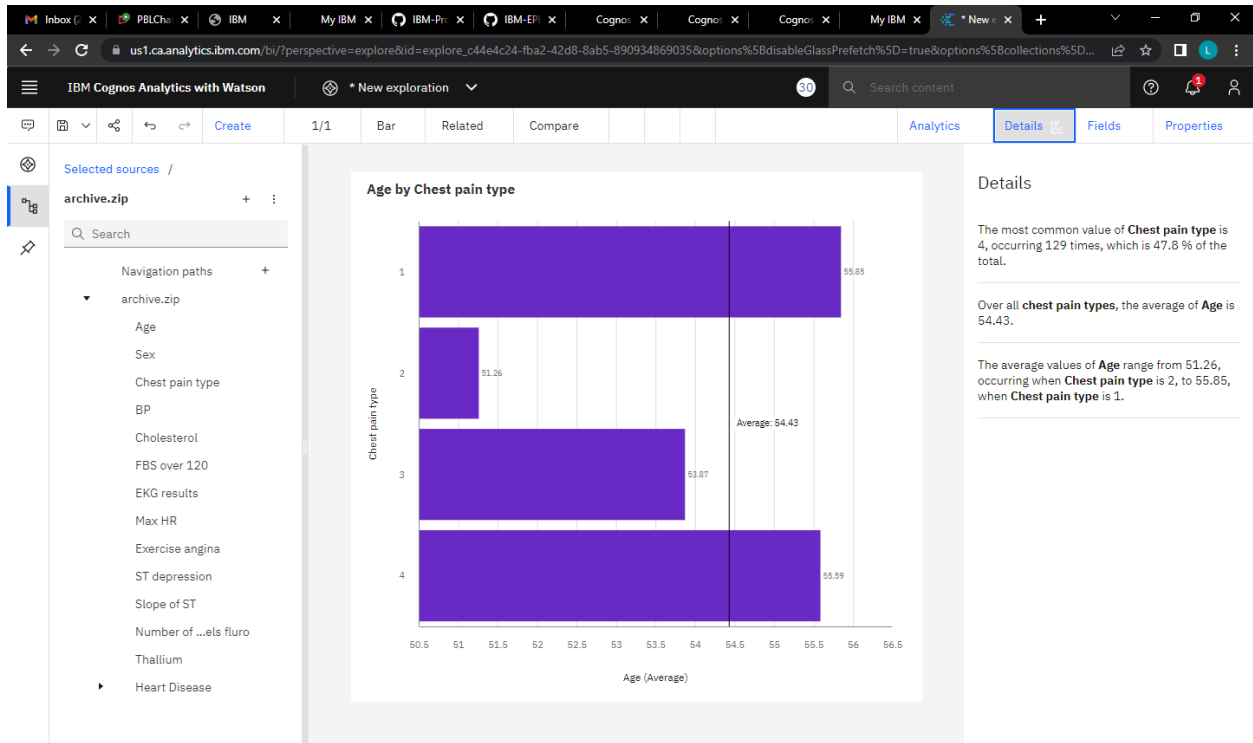
Exploration Of Cholesterol by age and Gender:



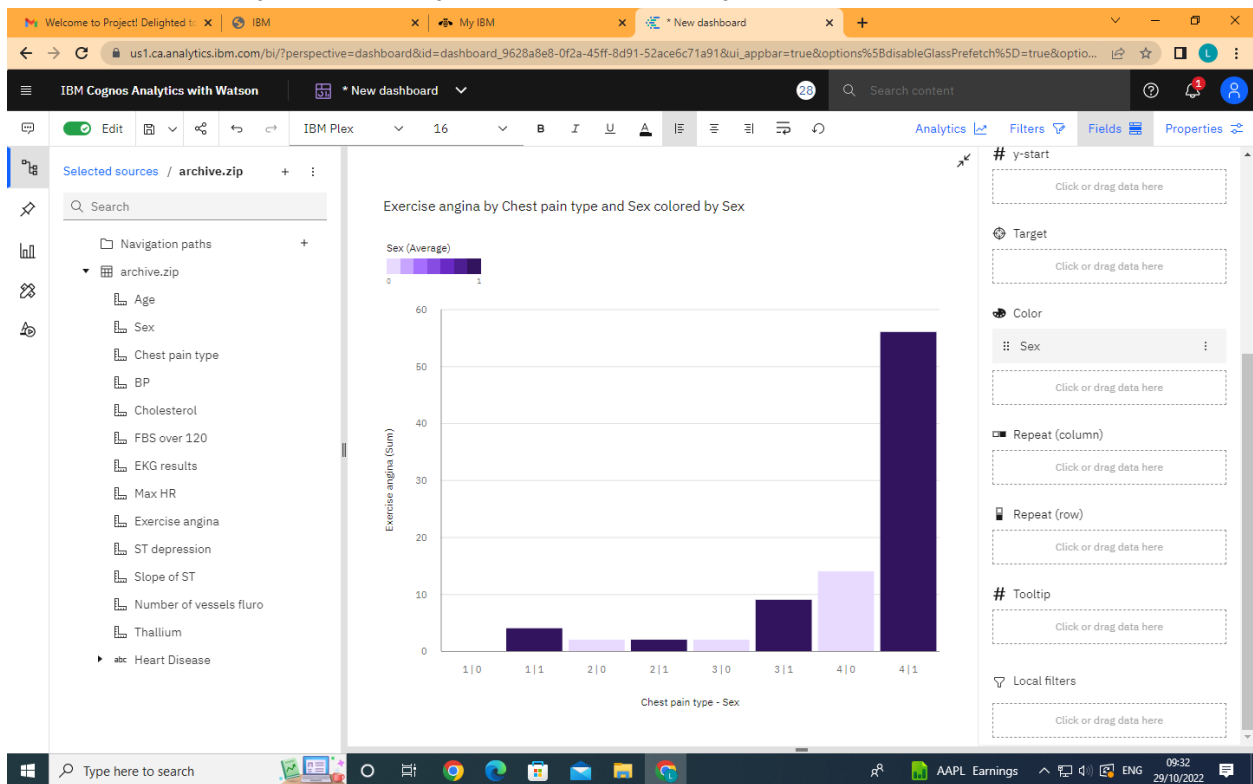
Max HR by chest pain type and sex:



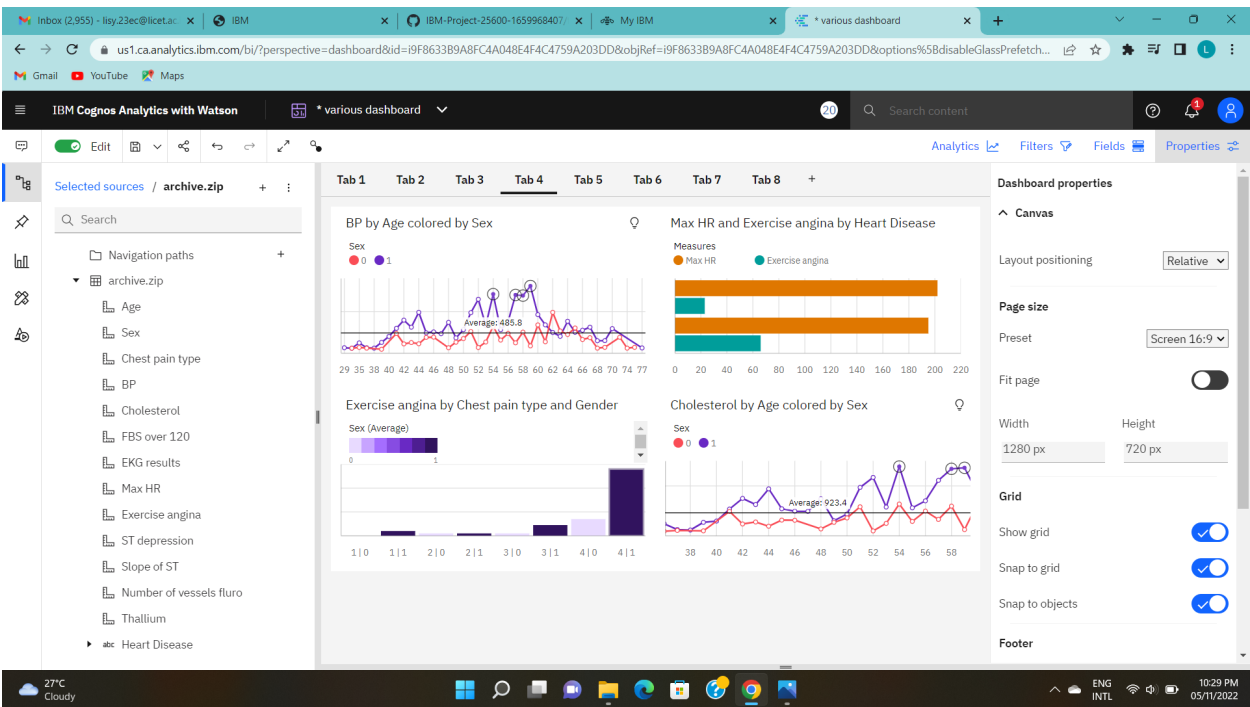
Age by chest pain type:



Exercise Angina by Chest pain type and sex colored by sex



Dashboard Showing Different Types Of Visuals:



6. Project Planning and Scheduling
6.1 Script Planning and Execution

Table with 6 columns: Sprint, Functional Requirement (Epic), User number story, User Story / Task, Story Points, and Priority. It contains 3 rows of project planning data.

Sprint-1	Login	4	As a user, I can log into the application by entering email & password	6	high
Sprint-2	Dashboard	5	Attractive dashboard For the Application	3	medium
Sprint-2	Profile	6	Profile - view & update your profile	5	low
Sprint-2	Analyse	7	Home - Analyze your Heart problem	2	high
Sprint-3	Support	8	Get feedback from users	10	medium
Sprint-3	Respond	9	Responds to user queries via telephone,email etc.	3	medium
Sprint-3	Respond	10	The team must respond immediately to the queries based on the priority	5	high
Sprint-4	System Requirements	11	Hardware Requirement Laptop or PC <ul style="list-style-type: none"> • i5 processor system or higher • 4 GB RAM or higher • 128 GB ROM or higher Mobile <ul style="list-style-type: none"> • (12.0 and above) 	5	medium

The screenshot shows a Windows 10 desktop. In the foreground, a web browser displays the 'Men Heart Risk Calculator'. The calculator has several input fields: 'Age' (42), 'Systolic blood pressure' (110), 'Total cholesterol' (190), 'HDL cholesterol' (50), and 'On blood pressure medication' (No). The 'Calculate' button is highlighted in red. Below the inputs, the results show a risk score of 1.93303 and a recommendation to 'On blood pressure medication'.

In the background, the Visual Studio Code editor is open, displaying the HTML code for the calculator. The code is a single-page application using Bootstrap 4. It includes form fields for Age, Systolic blood pressure, Total cholesterol, HDL cholesterol, and On blood pressure medication. The code uses JavaScript to calculate the risk score and update the recommendation.


```

17
18         <li><button class='loginbtn' onclick='document.getElementById('login-form').style.display='block' style='width:auto;'>Login<
19         <li><button class='loginbtn' onclick='document.getElementById('register-form').style.display='block' style='width:auto;'>Regi
20     </ul>
21 </nav>
22 </div>
23 <div class='sub-page'>
24     <div class='overlay'></div>
25     <div class='text' >
26         <h4><p> A healthy heart <br> will give you the courage to face and overcome <br>any challenge in life <br>'Start From The Healthy
27     </div>
28 </div>
29 <div id='login-form' class='login-page'>
30     <div class='form-box'>
31         <span onclick='document.getElementById('login-form').style.display='none' class='close'>&times;</span>
32         <div class='form'>
33             <form class='login-form', action='validate.php', method='post'>
34                 <center><h1 class='main-heading'>Login Form</h1></center>
35                 <input type='text' name='emailid' placeholder='Email ID', required/>
36                 <input type='password' name='password' placeholder='password', required/>
37                 <button>LOGIN</button>
38             </form>
39         </div>
40     </div>
41 </div>
42 <div id='register-form' class='register-page'>
43     <div class='form-box1'>
44         <span onclick='document.getElementById('register-form').style.display='none' class='close'>&times;</span>
45         <div class='form1'>
46             <form class='register-form', action='registration.php', method='post'>
47                 <center><h1 class='main-heading'>Register Form</h1></center>
48                 <input type='text' name='user' placeholder='user name' required/>

```

The image shows a Windows 10 desktop environment. In the foreground, a Visual Studio Code editor window is open, displaying a PHP file named 'Register.php'. The code is a registration script that connects to a MySQL database, checks for existing users by email, and either registers a new user or displays an error message. The code is as follows:

```
1  <code>?php
2  session_start();
3
4  $connection=mysqli_connect('localhost','root','');
5  //<code>$connection=mysqli_connect('localhost','root','write your password here')
6
7  mysqli_select_db($connection,'loginandregistrationform');
8
9  $name=$_POST['user'];
10 $email=$_POST['emailid'];
11 $password=$_POST['password'];
12
13 $select="select * from register_table where email_id='$email'";
14 $result=mysqli_query($connection,$select);
15 $num=mysqli_num_rows($result);
16 if($num==1)
17 {
18     header('location:usernotfound.html');
19 }
20 else
21 {
22     header('location:loginandregister.php');
23     $reg="insert into register_table(name,email_id,password) values('$name','$email','$password')";
24     mysqli_query($connection,$reg);
25 }
26 ?>
```

The desktop background is a Windows 10 lock screen with a sunset scene. The taskbar at the bottom shows various application icons and the system clock indicating 17-11-2022 at 15:55.

8.Result :

Calculator: Cardiovascular risk a | x | localhost - Search | x | user already exist.html | x | user not found.html | x | Calculator: Cardiovascular risk a | x | + | - | x

File | C:/Users/E11-07/Downloads/sprint/Men%20Heart%20Risk%20Calculator.html

Input

Age 70 yr

Systolic blood pressure 150 mmHg

Total cholesterol 60 mg/dL

HDL cholesterol 45 mg/dL

On blood pressure medication No (1.93303)

Cigarette smoker No (0)

Diabetes present No (0)

Results

Risk %

Reset form

Type here to search

Calculator: Cardiovascular risk a | x | localhost - Search | x | user already exist.html | x | user not found.html | x | Calculator: Cardiovascular risk a | x | + | - | x

File | C:/Users/E11-07/Downloads/sprint/Men%20Heart%20Risk%20Calculator.html

Input

Age 70 yr

Systolic blood pressure 150 mmHg

Total cholesterol 60 mg/dL

HDL cholesterol 45 mg/dL

On blood pressure medication No (1.93303)

Cigarette smoker No (0)

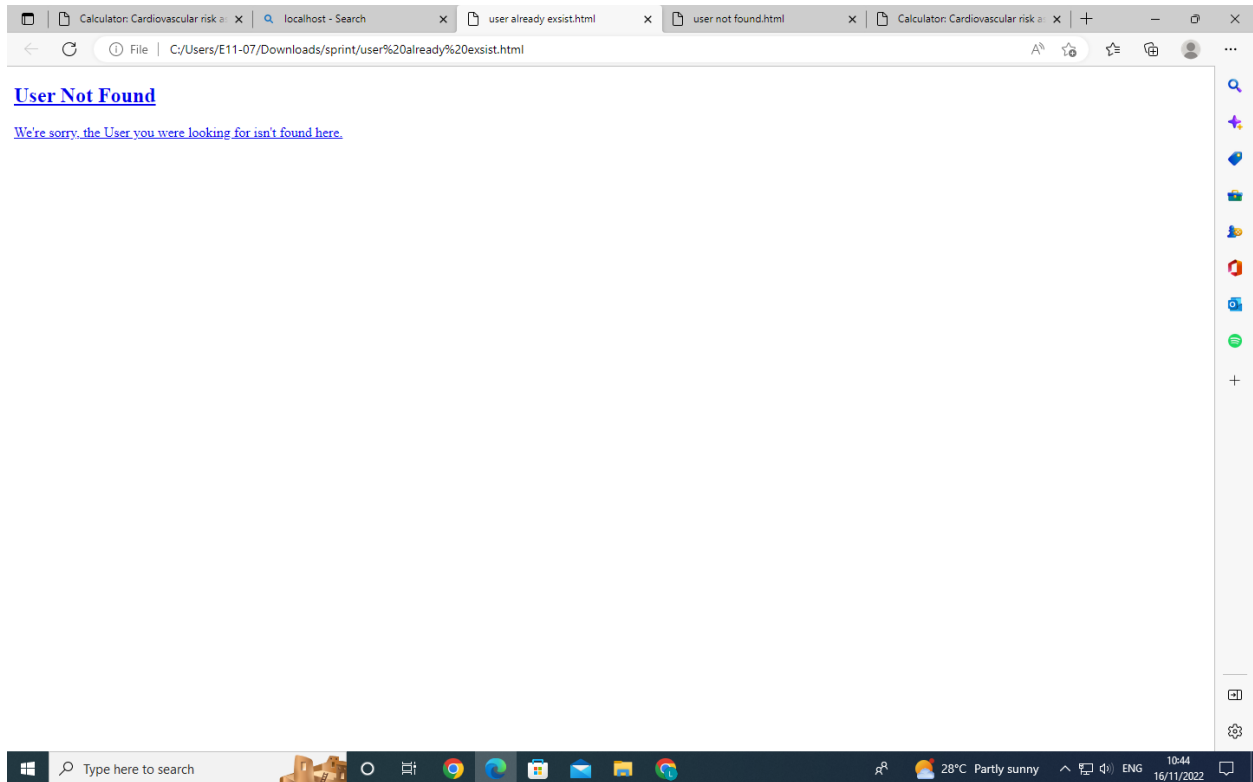
Diabetes present No (0)

Results

Risk %

Reset form

28°C Partly sunny 10:33 16/11/2022



9. 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

10. Conclusion

Complications of heart disease include heart attack and stroke. You can reduce the risk of complications with early diagnosis and treatment. So the suggestion that we get from the website might help save patients. It is always to get treated in the early stages of heart disease.

11. 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.

12. Appendix :

Source Code :

<https://github.com/IBM-EPBL/IBM-Project-39089-1660394016/tree/main>