A NAALAIYA THIRAN PROJECT REPORT ON

VISUALIZING AND PREDICTING HEART DISEASE WITH AN INTERACTIVE DASHBOARD

TEAM ID: PNT2022TMID48701

SUBMITTED BY

RISHWANA BURVEEN S – 920819106051

SASMITHA PARVEEN K – 920819106054

SHINY RESHMA J – 920819106058

SOUNDHARYA S – 920819106061

BACHELOR OF ENGINNEERING

IN

DEPARTMENT OF ELECTRONICS AND COMMUNICAATION ENGINEERING

NPR COLLEGE OF ENGINEERING AND TECHNOLOGY

NATHAM – 624401

DATE: 19 NOV 2022

1. **INTRODUCTION**
    - **1.1.** Project Overview
    - **1.2.** Purpose
2. **LITERATURE SURVEY**
    - **2.1.** Existing problem
    - **2.2.** References
    - **2.3.** Problem Statement Definition
3. **IDEATION & PROPOSED SOLUTION**
    - **3.1.** Empathy Map Canvas
    - **3.2.** Ideation & Brainstorming
    - **3.3.** Proposed Solution
    - **3.4.** Problem Solution fit
4. **REQUIREMENT ANALYSIS**
    - **4.1.** Functional requirement
    - **4.2.** Non-Functional requirements
5. **PROJECT DESIGN**
    - **5.1.** Data Flow Diagrams
    - **5.2.** Solution & Technical Architecture
    - **5.3.** User Stories
6. **PROJECT PLANNING & SCHEDULING**
    - **6.1.** Sprint Planning & Estimation
    - **6.2.** Sprint Delivery Schedule
7. **CODING & SOLUTIONING**
    - **7.1.** Feature 1
    - **7.2.** Feature 2

8. TESTING

8.1. Test Cases

8.2. User Acceptance Testing

9. RESULTS

9.1. Performance Metrics

10. ADVANTAGES & DISADVANTAGES

11. CONCLUSION

12. FUTURE SCOPE

13. APPENDIX

13.1. Source Code

13.2. GitHub & Project Demo Link

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 that involve narrowed or blocked blood vessels that can lead to a heart attack, chest pain (angina) or stroke

1.1 Project Overview

Machine learning (ML) is a type of artificial intelligence (AI) that allows software applications to become more accurate at predicting outcomes without being explicitly programmed to do so. Machine learning algorithms use historical data as input to predict new output values. Machine learning Incorporates various classifiers of Supervised, Unsupervised and Ensemble Learning which are used to predict and Find the Accuracy of the given dataset. We are using machine learning in our project that helps to Predict Heart Disease it will help a lot of people. Machine learning can be used to detect whether a person is suffering from a cardiovascular disease by considering certain attributes like chest pain, cholesterol level, age of the person and some other attributes. Classification algorithms based on supervised learning which is a type of machine learning can make diagnoses of cardiovascular diseases easy.

This project focuses on mainly on data mining technique namely Logistic regression. The accuracy of our project is 82.7% which is better than the previous system. Logistic regression falls under the category of supervised learning. Only discrete values are used in logistic regression. The objective of this project is to check whether the patient is likely to be diagnosed with any cardiovascular heart diseases based on their medical attributes such as gender, age, chest pain, fasting sugar level, etc. A dataset is selected from the Kaggle. By using this dataset, we predict whether the patient can have a heart disease or not. To predict this, we use 13 medical attributes of a patient and classify them if the patients likely to have a heart disease. We have also trained a additional dataset with additional parameters that is of total 14 medical attributes in which we are using different mining techniques such as 1) Logistic Regression 2) K-nearest neighbor classifier 3)Support Vector Classifier 4)Random Forest Classifier 5) Decision Tree Classifier these mining

techniques helped us for prediction with additional parameters with the accuracy of 82.67% which is almost equal to the previous parameters.

1.2 Purpose

We all know that heart is the vital part that keeps a person alive other than brain. The heart is important because it pumps blood around your body, delivering oxygen and nutrients to your cells and removing waste products. If the heart does not function properly then it will lead to serious health conditions including death. For having a healthy heart, there are many solutions available in the market. Exercise can also play an important role for maintaining heart health. Apart from medical treatments, technology can also prove to be very useful in treating any heart disease. Any heart disease is predicted beforehand, then curing it would be not much complex . But predicting would be a tough task. Medical science has made excellent use often technological breakthrough storage of the standard of healthcare. These technological developments have opened the path for precise illness diagnosis and prognosis Machine learning might be a great option for you obtain a high level of accuracy when it comes to forecasting heart illnesses with the help of algorithms.

CHAPTER 2 LITERATURE SURVEY

2.1 Existing problem

Before we did the experiments, we did research on how people explored heart disease prediction so that we can broaden our horizons and learn from them. In 2017, Cheryl Ann Alexander, Lidong Wang predicted the key to cardiovascular disease management is to evaluate large scores of datasets, compare and mine for information that can be used to predict, prevent, manage and treat chronic diseases such as heart attacks. Big Data analytics, known in the corporate world for its valuable use in controlling, contrasting and managing large datasets can be applied with much success to the prediction, prevention, management and treatment of cardiovascular disease. Per the studies analyzed, Big Data analytics is useful in predicting heart attack, and the technologies used in Big Data are extremely vital to the management and tailoring of treatment for cardiovascular disease. And as the use of Big Data in healthcare increases, more useful personalized medicine will be available to individual patients.

In 2018, Nashif, S., Raihan, Md.R., Islam, Md.R. and Imam, M.H In this study, a tentative design of a cloud-based heart disease prediction system had been proposed to detect impending heart disease using Machine learning techniques. For the accurate detection of the heart disease, an efficient machine learning technique should be used which had been derived from a distinctive analysis among several machine learning algorithms in a Java Based Open Access Data Mining Platform, WEKA. The proposed algorithm was validated using two widely used open-access database, where 10-fold cross-validation is applied in order to analyze the performance of heart disease detection. An accuracy level of 97.53% accuracy was found from the SVM algorithm.

In 2019, Madhura Patil, Rima Jadhav, vishakha Patil, Aditi Bhawar, Mrs. Geeta Chillarges provided a system which can help for prediction of heart disease by considering risky factor associated with heart disease. Here system applies support vector machine algorithm on historical information/data of patient and it provides features like Age, Sex, Smoking, Overweight, Alcohol Intake, Bad Cholesterol, Blood Pressure and Heart Rate to make prediction of coronary heart disease with higher accuracy is done. They are implementing a system which will help to predict heart disease depending on the patients clinical data related to the factor associated with heart disease.

In 2020, R.Indrakumari ,T.Poongodi, Soumya Ranjan Jena 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 metnes. In the result section, the visualized data shows that the prediction is accurate

2.2 References

- https://www.techtarget.com/searchenterpriseai/definition/machine-learning-ML
- https://www.sciencedirect.com/science/article/pii/S1877050920315210
- https://iopscience.iop.org/article/10.1088/1757-899X/1022/1/012046#:~:text=Machine%20learning%20can%20be%20used,www.who.int/cardiovascular_diseases/en/
- https://www.researchgate.net/publication/354901103_Using_Data_Visualization_to_Analyze_the_Correlation_of_Heart_Disease_Triggers_and_Using_Machine_Learning_to_Predict_Heart_Disease
- https://www.semanticscholar.org/paper/HEART-DISEASE-PREDICTION-USING-DATA-MINING-Sairam-Voruganti/269ba59bc918f43e55971d3641dd0376aed91d53
- https://www.ijert.org/heart-disease-prediction-using-data-mining-techniques

2.3 Problem Statement Definition

The USER needs a way to identify:

-whether he/she is affected by Heart disease by analysing symptoms

- whether he/she need to or need not to consult a doctor

- notify when he/she is in risk

- improve diagnosis & quality of care

-keep up to date medical records by analysing for predicting diseases

-advice for heart disease prevention

Problem statement:

1. Ayesha is feeling afraid that she is experiencing symptoms like high blood pressure & swollen feet. she thinking that she may suffer from heart disease. She is afraid of visiting doctors. So, she needs to know what is her condition without consulting doctor.

2. Dsouza has a chance of having a heart disease genetically. So she want to keep up date of her medical condition without going to hospital for earlier prediction.

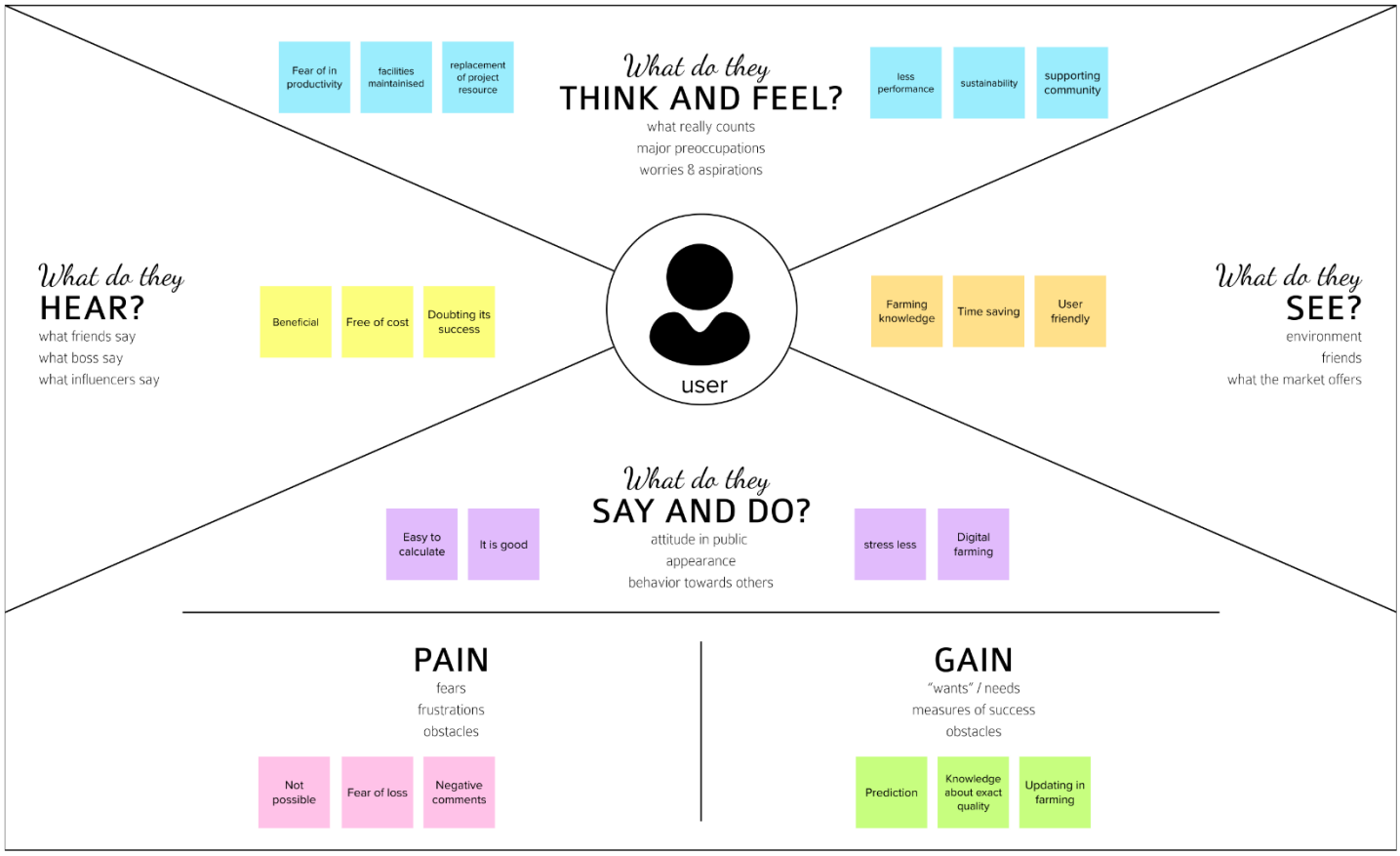
3. Suresh Gupta is a man who thinks all proper advice / treatment is provided directly by visiting doctors. suddenly one day, he had a slight symptoms of heart disease during lockdown. So how can he visit his doctor

4. Zhan ge who is a heart patient & walking on the road side. he wore a smart watch. Suddenly he fainted but there is no one around.

5. Prahan had a loss of breath and irregular heartbeat which is serious heart disease condition but he didn't know about it and never visited doctor about these conditions.

CHAPTER 3 IDEATION & PROPOSED SOLUTION

3.1 Empathy Map Canvas



3.2 Ideation & Brainstorming

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 user need a way to identify whether he/she is affected by Heart disease,improve diagnosis & quality of care, assists in predicting diseases, analyzing symptoms, providing appropriate medicines, minimizing cost, extending the life span and reduces the death rate of heart patients.

Key rules of brainstorming

To run an smooth and productive session

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

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 hit the pencil [switch to sketch] icon to start drawing!

rishwana burveen

sasmitha parveen

shiny reshma

soundharya

Person 5

Person 6

Person 7

Person 8

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 and break it up into smaller sub-groups.

20 minutes

TIP

Add customizable tags to sticky notes to make it easier to find, browse, organize, and categorize important ideas as themes within your mural.

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

Importance

If each of these tasks could get done without any difficulty or cost, which would have the most positive impact?

TIP

Participants can use their cursors to point at where sticky notes should go on the grid. The facilitator can confirm the spot by using the laser pointer holding the **H key** on the keyboard.

Feasibility

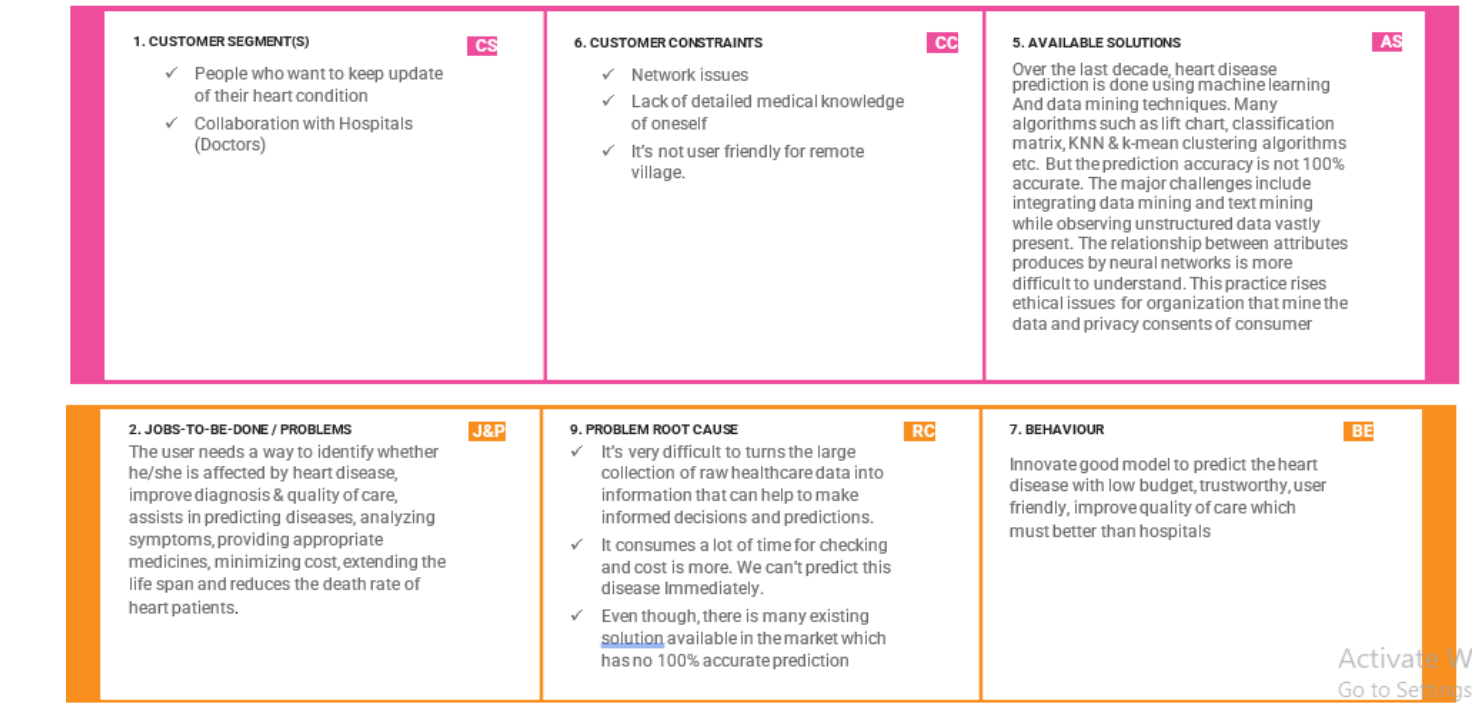
Regardless of their importance, which tasks are more feasible than others? (Cost, time, effort, complexity, etc.)

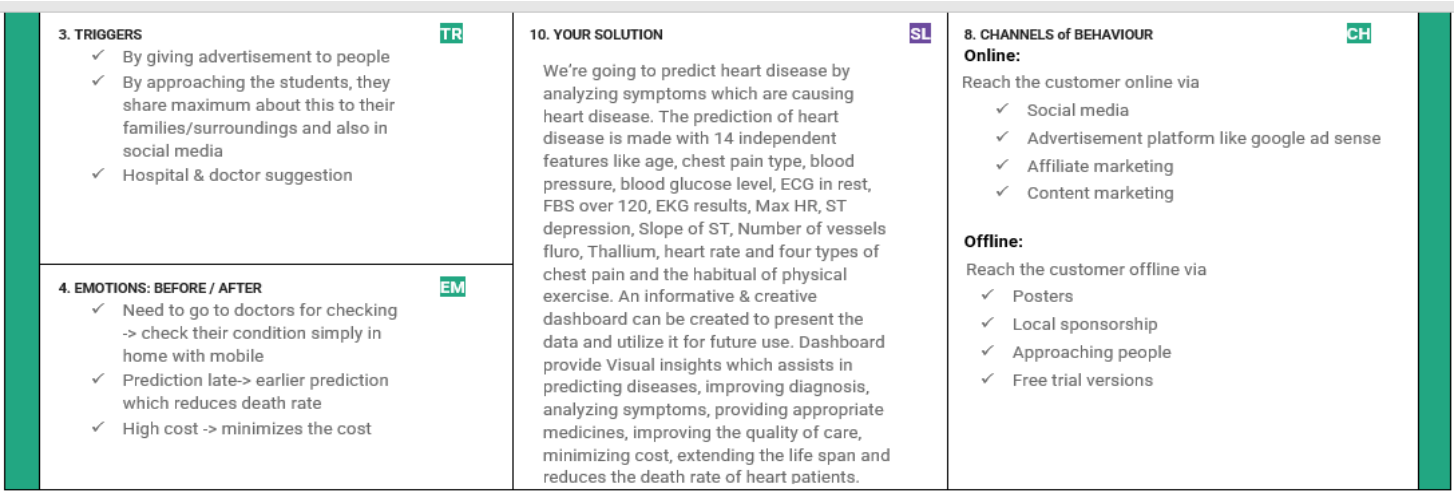
3.3 Proposed Solution

S.NO	Parameter	Description
1.	Problem Statement (Problem To Be Solved)	The user need a way to identify whether he/she is affected by Heart disease, improve diagnosis & quality of care, assists in predicting diseases, analyzing symptoms, providing appropriate medicines, minimizing cost, extending the life span and reduces the death rate of heart patients.
2.	Proposed Solution	We're going to predict heart disease by analysing symptoms which are causing heart disease. The prediction of heart disease is made with 14 independent features like age, chest pain type, blood pressure, blood glucose level, ECG in rest, FBS over 120, EKG results, Max HR,ST depression, Slope of ST, Number of vessels fluro, Thallium, heart rate and four types of chest pain and the habitual of physical exercise. A informative & creative dashboard can be created to present the data and utilize it for future use. Dashboard provide Visual insights which assists in predicting diseases, improving diagnosis, analyzing symptoms, providing appropriate medicines, improving the quality of care, minimizing cost, extending the life span and reduces the death rate of heart patients
3.	Novelty / Uniqueness	The use of analytics in healthcare improves care by facilitating preventive care and visually represented data provide various insights easily. Prediction is non invasive.so it is cost efficient. Earlier prediction is very helpful in reducing mortality rate. Moreover on the basis of patient heart condition, patient's treatment is very easy for the doctors It can be integrated with any real time systems such as app & smartwatch
4.	Social Impact/ Customer Satisfaction	It will reduce the mortality rate due to heart disease. Heart prediction can be done easier and earlier by visual analytics. As it is cost efficient, it is preferred by the most of the customers. Most importantly, it is very helpful for doctors to give treatments according to the patients conditions and it's preferred by the doctors as it saves time
5.	Business Model (Revenue Model)	There are 2 ways to generate a revenue from this project by creating product model. First one by introducing app for predicting heart disease or it can be integrated with smart watch for producing more efficient model
6.	Scalability of the Solution	It can be integrated with smart watch and apps for further advancements which is very helpful for earlier prediction. And

		further, we can provide live doctor consultancy, keep up the old data records for increasing accurate prediction and advices to prevent heart disease. Notifies alerts to nearby hospital when person is at risk.

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	User Registration	Registration through Facebook Registration through Gmail Registration through google
FR-2	Account creation	Gmail and password for account creation
FR-3	User Confirmation	Confirmation via Email Confirmation via OTP
FR-4	Personal details for account	Name, age, sex, height, weight, previous medical records, etc for health account basic details
FR-5	Regular medical condition updation in app	Entry present medical records, symptoms, etc

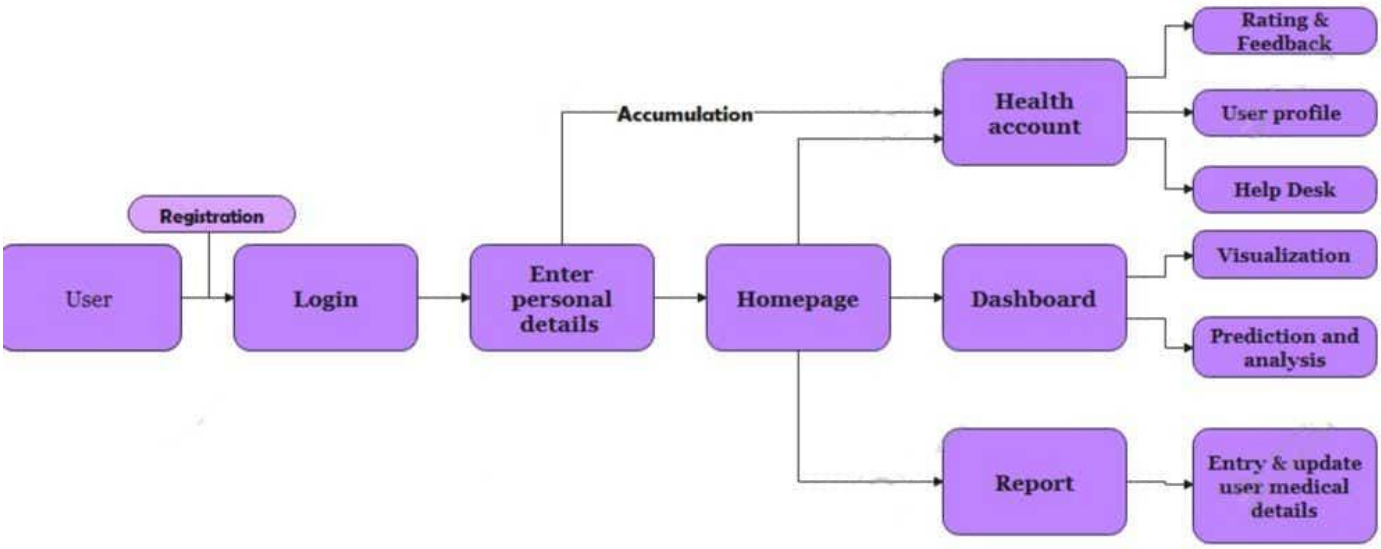
4.2 Non-Functional requirements

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	Good mobile navigation will boost the usability of the entire product, helping users to enjoy all the features offered. Bad navigation will make it difficult to find things, making it less likely that users will ever experience the product the way the design team had envisioned. Our solution has better features in navigation such as hamburger menu, Bottom navigation, Top navigation, Cards, Tabs, Gesture-Based Navigation, Full-screen navigation, 3D touch. In our app, we're using general language English to make the app user-friendly

NFR-2	**Security**	To preserve user trust and device integrity is done by making your app more secure. Our solution proposes 1. Provide the right permissions- Request only the minimum number of permissions necessary for your app to function properly. When possible, relinquish permissions when your app no longer needs them. 2. Store data safely- Store private data within internal storage 3. Ask for credentials before showing sensitive information 4. Keep services and dependencies up to date 5. Apply network security measures such as Add a network security configuration 6. Use WebView objects carefully- WebView objects in your app shouldn't let users navigate to sites that are outside of your control. Whenever possible, use an allow list to restrict the content loaded by your app's WebView objects. 7. Disallow access to your app's content providers-Unless you intend to send data from your app to a different app that you don't own, explicitly disallow other developers' apps from accessing your app's Content Provider objects.
NFR-3	**Reliability**	1. Our app is made accessible whenever needed. 2. It Responds within the time frame needed 3. It is regularly updated or modified as needed by the user. 4. Provide security and privacy to the extent needed by the user. 5. Provide bug free operation that is simple and easily predictable
NFR-4	**Performance**	1. Our app responds quickly by making application size small, using CDN & app bundles and produces the output and it takes lesser session length 2. Our app provides unique solution than the present system in the software 3. Special team is formed to reply queries of the users 24/7 4. Our app provides real time notifications about the user condition.
NFR-5	**Availability**	By setting up An Application Performance Monitoring (APM)system that helps to monitor the availability of application. Consistent performance monitoring and optimization help you to tackle issues as quickly as they show up. Our app is designed in such a way that to emphasize availability by spreading data across clusters so that if one fails the entirety of the data is not lost.
NFR-6	**Scalability**	A scalable app can easily accommodate double, triple, or even ten times its current amount of users by withstanding no crashes, no downtime, Fast loading speeds, Top-notch security. We're gonna make our app more scalable by using right Tech stack & Infrastructure scaling to process millions of data with bug free , multiple database servers that accommodate millions of user to secure our app's fail-safe performance, using caching and stateless approach to reduce the load, Content Delivery Networks (CDN) to minimal response time.

CHAPTER 5 PROJECT DESIGN

5.1 Data Flow Diagrams



5.2 Solution & Technical Architecture

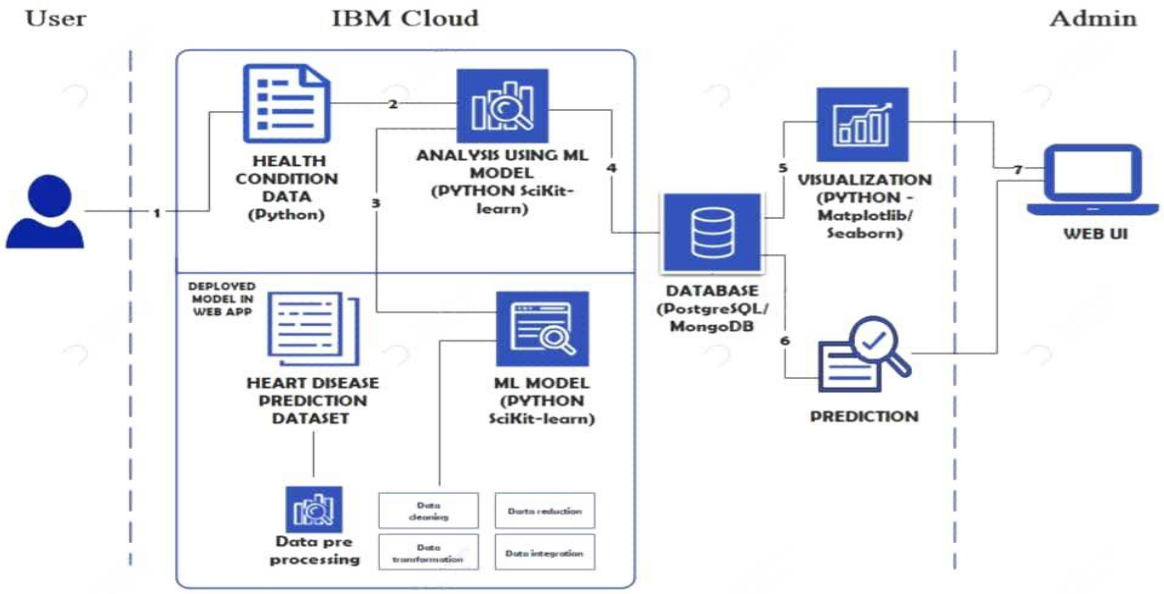


Table-1: Components & Technologies:

S.No	Component	Description	Technology
1.	User Interface	The user interacts with the application through the web UI.	HTML, CSS, JavaScript, React Js
2.	Application Logic-1	User's account registration, user's login & user's input entry tab is made using this web framework	Python (Flask /Django)
3.	Application Logic-2	Analysis and prediction input data is done using python SciKit Learn	Python
4.	Application Logic-3	The base data set is pre-processed & trained using python Scikit Learn	Python
5.	Application logic-4	The visualization in dashboard is analysed & shown by using python analytics tool (Matplotlib/Seaborn)	Python
6.	Application logic-5	The prediction of heart disease is done using python	Python
7.	Database	Contains information of registered users, user's health related data	MYSQL/PostgreSQL/MongoDB
8.	Cloud Database	Database Service on Cloud	IBM DB2
9.	File Storage	File storage requirements	Local Filesystem
10.	External API-1	one clicks signup feature can be	Google API and Facebook API.

		implemented using API's	
11.	Machine Learning Model	The main objective of heart prediction system is to discover and extract hidden knowledge associated with diseases from a historical heart data set and to identify whether a patient is diagnosed with heart disease or not. Heart disease prediction system aims to exploit data mining techniques on medical data set to assist in the prediction of the heart diseases	Predictive and Classification model.
12.	Infrastructure (Server / Cloud)	Application Deployment on Cloud Cloud Server Configuration: Kubernetes	Kubernetes

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Flask/Django	Flask-Python microservice web frame work for web development / Django- Python-based web framework that follows the model–template–views architectural pattern
2.	Security Implementations	Security / access controls implemented, use of firewalls for web app security	Encryptions, WAF, OWASP.
3.	Scalable Architecture	Scalability consists of 3-tiers	Client -HTML, CSS, JavaScript, Server-Python Database- IBM Cloud
4.	Availability	The application is available for all the users and largely scalable as it is deployed in cloud. Kubernetes is a Load balancer	Kubernetes
5.	Performance	As the application is developed with Flask/Django, it can handle large number of requests so our application will be available to large number of users and process many numbers of requests	Flask/Django

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 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 application	I can receive confirmation email & click confirm	High	Sprint-1
		USN-3	As a user, I can register for the application through Facebook	I can register & access the dashboard with Facebook Login	Low	Sprint-2
		USN-4	As a user, I can register for the application through Google	I can register & access my dashboard with Gmail login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can access my account / Dashboard when logged in	High	Sprint-1
	Dashboard	USN-6	As a User, I can view my complete medical analysis & accuracy and prediction of heart disease in a dashboard	I can view my medical analysis in the dashboard	High	Sprint-2
	User entry	USN-7	As a User, I can enter my personal details for analysis	I can view the details in my health account	High	Sprint-2
		USN-8	As a User, I can entry my medical records & symptoms	I can view the analysis in a dashboard	High	Sprint-2
	User profile	USN-9	As a user, I can update the health details of users.	I can view the user updated health details	High	Sprint-3
Customer Care Executive	Helpdesk	USN-10	As a user, I can post my queries & view the frequently asked question (FAQ)	I can view the queries & FAQ in a helpdesk	High	Sprint-3
		USN-11	As an admin, I can view the user queries	I can resolve the queries	High	Sprint-3
	Rating	USN-12	As a user, I can rate the app and give feedback	I can view in feedback page	Low	Sprint-4

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Administrator	User profile	USN-13	As an admin, I can update the health details of users.	I can view the user updated health details	High	Sprint-4
		USN-14	As an admin, I can add or delete users.	I can access my account / Dashboard when logged in	High	Sprint-4
		USN-15	As an admin, I can manage the user details.	I can view the organized data of myself	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.	5	High	Rishwana Burveen S, Sasmitha Parveen K, Shiny Reshma J
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	3	High	Rishwana Burveen S, Sasmitha Parveen K
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	Shiny Reshma J, Soundharya S
Sprint-1		USN-4	As a user, I can register for the application through Google	2	Medium	Shiny Reshma J, Soundharya S
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	3	High	Rishwana Burveen S, Sasmitha Parveen K
Sprint-2	Dashboard	USN-6	As a User, I can view my complete medical analysis & accuracy and prediction of heart disease in a dashboard	5	High	Rishwana Burveen S, Sasmitha Parveen K, Shiny Reshma J, Soundharya S
Sprint-2	User entry	USN-7	As a User, I can enter my personal details for analysis	3	High	Rishwana Burveen S, Sasmitha Parveen K, Shiny Reshma J,

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
						Soundharya S
Sprint-2		USN-8	As a User, I can entry my medical records & symptoms	3	High	Rishwana Burveen S, Sasmitha Parveen K, Shiny Reshma J, Soundharya S
Sprint-3	User profile	USN-9	As a user, I can update the health details of users.	5	High	Rishwana Burveen S, Sasmitha Parveen K, , Soundharya S
Sprint-3	Helpdesk	USN-10	As a user, I can post my queries & view the frequently asked question (FAQ)	5	High	Rishwana Burveen S, Shiny Reshma J
Sprint-3		USN-11	As an admin, I can view the user queries	3	High	Rishwana Burveen S, Soundharya S
Sprint-4	Rating	USN-12	As a user, I can rate the app and give feedback	2	Low	Shiny Reshma J, Soundharya S
Sprint-4	User profile	USN-13	As an admin, I can update the health details of users.	5	High	Rishwana Burveen S, Sasmitha Parveen K
Sprint-4		USN-14	As an admin, I can add or delete users.	3	High	Rishwana Burveen S, Shiny Reshma J
Sprint-4		USN-15	As an admin, I can manage the user details.	3	High	Sasmitha Parveen K, Soundharya S

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	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	13	6 Days	24 Oct 2022	29 Oct 2022	13	29 Oct 2022
Sprint-2	13	6 Days	31 Oct 2022	05 Nov 2022	13	05 Nov 2022
Sprint-3	13	6 Days	07 Nov 2022	12 Nov 2022	13	12 Nov 2022
Sprint-4	13	6 Days	14 Nov 2022	19 Nov 2022	13	19 Nov 2022

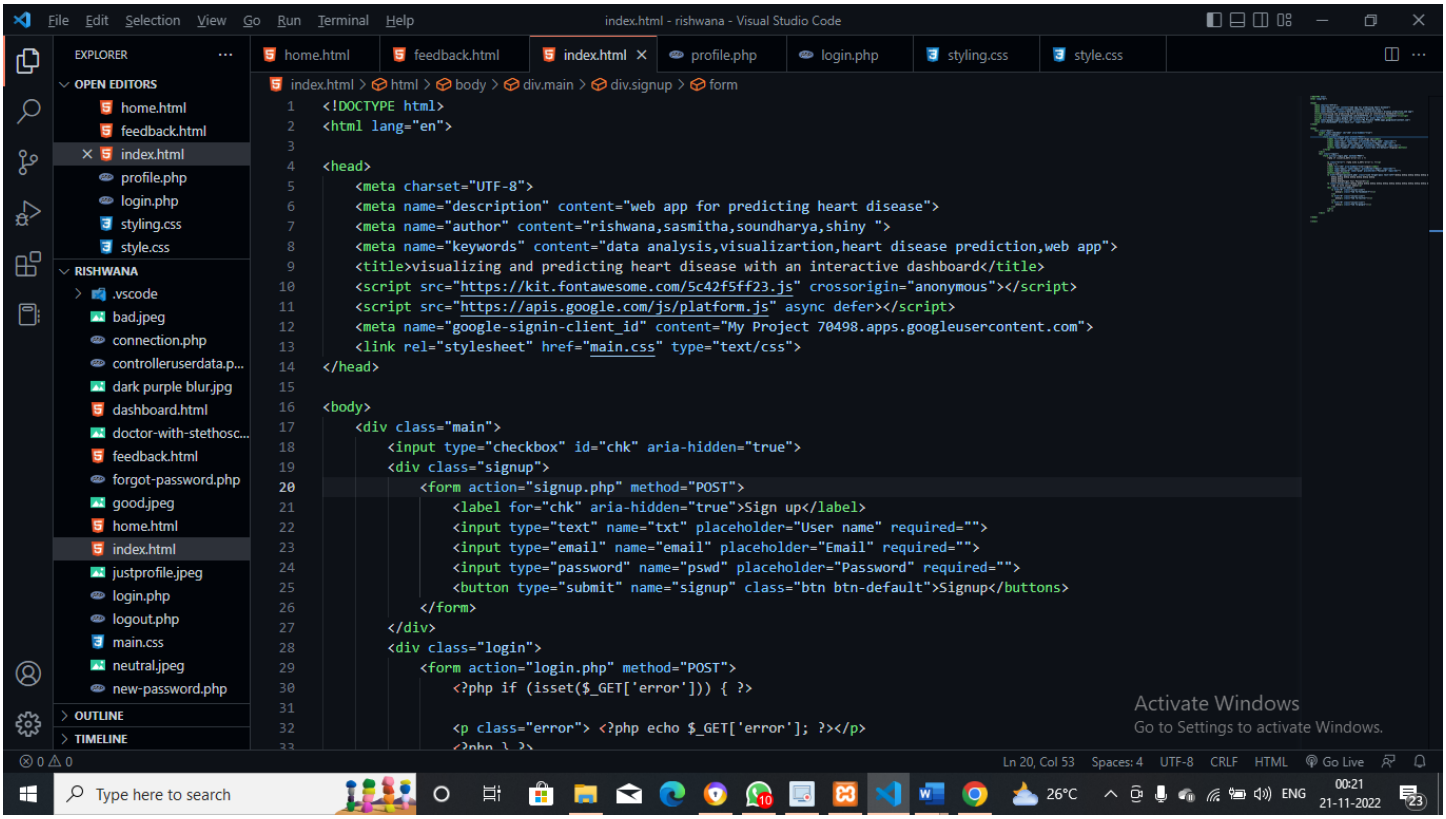
Velocity:

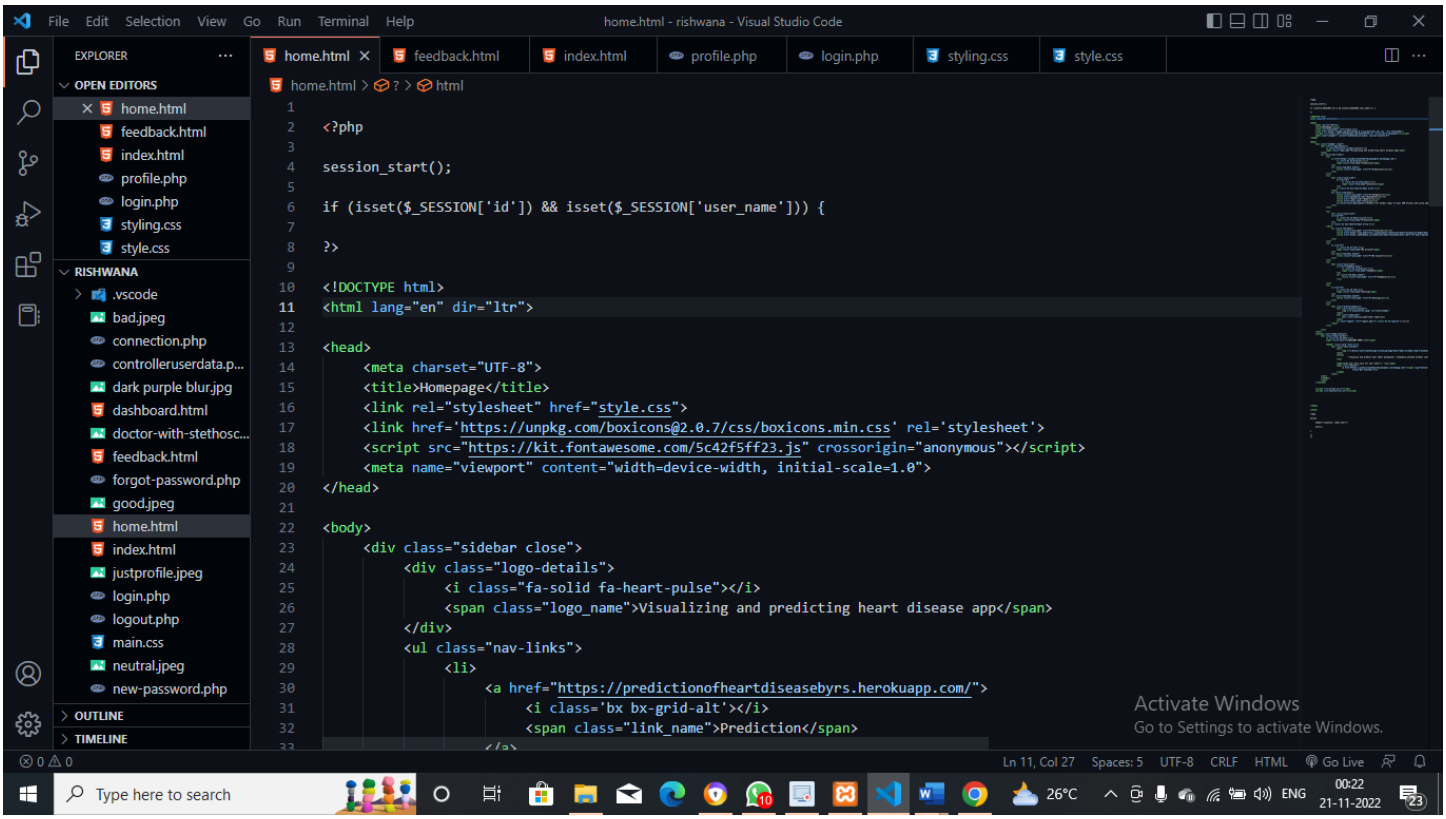
Imagine we have a 6-day sprint duration, and the velocity of the team is 13 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

AV = Sprint duration/Velocity = 13/6 = 2.16

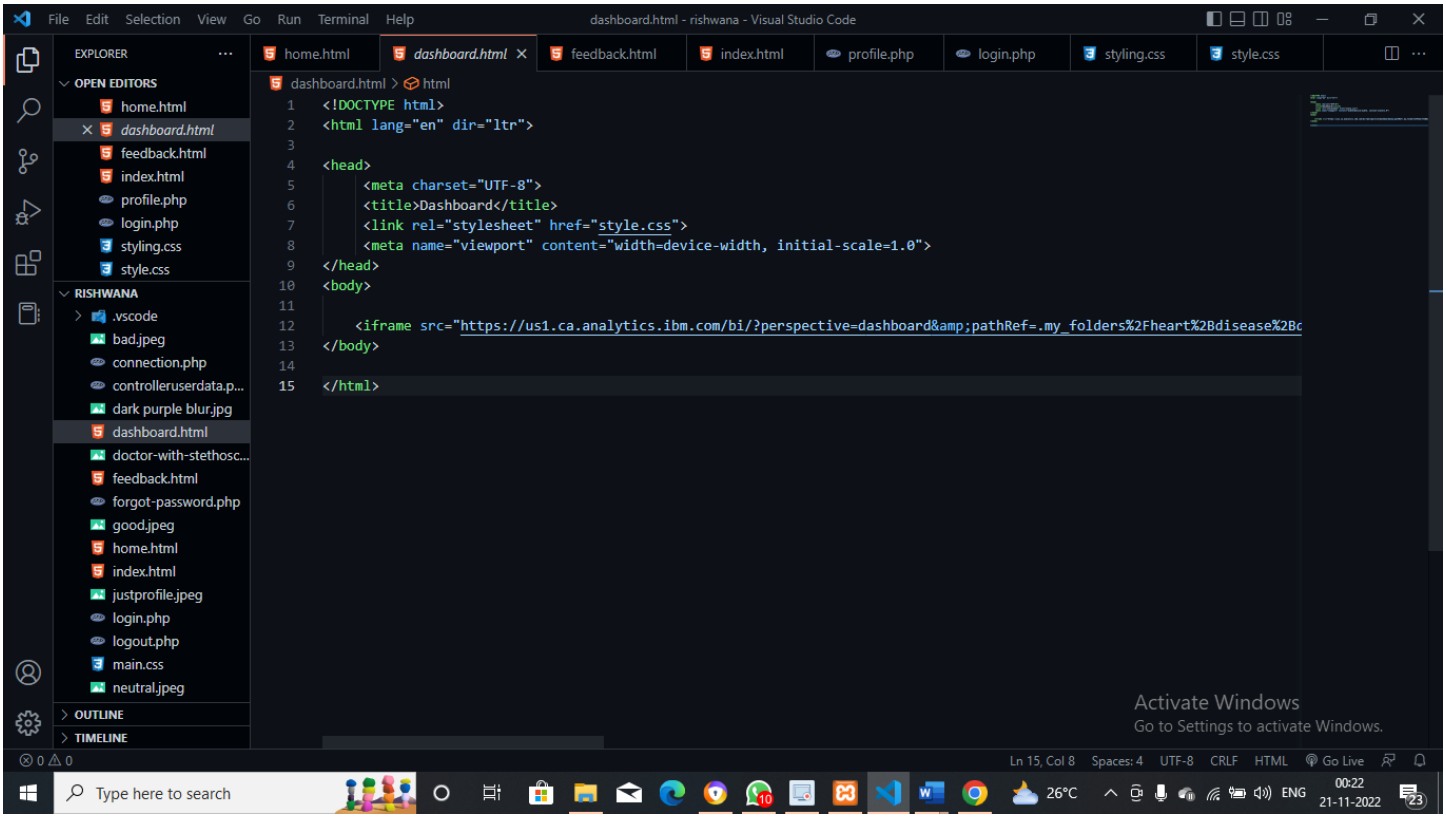
CHAPTER 7
CODING & SOLUTIONING

7.1 Feature 1:



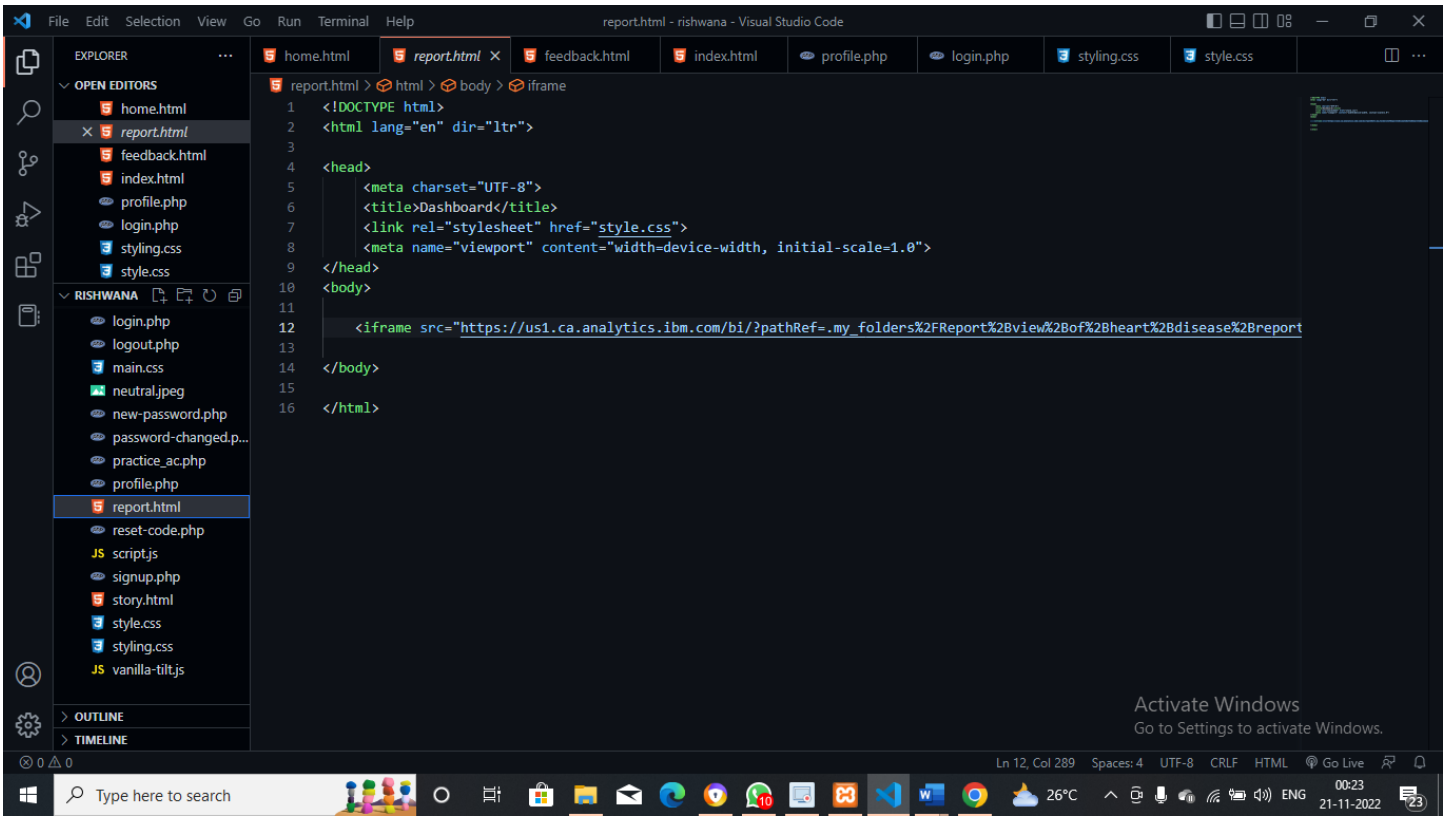


7.1.1 Dashboard



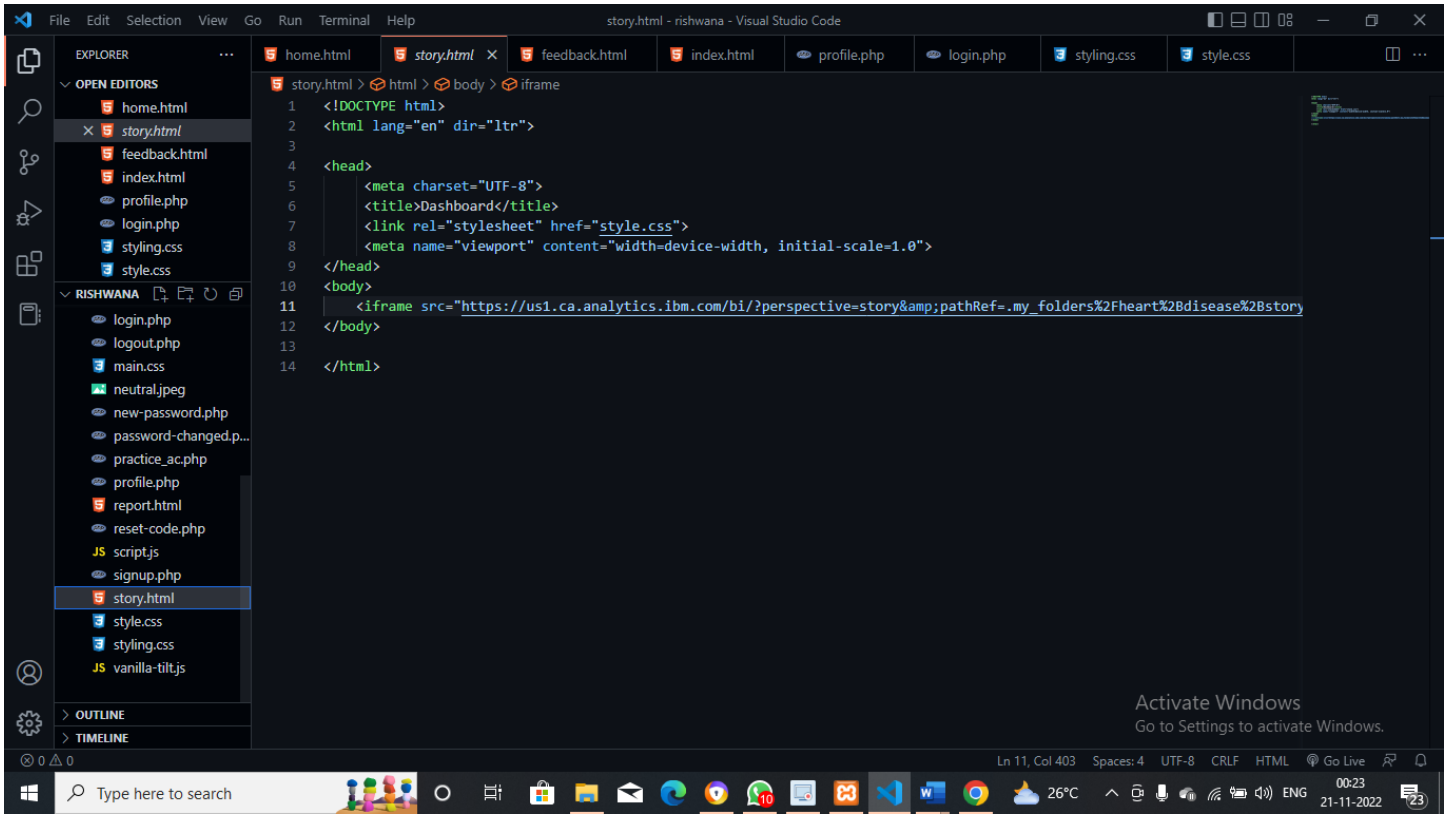
Using Cognos Analytics, dashboard is created which shows the relation between attributes and how they are responsible for chances of heart disease. The dashboard is incorporated in website using iframe. It is mandatory to have an IBM account to view the dashboard. As soon as the page is loaded, it asks to sign in to the IBM account. Once signed in, user can view the dashboard. Dashboard has multiple tabs, each containing a chart of relation between attributes. The above code shows how dashboard is included in the website.

7.1.2 Report



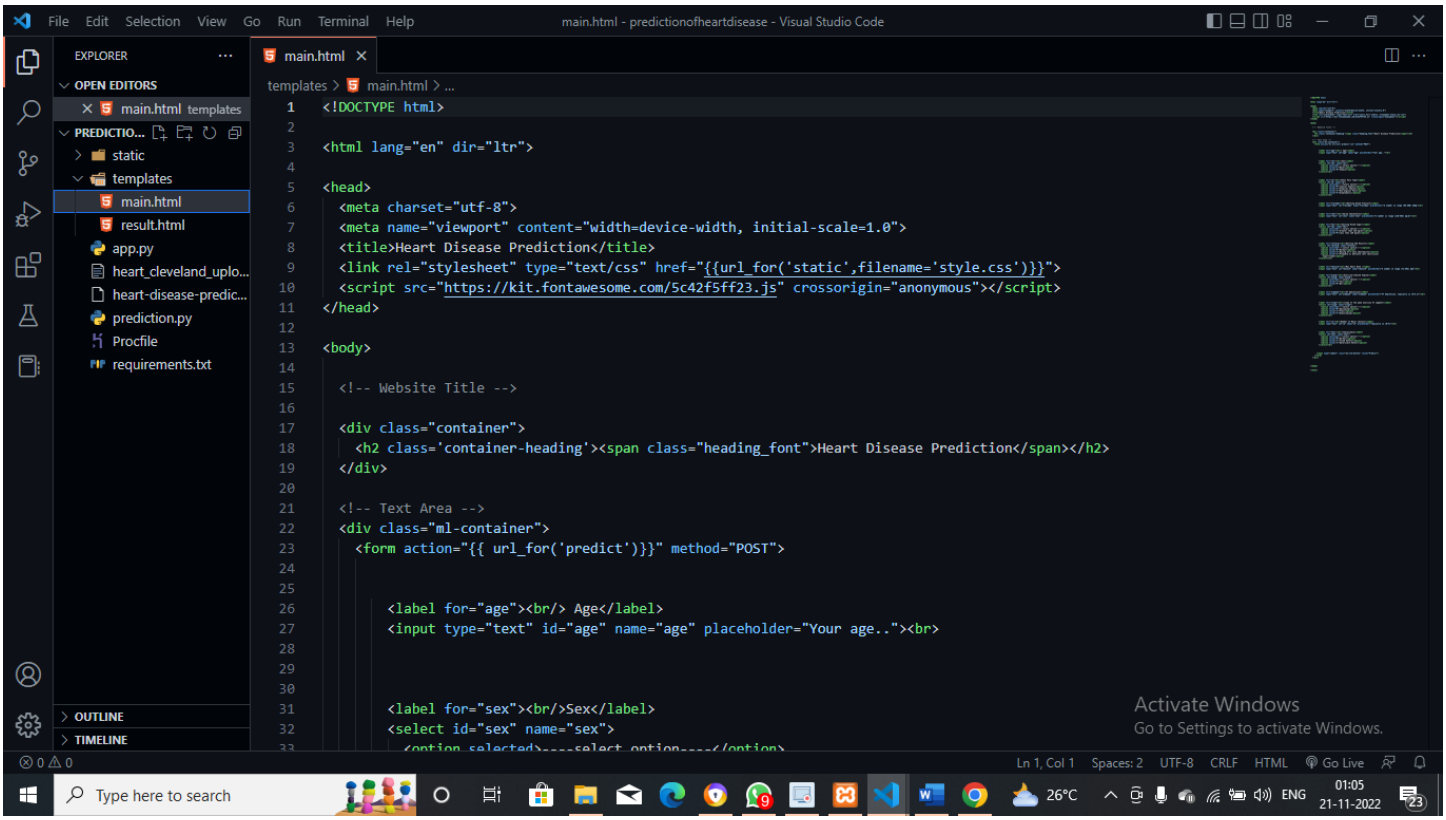
Using Cognos Analytics, Report is created which shows the relation between attributes and how they are responsible for chances of heart disease. The Report is incorporated in website using iframe. It is mandatory to have an IBM account to view the Report. As soon as the page is loaded, it asks to sign in to the IBM account. Once signed in, user can view the Report. The above code shows how Report is included in the website.

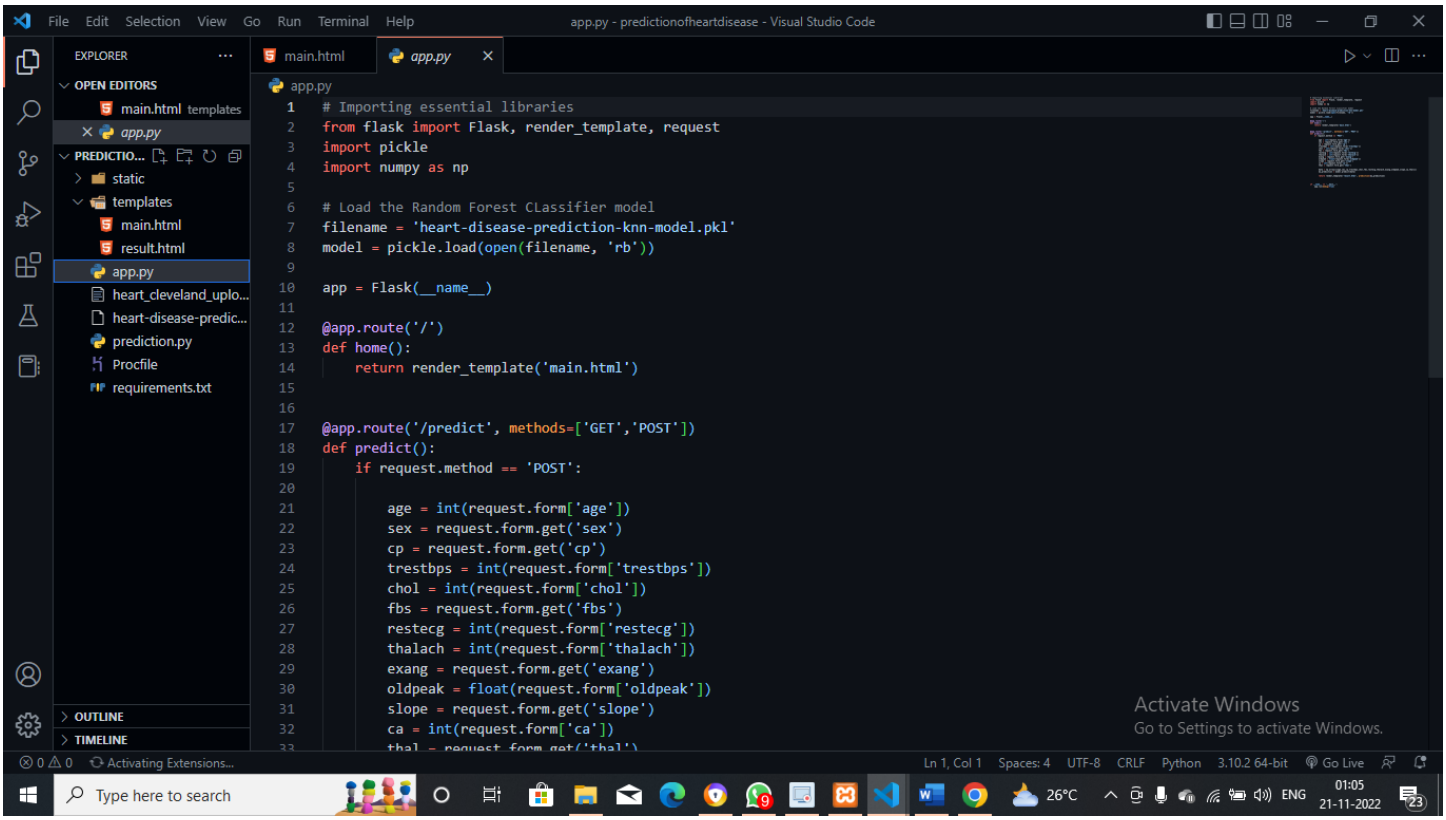
7.1.3 Story

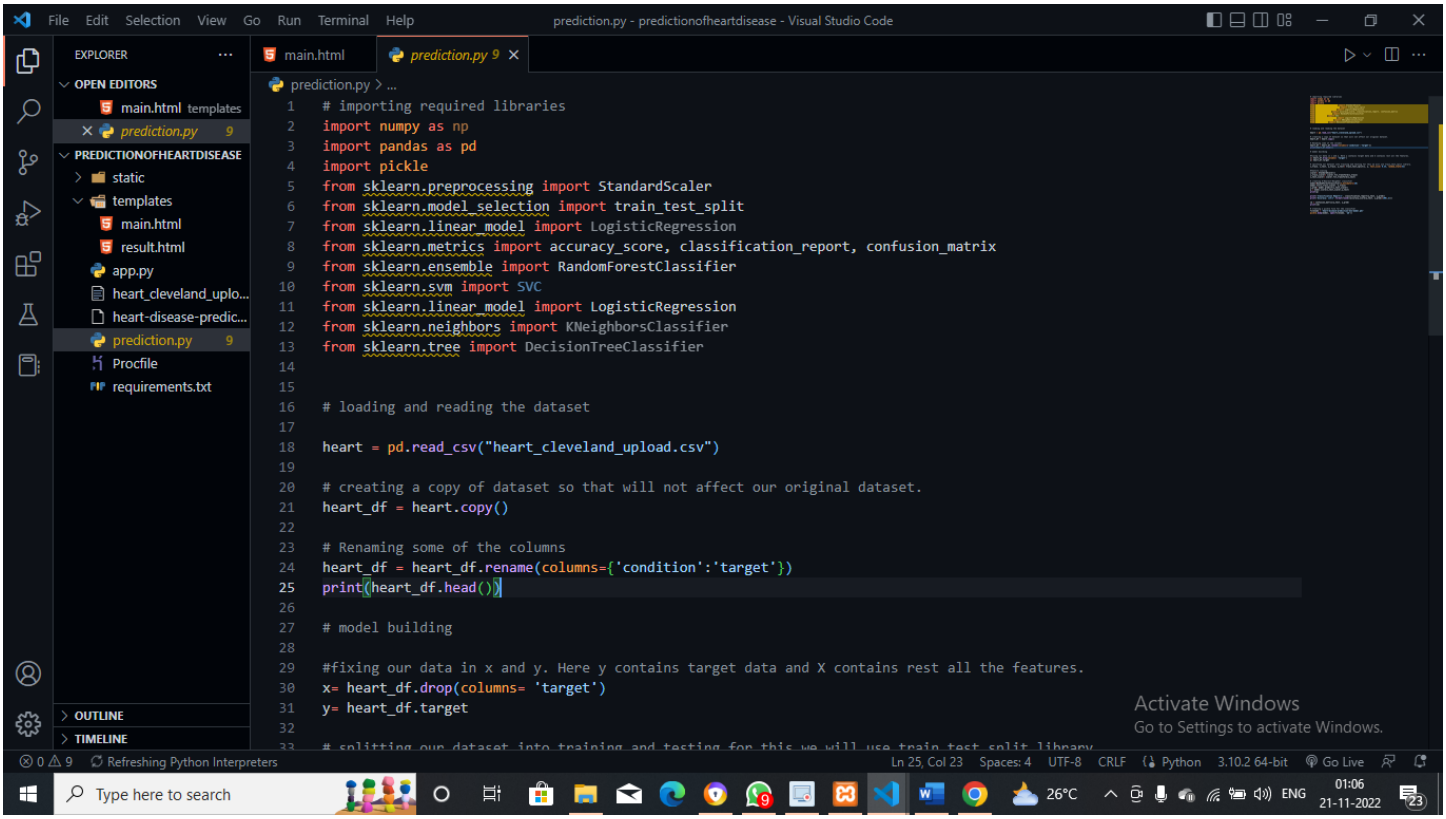


Using Cognos Analytics, Story t is created which shows the relation between attributes and how they are responsible for chances of heart disease. The story is incorporated in website using iframe. It is mandatory to have an IBM account to view the story. As soon as the page is loaded, it asks to sign in to the IBM account. Once signed in, user can view the story. story has multiple scenes, each containing a chart of relation between attributes. The above code shows how story is included in the website.

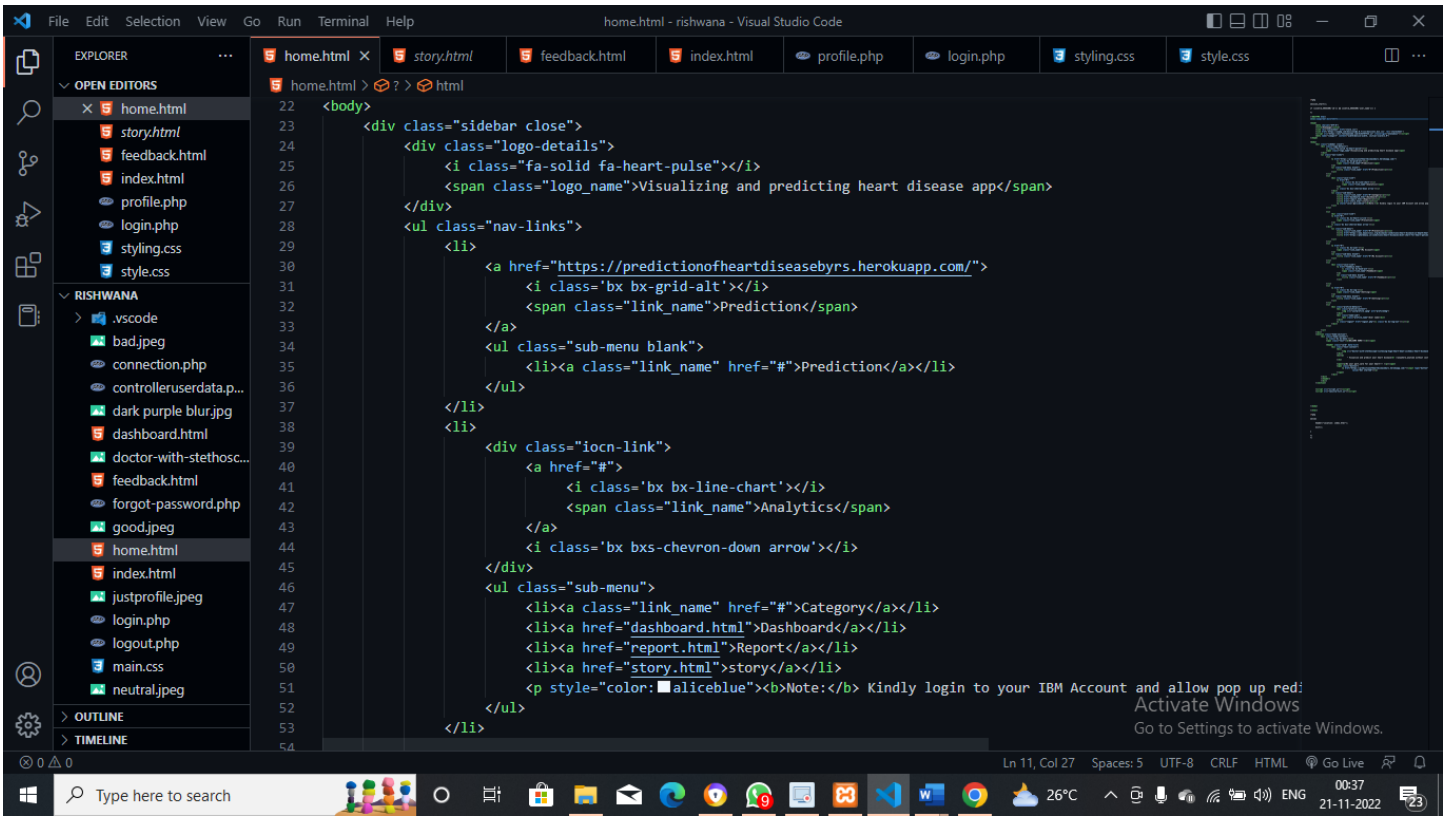
7.2 Feature 2: heart disease Prediction app







The above code shows how user input is got as form and how it is processed and given as input to machine learning model. Which in turn gives if heart disease is present or absent. This model is created using flask and deployed on Heroku cloud. That link is embedded in the main web app.



The above code shows how heart disease prediction app which is deployed on Heroku cloud is included in the website.

CHAPTER 8
TESTING

8.1 Test Cases

Test case ID	Feature Type	Component	Test Scenario	Steps To Execute	Test Data	Expected Result	Actual Result	Status
SignupPage_TC_OO1	Functional	Login page	Email Verification	1.Enter URL and click go 2.Enter user details 3.Checking whether the mail id is valid or not	rishwanabuveen@.com	"." is used in wrong position in ."c0"	Working as expected	Pass
SignupPage_TC_OO2	Functional	Login Page	The required field must be filled	1.Enter URL and click go 2.It is directed to signup page 3.Required credentials must be filled correctly	Username:Rishwana Email id:rishwanaburveen@gmail.com password:123444	The user received the mail after required credentials are filled	Working as expected	Pass
SignupPage_TC_OO3	Functional	Login page	Confirmation mail for successful signup	1.Enter URL and click go. 2.It is directed to signup page 3.Required credentials must be filled correctly 4.Mail is sent to the user on susccessful creation of the account	Username: Rishwana mailid:rishwanaburveen@gmail.com password: 123444	Confirmation mail is received by the user	Working as expected	Pass
SignupPage_TC_OO4	Functional	Home page	On Successful signup it is redirected to homepage	1.Enter URL and click go. 2.It is directed to signup page 3.Required credentials must be filled correctly 4.Mail is sent to the user on successful creation of the account 5.After sigup it is redirected to homepage	Get started	Successful opening of homepage	Working as expected	pass
LoginPage_TC_OO1	Functional	forgot password page	Reset new password	1.Enter URL and click go 2.It is directed to signup page 3.Click on forgot password 4.And then it is directed to forgot password page. 5.Enter your registered mail id 6.Verification code is sent to registered mail 7.When you enter the correct verification code	New password: soundharya	New password is updated	Working as expected	pass
LoginPage_TC_OO1	Functional	forgot password page	Reset new password	1.Enter URL and click go 2.It is directed to signup page 3.Click on forgot password 4.And then it is directed to forgot password page. 5.Enter your registered mail id 6.Verification code is sent to registered mail 7.When you enter the correct verification code it allows you to reset your password. 8.Enter your new password and click change	New password: soundharya	New password is updated	Working as expected	pass
LoginPage_TC_OO2	Functional	Login page	Verify user is able to log into application with InValid credentials	1.Enter URL and click go 2.Click on My Account dropdown button 3.Enter Invalid password in password text box 4.Click on login button	Username: Rishwana mail id : sasmithaparveen@gmail.com	Application should show 'Incorrect email or password ' validation message.	Working as expected	Pass
LoginPage_TC_OO3	Functional	Home page	Verify user is able to log into application with Valid credentials	1.Enter URL and click go 2.Click on My Account dropdown button 3.Enter valid password in password text box 4.Click on login button and it is redirected to home page	Username: Rishwana mail id : rishwanaburveen@gmail.com password: soundharya	Application will be directed to home page of the account holder	Working as expected	pass

LoginPage_TC_004	Functional	Loginpage	The required field must be filled	1.Enter URL and click go 2.It is directed to signup page 3.Required credentials must be filled correctly	Username: Rishwana mail id : rishwanaburveen@gmail.com password: soundharya	It is redirected to homepage.	Working as expected	pass
HomePage_TC_001	Functional	Prediction page	User health details such as Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results and so on..	1.After signup/login it is directed to homepage. 2.User can enter details to start prediction. 3.Health condition of the user will be predicted.	Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results,EKG results,Max HR,Exercise angina, ST depression,Slope of ST,Number of vessels fluro Thallium	Oops...You have chances of heart disease. Hey there...You don't have any chances of heart disease.	working as expected	Pass
HomePage_TC_002	Functional	Dashboard	User health details such as Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results and so on..	1.After signup/login it is directed to homepage. 2.User can enter the details to view their health condition in the form of dashboard	Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results,EKG results,Max HR,Exercise angina,	User can view their health condition in the form of graph,pie chart,bar chart	Working as expected	Pass
HomePage_TC_003	Functional	Report	User health details such as Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results and so on..	1.After signup/login it is directed to homepage. 2.User can enter the details to view their health condition in the form of report	Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results,EKG results,Max HR,Exercise angina,ST depression,Slope of ST,Number of vessels fluro	User can view their health condition in the form of pie chart,bar chart	Working as expected	Pass
HomePage_TC_004	Functional	Story	User health details such as Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results and so on..	1.After signup/login it is directed to homepage. 2.User can enter the details to view their health condition in the form of story	Age,Sex,Chest pain type,Resting Blood Pressure,Serum Cholesterol,Fasting Blood Sugar,Resting ECG results,EKG results,Max HR,Exercise angina,	User can view their health condition in the form of graph,pie chart,bar chart.Here we can use only two parameters	Working as expected	Pass
HomePage_TC_005	Functional	Prevention	It tells the user how to prevent them from heart disease	1.After signup/login it is directed to homepage. 2.User can learn about prevention of heart	Healthy diet chart and so on	Measures and schedules to be followed are displayed	Working as expected	Pass
HomePage_TC_006	Functional	My Account	The details of the user are present	1.After signup/login it is directed to homepage. 2.User can check their details that has been stored	User details	User details can be viewed	Working as expected	Pass
HomePage_TC_007	Functional	Feedback	The user rate our application based on their expeience while using their app	1.After signup/login it is directed to homepage. 2.There is section for feedback in which the user can rate our app based on their opinions	Feedback form	Feedback based on app function can be given	Working as expected	Pass
HomePage_TC_008	Functional	Settings	Delete Account	1.After signup/login it is directed to homepage. 2.In Settings user can delete the account if not needed	Account deletion form	The user who are do not neec the account or wrong details has been added and wish to delete their account can delete	Working as expected	Pass

8.2 User Acceptance Testing

1. Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

2 . Purpose of Document

The purpose of this document is to briefly explain the test coverage and open issues of the [ProductName] project at the time of the release to User Acceptance Testing (UAT).

Resolution	Severity 1	Severity 2	Severity 3	Severity 4	Subtotal
By Design	7	3	3	3	16
Duplicate	1	1	2	2	6
External	4	4	1	3	12
Fixed	12	8	6	8	34
Not Reproduced	0	0	0	0	0
Skipped	0	0	0	0	0
Won't Fix	0	0	0	0	0
Totals	24	16	12	16	68

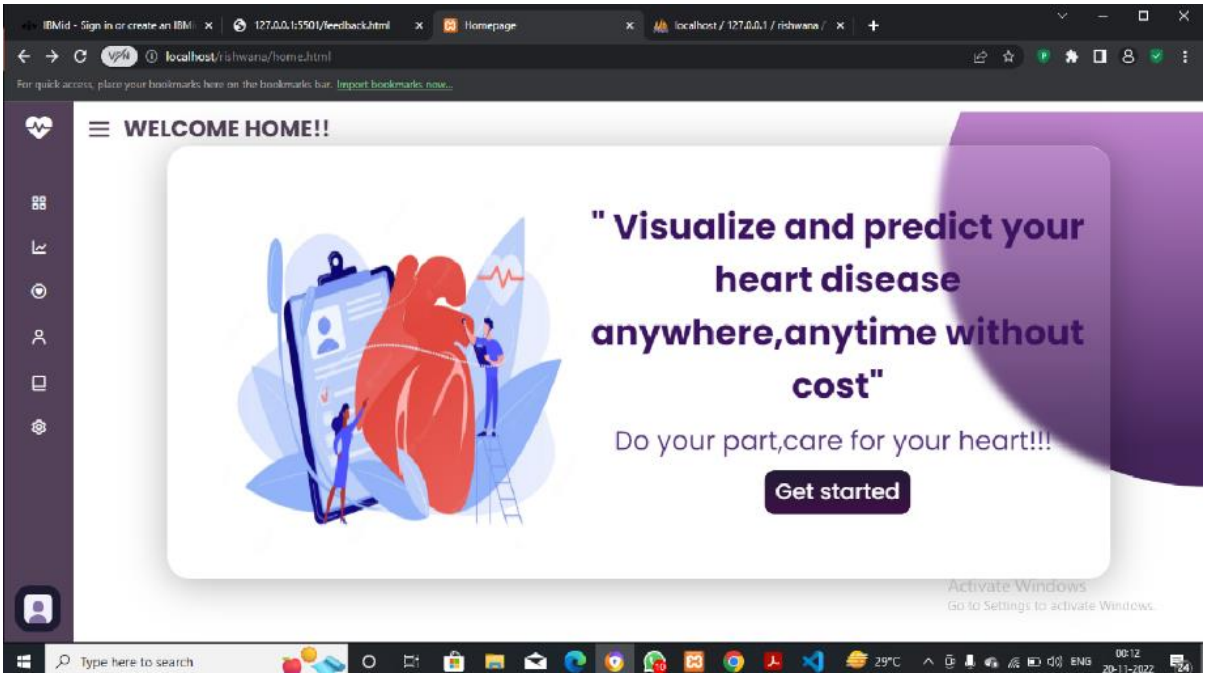
3. Test Case Analysis

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

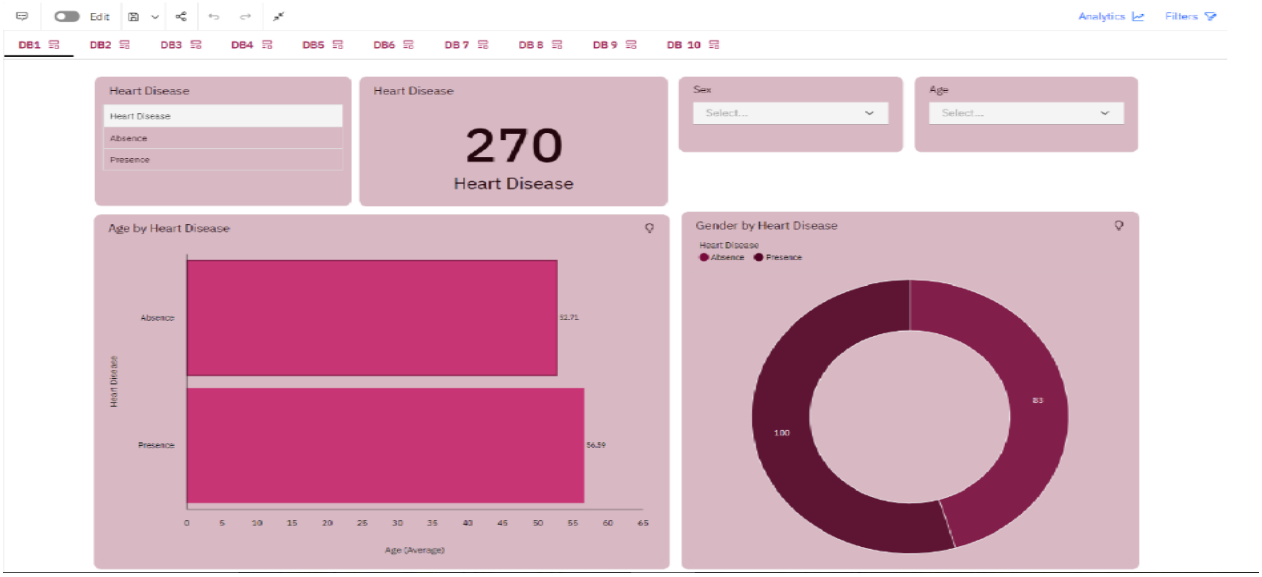
Section	Total Cases	Not Tested	Fail	Pass
Print Engine	13	0	0	13
Client Application	50	0	0	50
Security	1	0	0	1
Exception Reporting	1	0	0	1
Final Report Output	4	0	0	4
Version Control	1	0	0	1

CHAPTER 9
RESULTS

Homepage

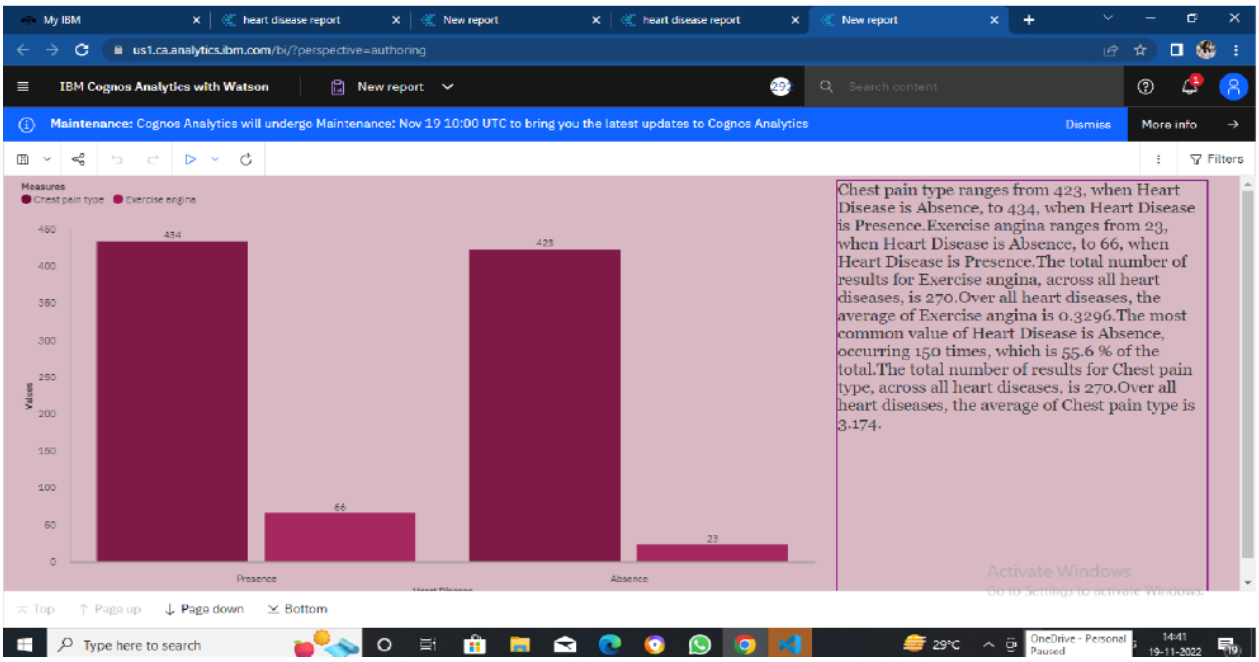


Dashboard

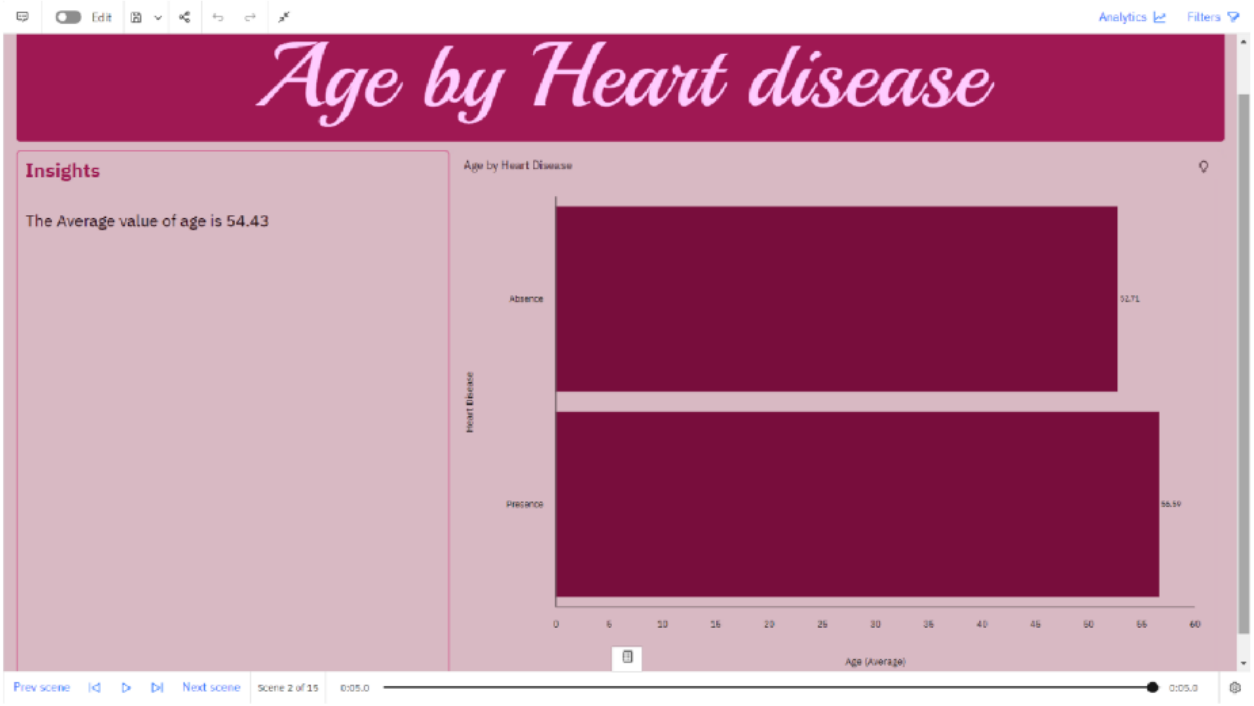


Edit
Analytics
Filters
DB1
DB2
DB3
DB4
DB5
DB6
DB7
DB8
DB9
DB 10
Age
Select...
Sex
Select...
Heart Disease
270
Heart Disease
Average Cholesterol
249.659
Cholesterol
Cholesterol by Age and Gender
Sex
0
1
Cholesterol (Sum)
Age

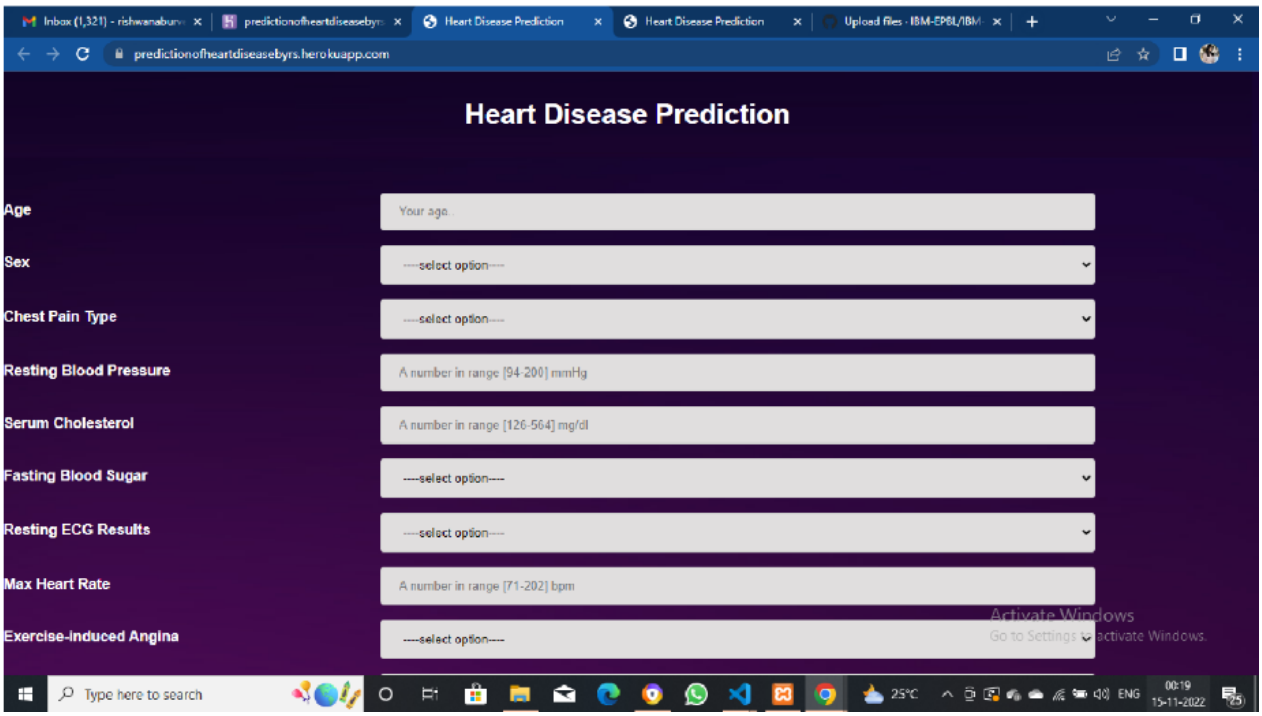
Report

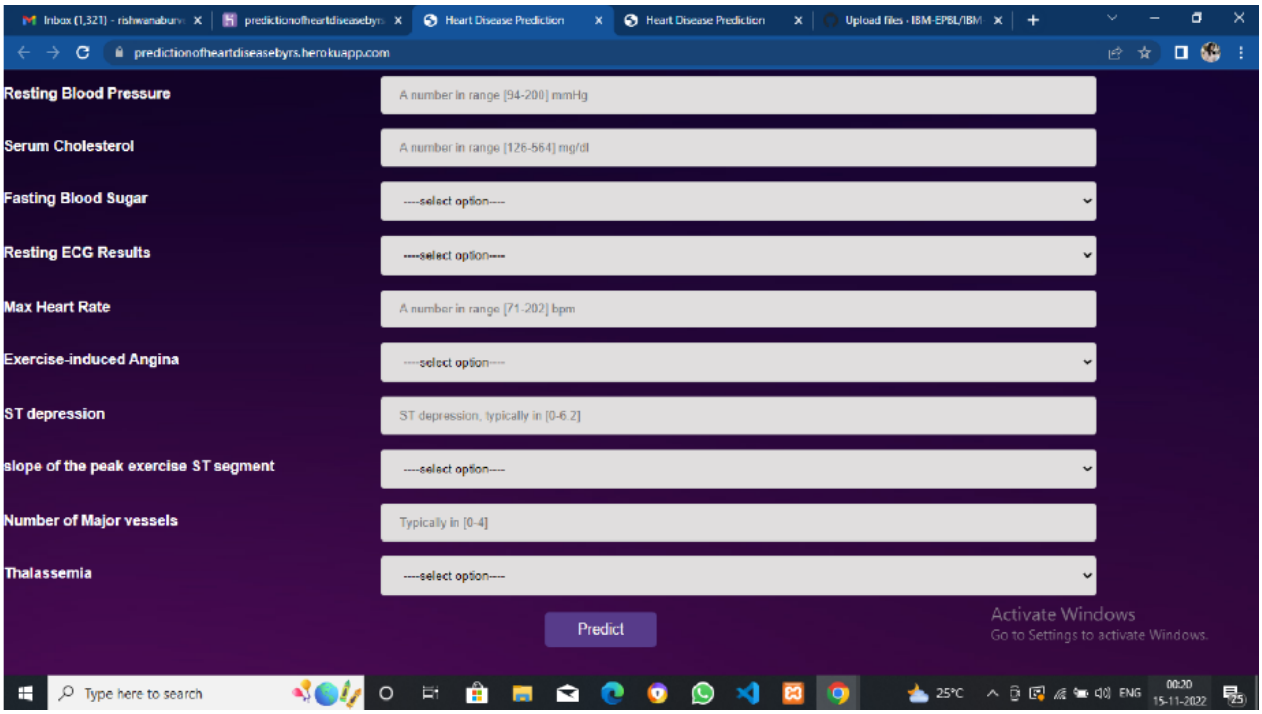

My IBM
heart disease report
New report
heart disease report
New report
us1.ca.analytics.ibm.com/bi/?perspective=authoring
IBM Cognos Analytics with Watson
New report
Search content
Maintenance: Cognos Analytics will undergo Maintenance: Nov 19 10:00 UTC to bring you the latest updates to Cognos Analytics
Dismiss
More info
Filters
Measures
Chest pain type
Exercise engine
Values
434
66
423
23
Presence
Absence
Chest pain type ranges from 423, when Heart Disease is Absence, to 434, when Heart Disease is Presence.Exercise angina ranges from 23, when Heart Disease is Absence, to 66, when Heart Disease is Presence.The total number of results for Exercise angina, across all heart diseases, is 270.Over all heart diseases, the average of Exercise angina is 0.3296.The most common value of Heart Disease is Absence, occurring 150 times, which is 55.6 % of the total.The total number of results for Chest pain type, across all heart diseases, is 270.Over all heart diseases, the average of Chest pain type is 3.174.
Top
Page up
Page down
Bottom
Type here to search
29°C
OneDrive - Personal
Paused
14:41
19-11-2022

Story

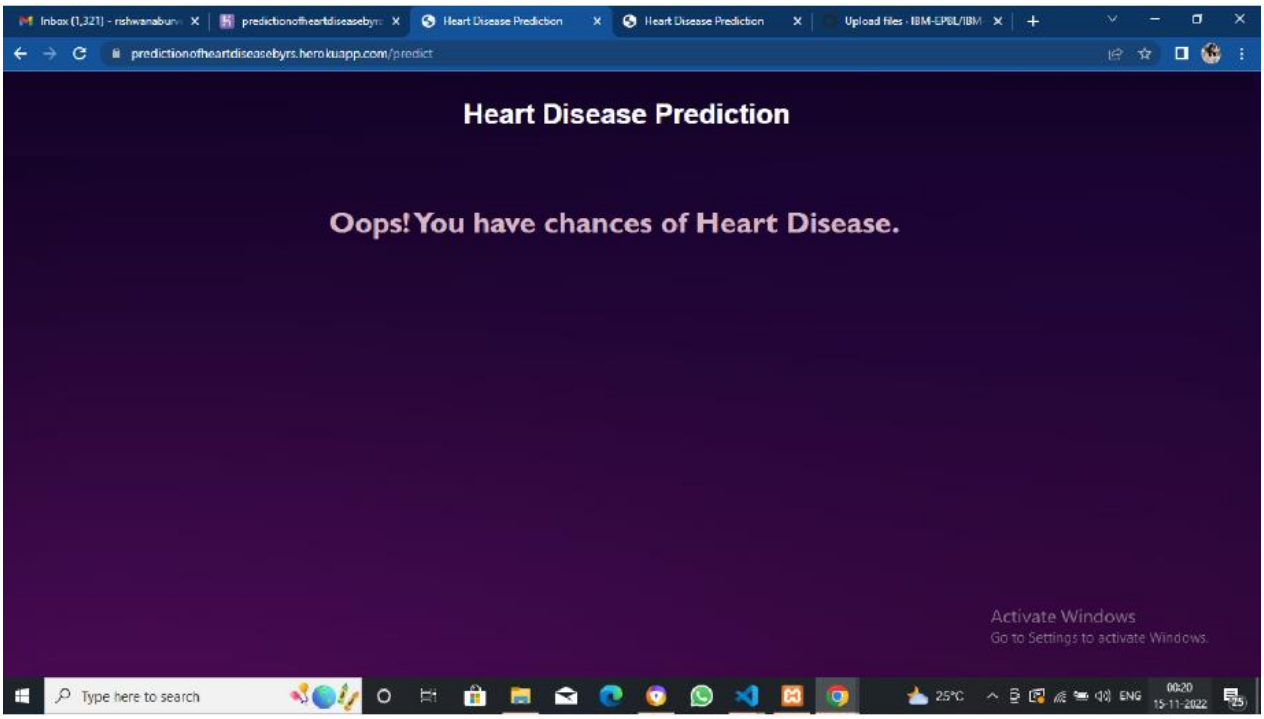


Prediction Form





Prediction Result



9.1.1. Performance Metrics

S.No.	Parameter	Screenshot / Values
1.	Dashboard design	No of Visualizations / Graphs - 10
2.	Data Responsiveness	**HEART DISEASE PREDICTION DATASET** This dataset contains 14 columns and This dataset consists of features that can be used to predict which patients have a high risk of heart disease such as age, sex, Chest pain type, Resting Blood Pressure, Serum Cholesterol, Fasting Blood Sugar, Resting ECG results, EKG results, Max HR, Exercise angina, ST depression, Slope of ST, Number of vessels fluro and Thallium
3.	Amount Data to Rendered (DB2 Metrics)	270 values
4.	Utilization of Data Filters	Utilization of data filters - 62
5.	Effective User Story	No of Scene Added - 15
6.	Descriptive Reports	No of Visualizations / Graphs - 7

CHAPTER 10
ADVANTAGES & DISADVANTAGES

10.1 Advantages

1. Helps in reduction of work for doctors
2. Users can know the result anywhere and anytime without any delay
3. Can change parameters of charts in dashboard
4. This is saving cost and time to undergo medical tests and check-ups and ensuring that the patient can monitor his health on his own

10.2 Disadvantages

1. Can have unwanted biases and errors
2. Diagnosis from doctor is more trusted than an online predictor
3. The result of the application depends upon the accuracy of the algorithms

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 that helps to predict the chances of a user having heart disease. The proposed application uses Risk Factors, which need to be identified by Medical Professionals before using the application. The result may vary based on the identified Risk Factors. If the Risk Factors identified are less accurate or wrong, the application may give wrong results

CHAPTER 12
FUTURE SCOPE

Using more accurate dataset with more necessary parameters, the accuracy of prediction can be increased. In collaboration with hospitals, doctors can be suggested with contact information. The dashboard can be expanded to have more charts and relations. Can also be connected to smart watch that helps to notify hospitals nearby if the user gets a sudden heart attack.

CHAPTER 13
APPENDIX

Git link (source code) -

https://github.com/IBM-EPBL/IBM-Project-40222-1660626217/tree/main/final%20deliverables

Demo link -

https://youtu.be/7kB_-RA5Xfo