VISUALIZING AND PREDICTING HEART DISEASES WITH AN INTERACTIVE DASHBOARD

TEAM ID : PNT2022TMID50911

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CHAPTER 1

INTRODUCTION:

Heart disease describes a range of conditions that affect your heart. Diseases under the heart disease umbrella include blood vessel diseases, such as coronary artery disease, heart rhythm problems and heart defects you're born with (congenital heart defects), among others.The term "heart disease" is often used interchangeably with the term "cardiovascular disease". Cardiovascular disease generally refers to conditions thatinvolve narrowed or blocked blood vessels that can lead to a heart attack, chest pain(angina) or stroke. Other heart conditions, such as those that affect your heart's muscle, valves or rhythm, also are considered forms of heart disease.

1.1Project Overview :

Heart disease is one of the leading cause of death in this world. With unhealthy attitude of people, the number of cases is increasing more and more. Using a set of attributesidentify the patients who are more prone to have a heart disease will make the lives of doctors easier.

1.2Purpose :

One of the leading causes of morbidity and mortality among the global population is heart disease. One of the most crucial topics in the clinical data analysis subsection is the prediction of cardiovascular disease. The volume of information in the healthcare sector is enormous. The vast amount of unprocessed healthcare data is transformed via data mining into knowledge that may be used to make forecasts and educated judgments. The main cause of death for both men and women is heart disease. This makes heart disease a serious issue that has to be addressed. However, because of numerous contributing risk factors, including diabetes, high blood pressure, high cholesterol, an irregular pulse rate, and many other factors, it can be challenging to diagnose heart disease.Due to such constraints, scientists have turned towards modern approaches like Data Mining and Machine Learning for predicting the disease.

CHAPTER 2

LITERATURE SURVEY

2.1 Existing problem :

1. Predicting the Risk of Heart Failure With EHR Sequential Data Modeling

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 used one-hot encryption 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.

2.Disease Prediction using Evolutionary Rule Learning

Aakash Chauhan et al. (2018) presented "Heart Disease Prediction using Evolutionary Rule Learning". This study eliminates the manual task that additionally helps in extracting the information (data) directly from the electronic records. To generate strong association rules, we have applied frequent pattern growth association mining on patient's dataset. This will facilitate (help) in decreasing the amount of services and shown that overwhelming majority of the rules helps within the best prediction of coronary sickness.

3.n Intelligent Learning System based on Random Search Algorithm and Optimized Random Forest Model for Improved Heart Disease Detection Ashir Javeed, Shijie Zhou et al. (2017) designed "An Intelligent Learning System based on Random Search Algorithm and Optimized Random Forest Model for Improved Heart Disease Detection". This paper uses random search algorithm (RSA) for factor selection and random forest model for diagnosing the cardiovascular disease. This model is principally optimized for using grid search algorithmic program

2.2References :

1. Jin, Bo, et al. "Predicting the risk of heart failure with EHR sequential data modeling." *Ieee Access* 6 (2018): 9256-9261.
2. Chauhan, Aakash, et al. "Heart disease prediction using evolutionary rule learning." *2018 4th International conference on computational intelligence & communication technology (CICT)*. IEEE, 2018.
3. Javeed, Ashir, et al. "An intelligent learning system based on random search algorithm and optimized random forest model for improved heart disease detection." *IEEE Access* 7 (2019): 180235-180243

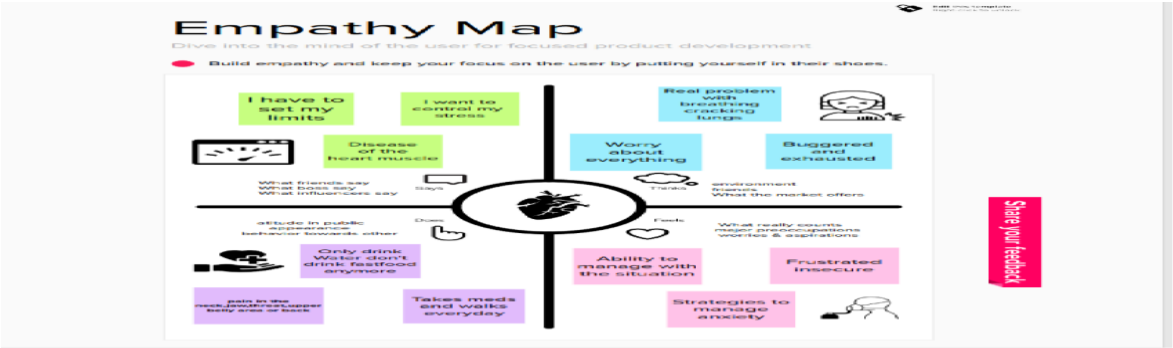
2.3Problem Statement Definition :

Who does the problem affect?	Most persons with coronary heart disease who pass away are 60 years of age or older. Although both sexes can get heart attacks inold age, women have a higher mortality rate.
What are the boundaries of the problem?	Risk for heart disease can be increased by a number of medical issues, lifestyle, age, and family history.
What's the issue?	When a person is affected by heart disease, it causes side effects. Chest pain, chest tightness, chest pressure and chest discomfort Breathing difficulties, Neck, jaw, throat, upper abdomen, or back pain.
When the issue occur?	Heart disease - and the conditions that lead to it - can happen at any age. High rates of obesity and high blood pressure among younger people (ages 35–64) are putting them at risk for heart disease earlier in life.

CHAPTER 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 be solved)	To develop an interactive dashboard and to predict the possibility of heart disease
2.	Idea / Solution description	Using Cognos Analytics, a dashboard is created with shows how each attribute like sex, age is related to the possibility of heart disease and a machine learning model that accurately predicts the possibility of heart disease.
3.	Novelty / Uniqueness	Use of Cognos Analytics to find relation between attributes and visualizing it in dashboard
4.	Social Impact / Customer Satisfaction	User friendly website Can check for possibility of heart disease themselves.
5.	Business Model (Revenue Model)	Confidentiality Accurate Results
6.	Scalability of the Solution	Supports increase in throughput Supports multiple platforms

3.4 Problem Solution fit :

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 Functional requirement :

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	The website has a home page Which lists the options	Two options- predict , dashboard
FR-2	A "predict" page	Predicts whether the person has heart disease or not
FR-3	A "dashboard" option	Shows the data entered in the form of charts

4.2 Non-Functional requirements :

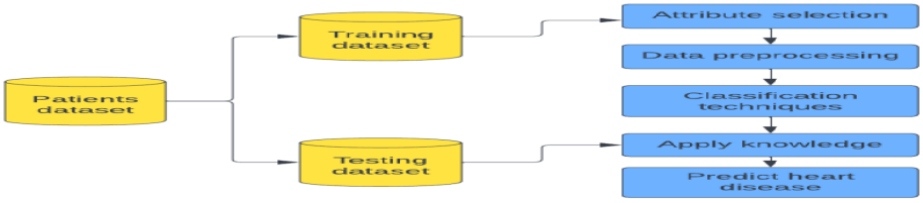
FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The website will utilise the user interface for navigation purposes
NFR-2	**Security**	The website will be protected against SQL injection, DDoS attacks.
NFR-3	**Reliability**	The model will give exact results most of the time
NFR-4	**Performance**	An optimized website which includes smooth experience for the user.
NFR-5	**Availability**	The tool will be available to use for the users.
NFR-6	**Scalability**	The system will be able to support n no of users at the same time with good speed.

CHAPTER 5

PROJECT DESIGN

5.1 Data Flow Diagrams :

5.2 Solution & Technical Architecture :



5.3 User Stories :

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer	Homepage	USN-1	As a user, I can go to homepage	I can access predictor or dashboard	Low	Sprint-1
		USN-2	As a user, I can click on dashboard	I will see dashboard	Medium	Sprint-1
		USN-3	As a user, I can click on predict	I will see form for prediction	Medium	Sprint-1
	Dashboard	USN-4	As a user, I can interact with dashboard	I can change parameters of the charts	High	Sprint-2
	Predict	USN-5	As a user, I can access prediction form	I can change parameters of the charts	High	Sprint-3
		USN-6	As a user I can submit the form	I can see if I have heart disease or not	High	Sprint 4

CHAPTER 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	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	9	High	Anto Nishanth
			As a user, I will receive confirmation email once I have registered for the application.	4	Low	Johngkit
		USN-2	As a user, I can register for the application through Gmail.	7	Medium	Elavarasan
	Login	USN-3	As a user, I can log into the application by entering email & password.	9	High	Joyson
Sprint-2	Working with the Dataset	USN-4	Importing the dataset on cognos platform and understand, clean and prepare the dataset.	9	High	Anto Nishanth Johngit
	Data Visualization chart	USN-5	After importing the dataset, we create some visualizations to understand more about the predicting heart diseases.	7	Medium	Aneesh Elavarasan
Sprint-3	Creating the Dashboard	USN-6	Creating the dashboard to display the visualizations which gives insights of predicting the Heart diseases.	9	High	Joyson Johngit Aneesh
Sprint-4	Export the Analytics	USN-7	Exporting the created dashboard to showcase the work to others.	9	High	Anto Nishanth Joyson Elavarasan

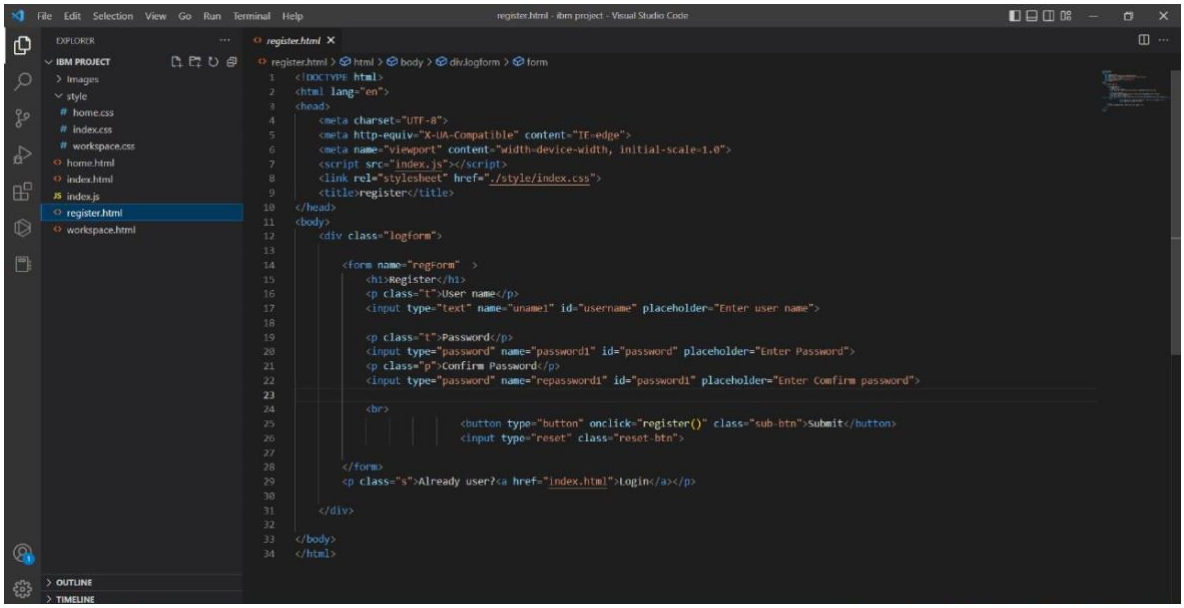
6.2 Sprint Delivery Schedule :

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	14 Nov 2022
Sprint-2	20	6 Days	31 Oct 2022	05 Nov 2022	20	15 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	17 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	20	19 Nov 2022

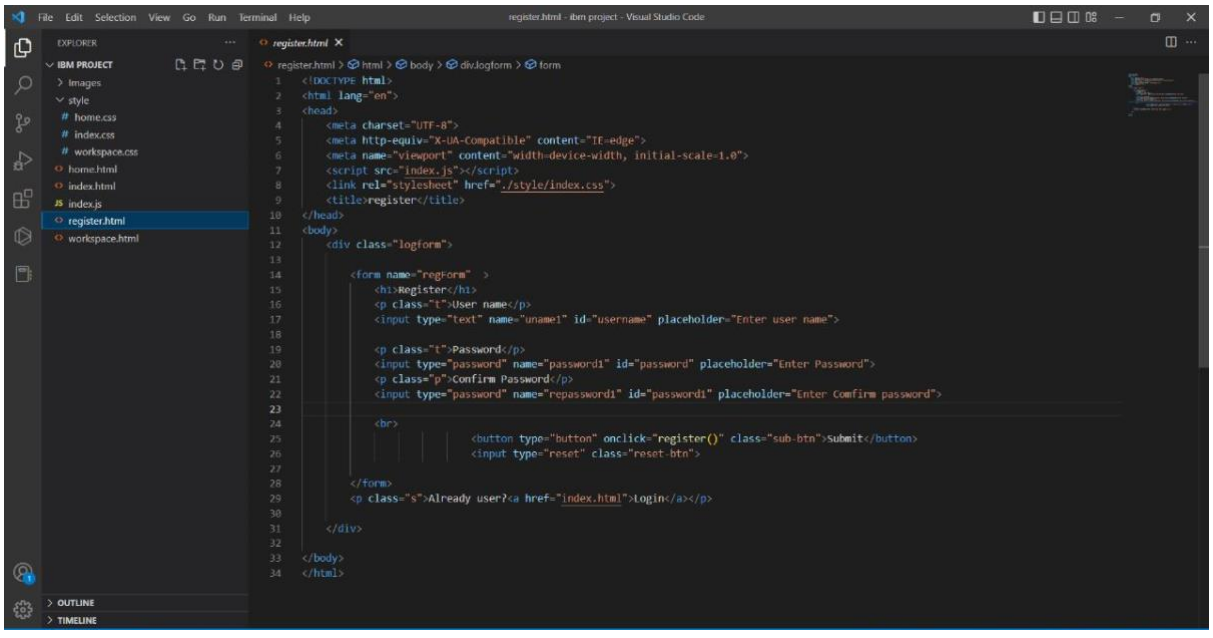
CHAPTER 7

CODING & SOLUTIONING

7.1 Feature 1 – Sprint1:Register



INDEX HTML:



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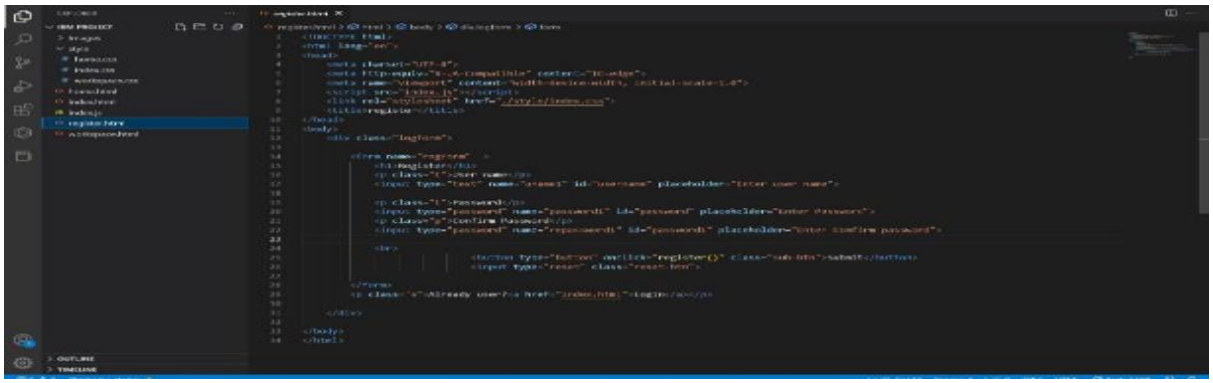
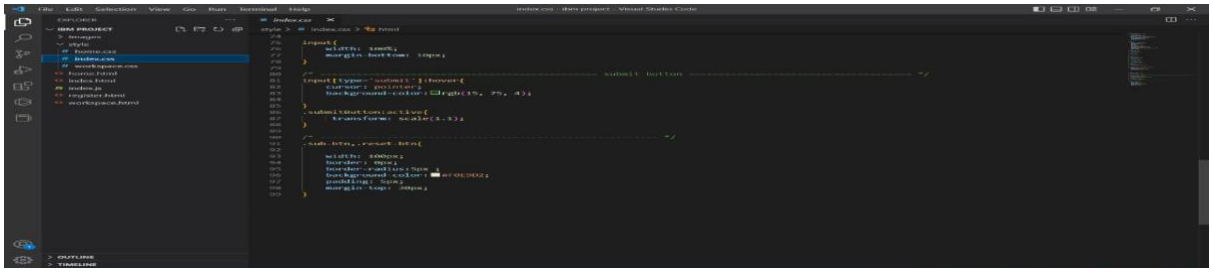
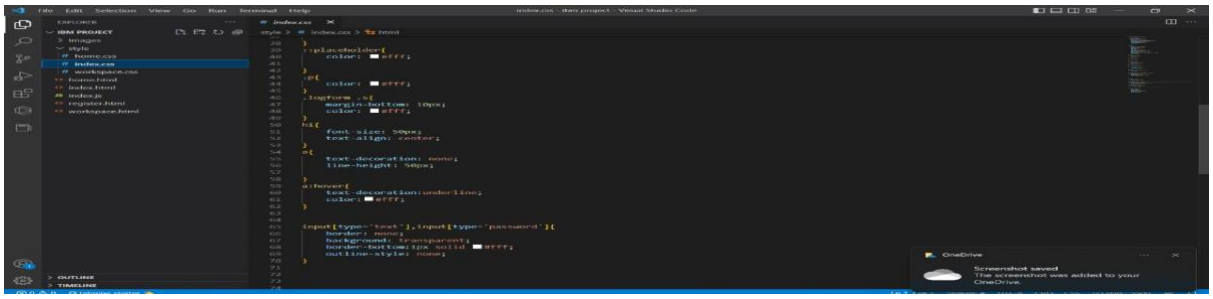
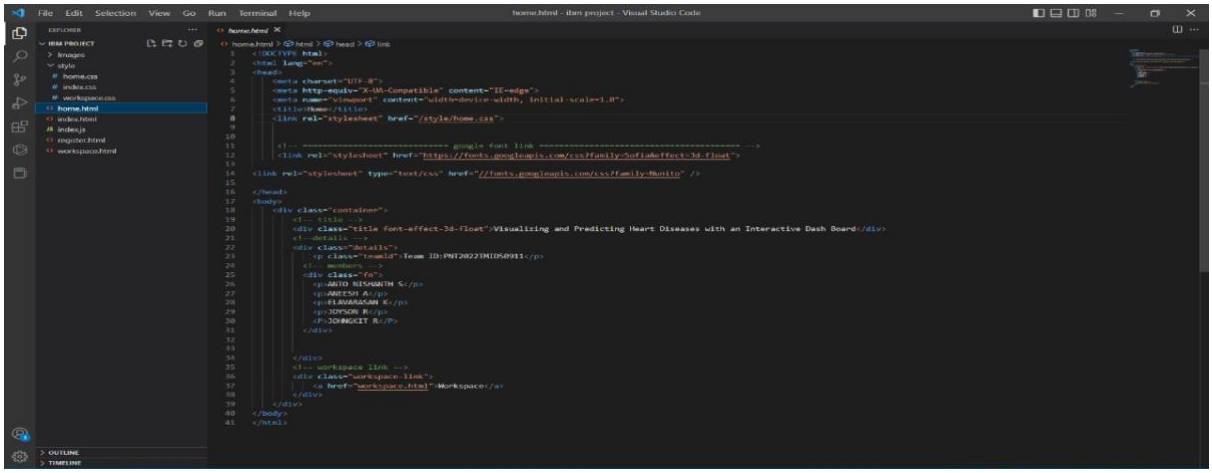




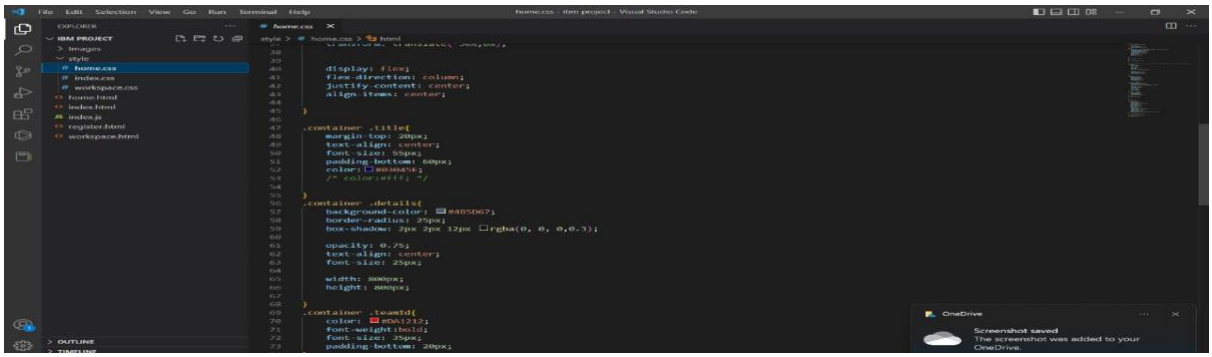


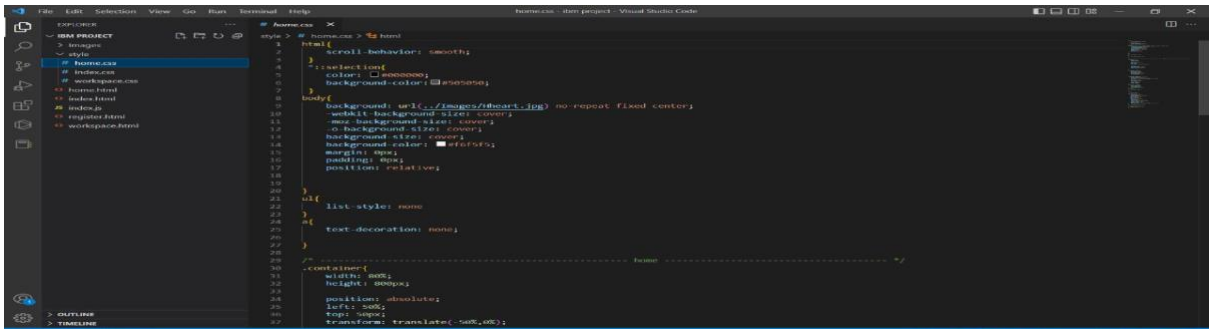
7.2 Fearures-2:Sprint 2

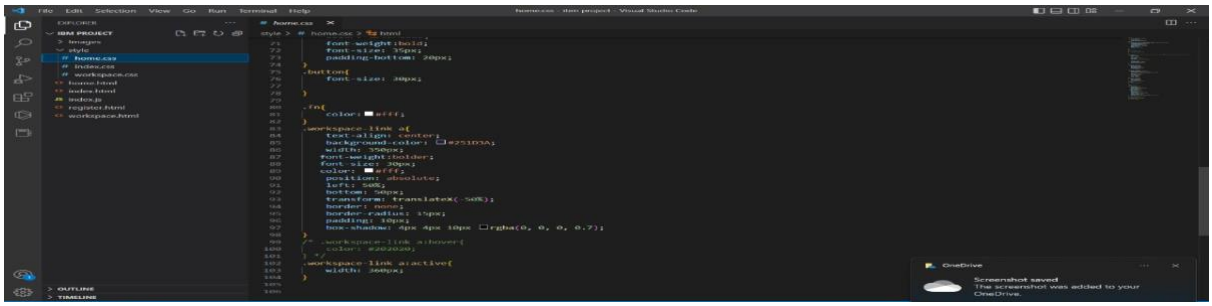
Home HTML



Home CSS

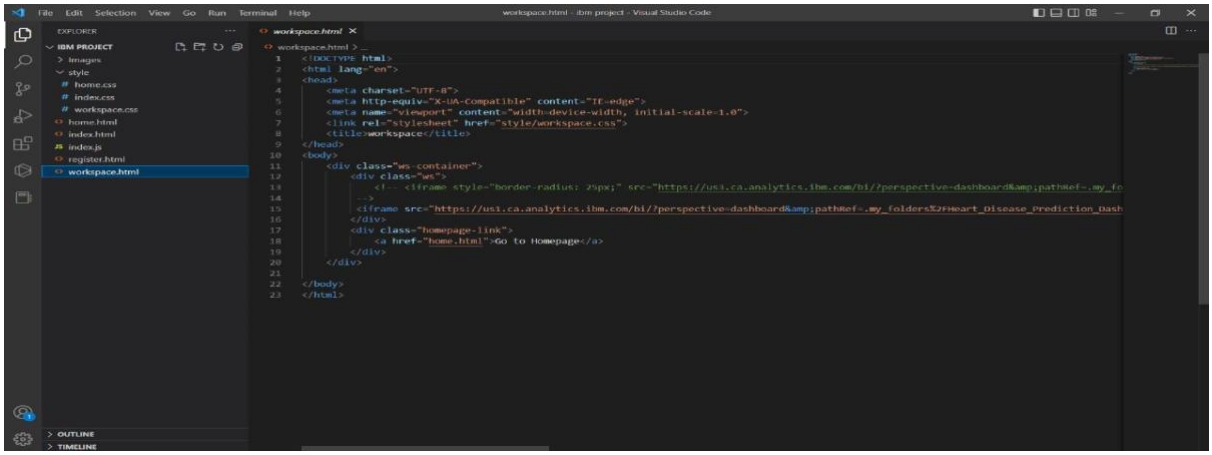




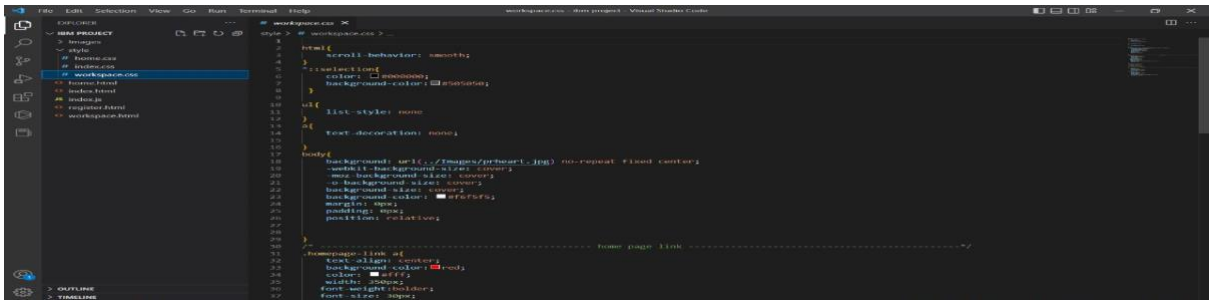


7.3 Features-3:Sprint 3

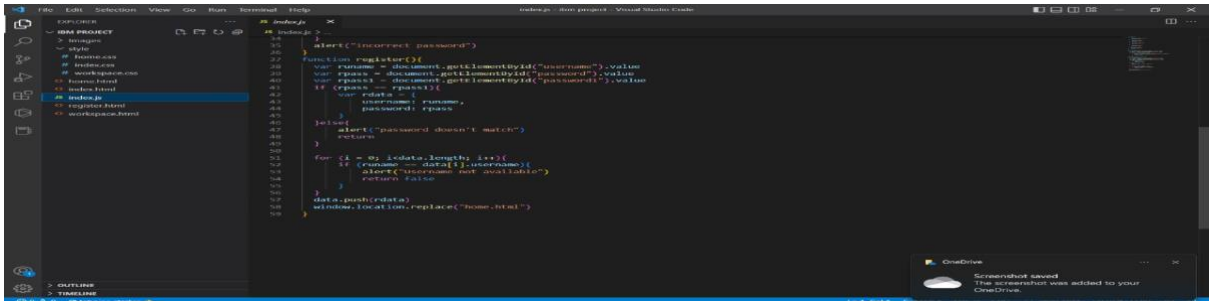
Workspace HTML

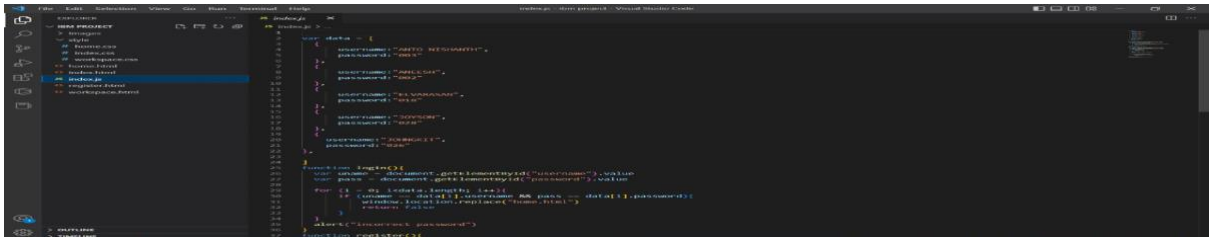


Workspace CSS

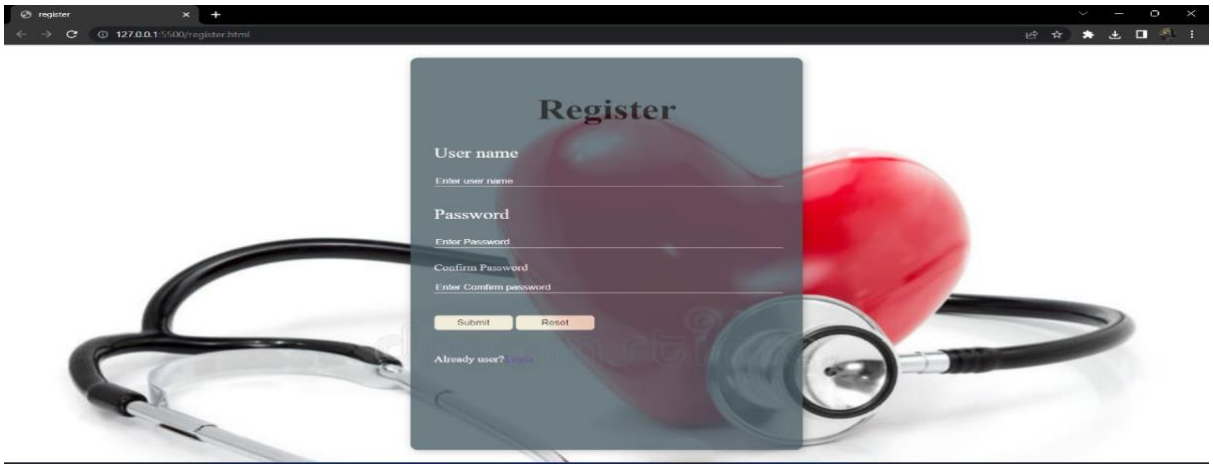


Index JS :





7.4-Features-4:Sprint 4



CHAPTER 8

TESTING

8.1 Test Cases :

Test case ID	Test case description	Expected results	Actual results	Pass/Fail
TC01	Check for valid IBM account	User should see the IBM cognos dashboard	As Expected	Pass
TC02	Check for invalid IBM account	User should not see the IBM Cognos dashboard	As Expected	Pass

TC03	Check for values in all the Input boxes	User should see whether he/she has high risk or low risk of getting affected by heart disease	As Expected	Pass
TC04	Check for empty values in any one of the input boxes	User should not see whether he/she has high risk or low risk of getting affected by heart disease	As Expected	Pass

8.2User Acceptance Testing :

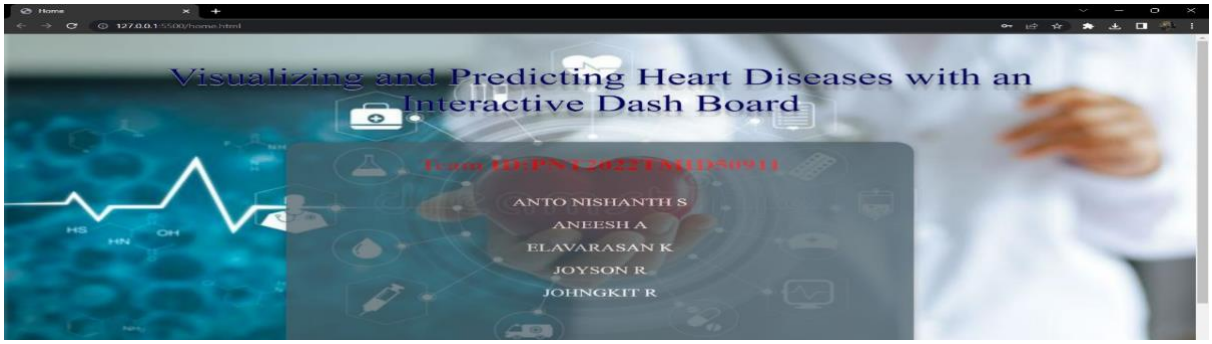
Test case ID	**Test case description**	**Acceptence criteria**	**Actual results**	**Pass/Fail**
TC01	As a user, I can go to homepage	I can access predictor or dashboard	As Expected	Pass
TC02	As a user, I can click on dashboard	I will see dashboard	As Expected	Pass

TC03	As a user, I can click on predict	I will see form for prediction	As Expected	Pass
TC04	As a user, I can interact with dashboard	I can change parameters of the charts	As Expected	Pass
TC05	As a user, I can access prediction form	I can fill form	As Expected	Pass
TC06	As a user I can submit the form	I can see if I have heart disease or not	As Expected	Pass

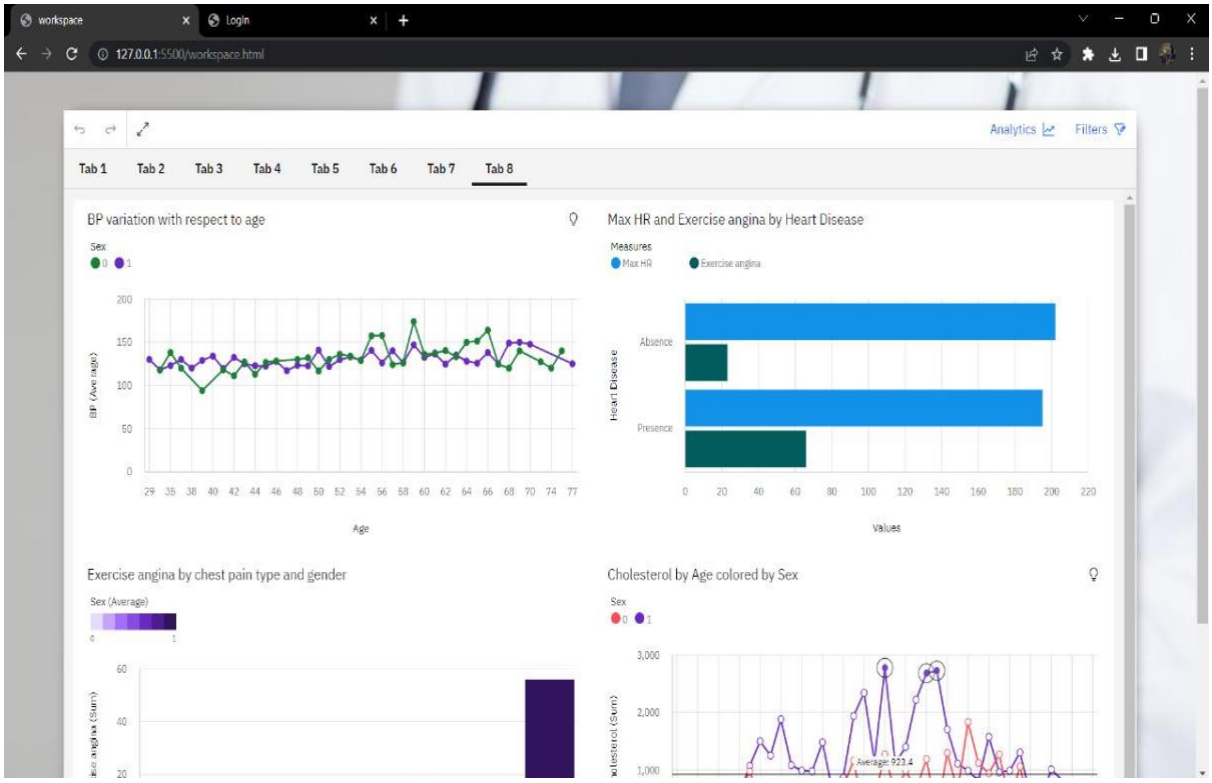
CHAPTER 9

RESULTS

Homepage



Dashboard



CHAPTER 10

ADVANTAGES & DISADVANTAGES

10.1 Advantages

1. Reduce the work of doctors.
2. Users can know the result instantly.
3. Can change parameters of charts in dashboard.

10.2Disadvantages

4. Can have unwanted biases and errors.
5. Diagnosis from doctor is more trusted than an online predictor.

CHAPTER 11

CONCLUSION

This project predicts if people have cardiovascular disease using their medical history.Using a dataset that includes parameters such as chest pain, sugar level, blood pressure, etc, a dashboard is constructed which showcases the relation between attributes. A machine learning model is also created with the same dataset to predicted the chances of a user having heart disease.

CHAPTER 12

FUTURE SCOPE

Using more robust dataset with more necessary parameters, the accuracy of prediction can be increased. In collaboration with hospitals, doctors can be suggested with contact information. People can also book appointments through the website. The dashboard can be expanded to have more charts and relations.

APPENDIX :

Git link -
https://github.com/IBM-EPBL/IBM-Project-49233-1660816998

Demo link -

https://drive.google.com/file/d/1QLk8PB9T5dgWqXrJzf6cTDkblJ48P3hn/view?usp=sharing