Visualizing And Predicting Heart Diseases With An Interactive Dash Board

PROJECT REPORT

TEAM ID	PNT2022TMID43537
TEAM LEADER	ALVIN K JOY
TEAM MEMBERS	1. JEEVA S 2. KARTHIK R

1. INTRODUCTION:

1.1 PROJECT OVERVIEW:

According to the World Health Organization, every year 12 million deaths occur worldwide due to Heart Disease. Heart disease is one of the biggest causes of morbidity and mortality among the population of the world. Prediction of cardiovascular disease is regarded as one of the most important subjects in the section of data analysis. The load of cardiovascular disease is rapidly increasing all over the world from the past few years. Numerous studies have been undertaken in an effort to identify the most significant risk factors for heart disease and to precisely forecast the general risk Even the silent killer of heart disease, which causes the person's death without obvious symptoms. early heart disease detection plays a crucial role in determining whether high-risk individuals should make lifestyle modifications and in lessens the complications in turn.
Machine learning proves to be effective in assisting in making decisions and predictions from the large quantity of data produced by the health care industry. This project aims to predict future Heart Disease by analysing data of patients which classifies whether they have heart disease or not using machine-learning algorithms. Machine Learning techniques can be a boon in this regard. There is a common set of basic risk factors that determine whether someone will ultimately be at risk for heart disease, although heart disease can manifest itself in various ways. We may say that this technique can be very well fitted to accomplish the prediction of heart disease by gathering the data from many sources, classifying them under acceptable categories, and then analysing to obtain the needed data.

1.2 PURPOSE:

The main purpose of doing this research is to present a heart disease prediction model for the prediction of occurrence of heart disease. Further, this research work is aimed towards identifying the best classification algorithm for identifying the possibility of heart disease in a patient. This work is justified by performing a comparative study and analysis using three classification algorithms namely Naïve Bayes, Decision Tree, and Random Forest are used at different levels of evaluations. Although these are commonly used machine learning algorithms, the heart disease prediction is a vital task involving the highest possible accuracy. Hence, the three algorithms are evaluated at numerous levels and types of evaluation strategies. This will provide researchers and medical practitioners to establish a better.

2.LITERATURE SURVEY:

2.1 EXISTING SYSTEM:

Bo Jin, Chao Che et al. (2018) proposed a “Predicting the Risk of Heart Failure With EHR Sequential Data Modelling” model designed by applying neural network. This paper used the electronic health record (EHR) data from realworld datasets related to congestive heart disease to perform the experiment and predict the heart disease before itself. We tend to use 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 analysing the results, we tend to reveal the importance of respecting the sequential nature of clinical records **[1]**.

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 show that the overwhelming majority of the rules helps within the best prediction of coronary sickness **[2].**

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 cardiovascular disease. This model is principally optimized for using grid search algorithmic program.

Two forms of experiments are used for cardiovascular disease prediction. In the first form, only a random forest model is developed and within the second experiment the proposed Random Search Algorithm based random forest model is developed. This methodology is efficient and less complex than the conventional random forest model. Comparing to conventional random forest it produces 3.3% higher accuracy. The proposed learning system can help physicians to improve the quality of heart failure detection **[3]**.

“Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques” proposed by Senthilkumar Mohan, Chargehand Malathion et al. (2019) was an efficient technique using hybrid machine learning methodology. The hybrid approach is a combination of random forest and linear method. The dataset and subsets of attributes were collected for prediction. The subset of some attributes were chosen from the pre-processed knowledge(data) set of cardiovascular disease .After prep-processing, the hybrid techniques were applied and diagnosis the cardiovascular disease **[4]**.

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 the 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 **[5].**

M.Satish, et al. (2015) used different Data Mining techniques like Rule based, Decision Tree, Navie Bayes, and Artificial Neural Network. An efficient approach called pruning- classification association rule (PCAR) was used to generate association rules from cardiovascular disease warehouse for prediction of Heart Disease. Heart attack data warehouse was used for pre-processing for mining. All the above discussed data mining techniques were described **[6].**

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 **[7].**

"Prediction and Diagnosis of Heart Disease by Data Mining Techniques" designed by Bosham Bahrami, Misaddress 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**[8]**.

Mamatha Alex P and Shaicy P Shaji (2019) designed | | "Prediction and Diagnosis of Heart Disease Patients using Data Mining Technique". This paper uses techniques of Artificial Neural Network, KNN, Random Forest and Support Vector Machine. Comparing with the above mentioned classification techniques in data mining to predict the higher accuracy for diagnosing the heart disease is Artificial Neural Network**[9].**

2.2 REFERENCES:

[1] Bo Jin ,Chao Che, Zhen Liu, Shulong Zhang, Xiaomeng Yin, And Xiaopeng Wei, “Predicting the Risk of Heart Failure With EHR Sequential Data Modeling” ,IEEE Access 2018.

[2] Aakash Chauhan , Aditya Jain , Purushottam Sharma , Vikas Deep, “Heart Disease Prediction using Evolutionary Rule Learning”, “International Conference on "Computational Intelligence and Communication Technology” (CICT 2018).

[3] Ashir Javeed, Shijie Zhou, Liao Yongjian, Iqbal Qasim, Adeeb Noor, Redhwan Nour4, Samad Wali And Abdul Basit , “An Intelligent Learning System based on Random Search Algorithm and Optimized Random Forest Model for Improved Heart Disease Detection” , IEEE Access 2017.

[4] Senthilkumar Mohan, Chandrasegar Thirumalai, and Gautam Srivastava, “Effective Heart Disease Prediction Using Hybrid Machine Learning Techniques”, IEEE Access 2019.

[5] K.Prasanna Lakshmi, Dr. C.R.K.Reddy, “Fast Rule-Based Heart Disease Prediction using Associative Classification Mining”, IEEE International Conference on Computer, Communication and Control (IC4-2015).

[6] M.Satish, D Sridhar, “Prediction of Heart Disease in Data Mining Technique”, International Journal of Computer Trends & Technology (IJCTT), 2015.

[7] Lokanath Sarangi, Mihir Narayan Mohanty, Srikanta Pattnaik, “An Intelligent Decision Support System for Cardiac Disease Detection”, IJCTA, International Press 2015.

[8] Boshra Bahrami, Mirsaeid Hosseini Shirvani, “Prediction and Diagnosis of Heart Disease by Data Mining Techniques”, Journal of Multidisciplinary Engineering Science and Technology (JMEST) ISSN: 3159-0040 Vol. 2 Issue 2, February–2015.
[9] Mamatha Alex P and Shaicy P Shaji,“Prediction and Diagnosis of Heart Disease Patients using Data Mining Technique”, International Conference on Communication and Signal Processing 2019.

[10] Shantakumar B.Patil and Y.S.Kumaraswamy, “Intelligent and Effective Heart Attack Prediction System Using Data Mining and Artificial Neural Network”, European Journal of Scientific Research, Vol.31, No.4, pp.642-656, 2009
[11] Peter, T.J, Somasundaram, K “An empirical study on prediction of heart disease using classification data mining techniques” International Conference on Advances in Engineering, Science and Management (ICAESM) 2012.

[12] Mai Shouman, Tim Turner, Rob Stocker, “ Using data mining techniques in heart disease diagnosis and treatment”, IEEE Japan-Egypt Conference on Electronics, Communications and Computers, 2012.
[13] Syed Umar Amin, Kavita Agarwal, Dr. Rizwan Beg “Genetic Neural Network based Data mining in prediction of Heart disease using risk factors” IEEE Conference on Information and Communication Technologies (ICT 2013).

[14] Shamsher Bahadur Patel, Pramod Kumar Yadav and Dr. D.P.Shukla, “Predict the Diagnosis of Heart Disease Patients using classification Mining Techniques”, IOSR Journal of Agriculture and Veterinary Science (IOSR-JAVS), 2013.
[15] Dubey A, Patel R, Choure K, "An efficient data mining and ant colony optimization technique (DMACO) for heart disease prediction", International Journal of Advanced Technology and Engineering Exploration.; 1(1):1-2014.

[16] “Genetic Neural Network based Data mining in prediction of Heart disease using risk factors”, Syed Umar Amin1, Kavita Agarwal2, Dr. Rizwan Beg Proceedings of 2013 IEEE Conference on Information and Communication Technologies (ICT 2013).
[17] G. Purusothama and P. Krishnakumari, “A Survey of Data mining techniques on risk prediction: Heart disease”, Indian Journal of Science and Technology, 2015.

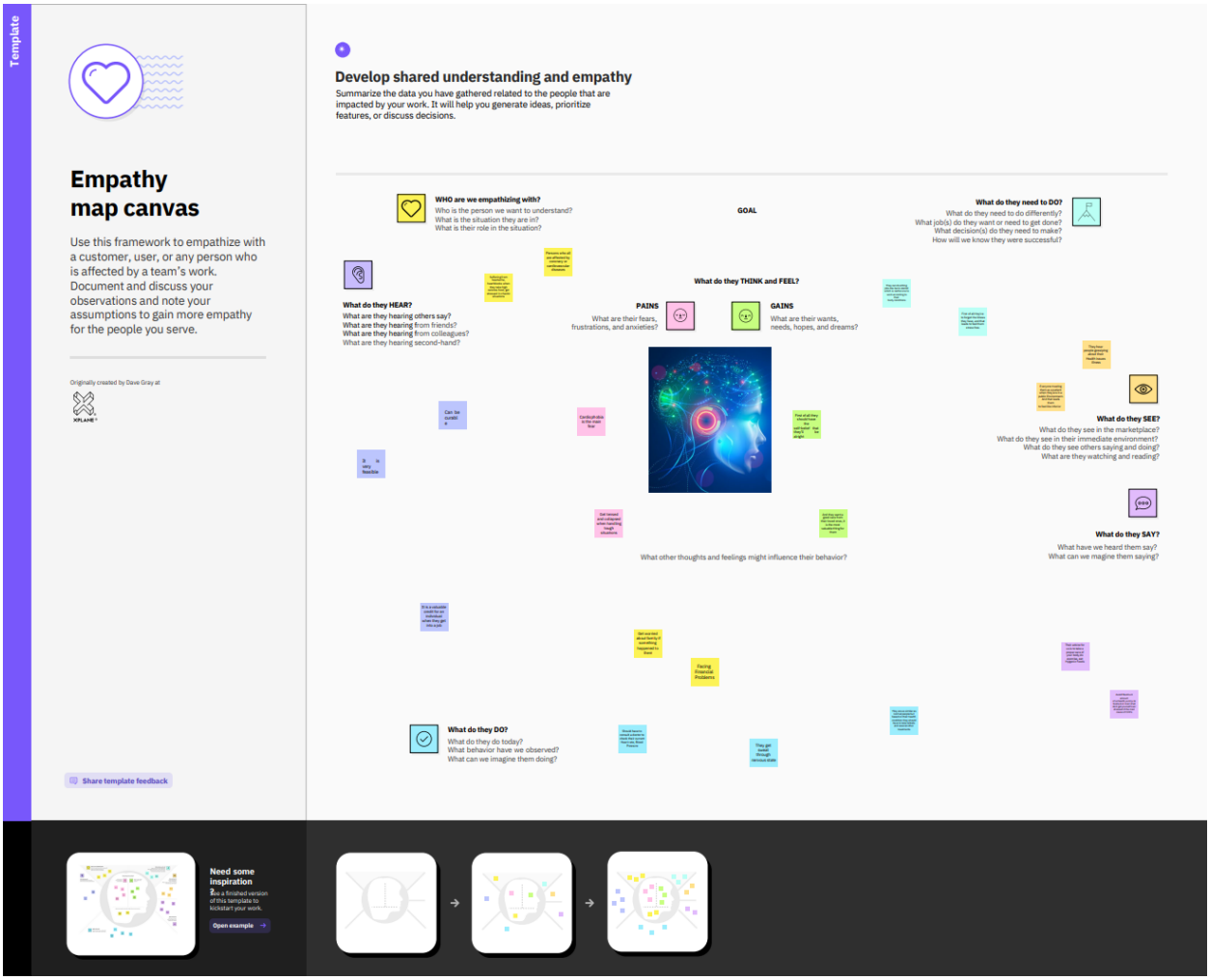
2.3 PROBLEM STATEMENT DEFINITION:

Who does the Problem Affect?	This problem can involve major structural issues, such as the absence of a ventricle or problems with unusual connections between the main arteries that leave the heart. It is caused by the people having age of more than 46 years. This is also a disease passed down by hereditary.
Some issues of heart diseases	• Heart attacks • Heart failure • Arrhythmia • Valve disease. ... • High blood pressure. ... • Congenital heart conditions. ... Inherited heart conditions. • Unstable angina.

When does the heart related issues occur	This issue occurs in men/people with unstable lifestyle and in people above the age of 45 or above.
Where is the issue coming	This issue is coming originates from people who have an unstable health conditions. A heart attack occurs when an artery that sends blood and oxygen to the heart is blocked. Fatty, cholesterol-containing deposits build up over time, forming plaques in the heart's arteries
Why is it important so we fix the problem	There are 2,380 deaths from CVD each day, based on 2018 data. On average, someone in the US has a stroke every 40 seconds. There are about 795,000 new or recurrent strokes each year, based on 1999 data. On average, someone dies of a stoke every 3 minutes and 33 seconds in the US. About 697,000 people died from heart disease in 2020—that's 1 in every 5 deaths. So it is important to create a predictor to mitigate this problem

3. IDEATION & PROPOSED SOLUTION:

3.1 EMPATHY MAP CANVAS



3.2 IDEATION & BRAINSTORMING:

STEP 1:

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

How might we [your problem statement]?

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.

STEP 2:

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!

Alvin K Joy

- Special care for genetic heart diseases
- Advices for heart diseases prevention
- Consultancy 24/7 support
- Heart beat rate prediction

Jeeva S

- Finding symptoms for prediction
- Real time visual analysis
- Blood sugar level prediction
- Chest pain prediction

Chiranjeevi M

- Mental trackin g
- Fitness trackin g
- Sleep trackin g
- Healthy practice s

Karthik R

- Cholestero l prediction
- Blood pressure prediction
- Proper diet
- Regular screening

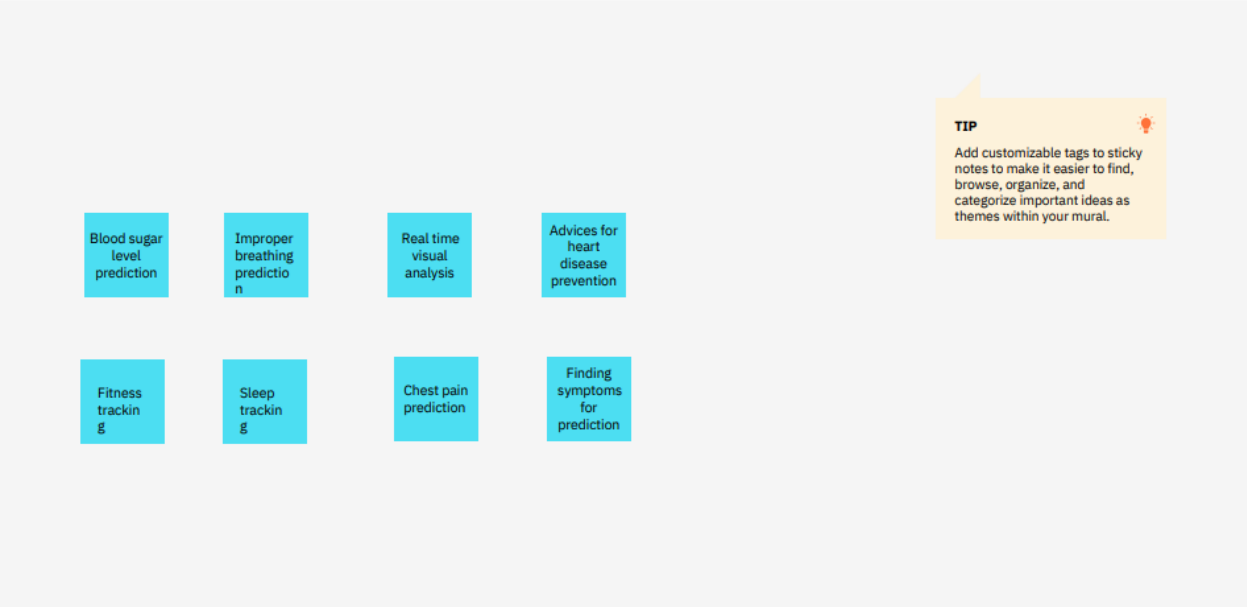
STEP 3:

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 and break it up into smaller sub-groups.

20 minutes



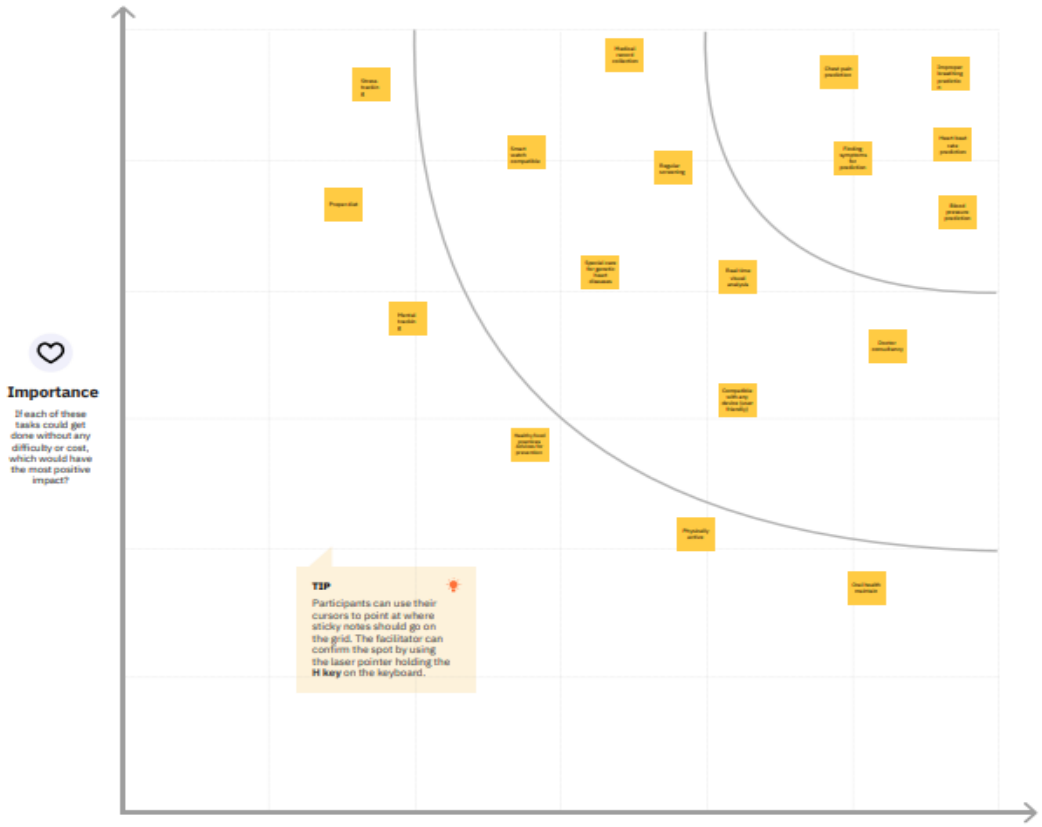
STEP 4:

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



STEP 5:

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

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

B **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 →

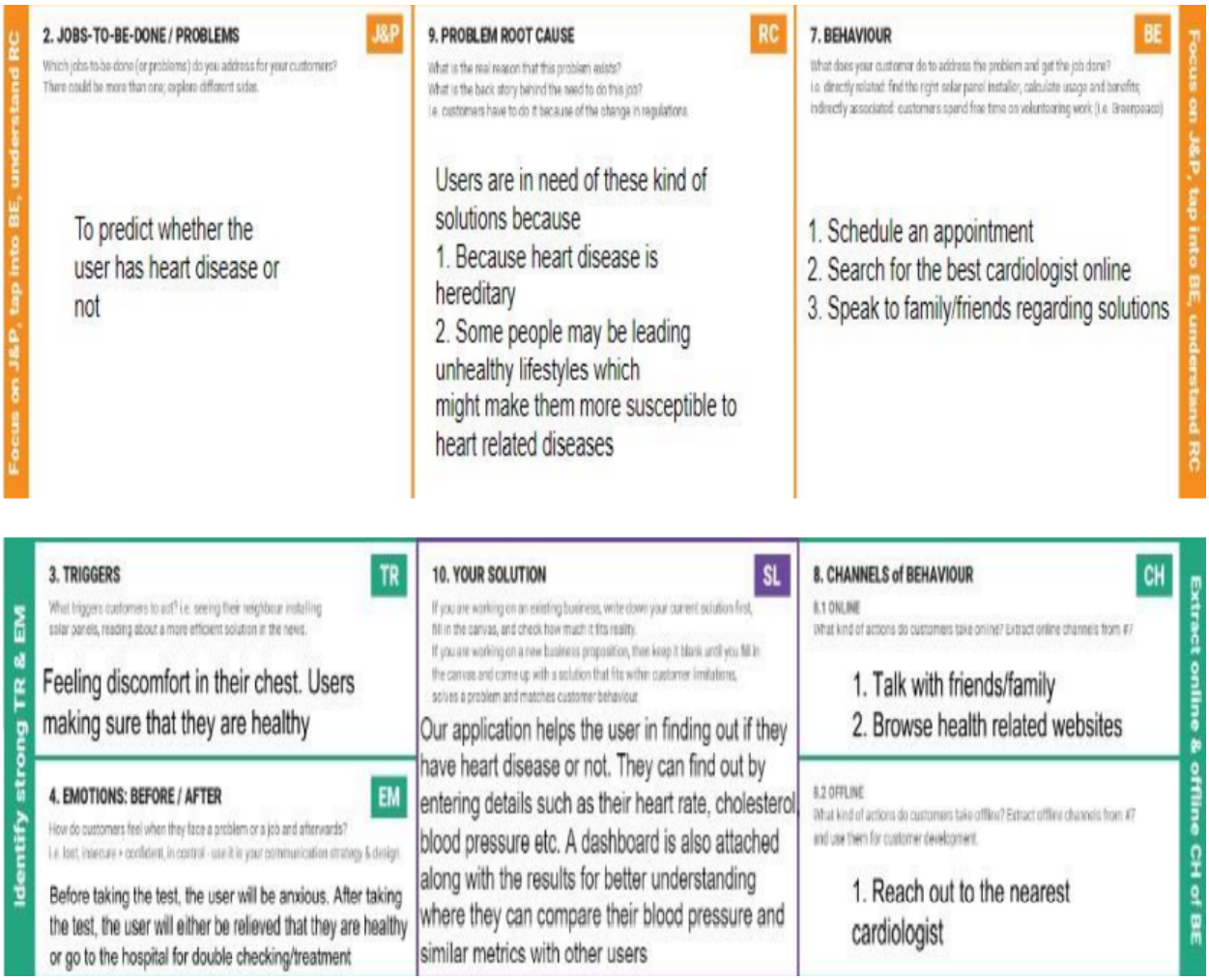
Share template feedback

3.3 PROPOSED SOLUTION:

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	Analysing 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:


Focus on J&P, tap into BE, understand RC
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.
To predict whether the user has heart disease or not
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.
Users are in need of these kind of solutions because
1. Because heart disease is hereditary
2. Some people may be leading unhealthy lifestyles which might make them more susceptible to heart related diseases
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)
1. Schedule an appointment
2. Search for the best cardiologist online
3. Speak to family/friends regarding solutions
Focus on J&P, tap into BE, understand RC
Identify strong TR & EM
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.
Feeling discomfort in their chest. Users making sure that they are healthy
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.
Before taking the test, the user will be anxious. After taking the test, the user will either be relieved that they are healthy or go to the hospital for double checking/treatment
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.
Our application helps the user in finding out if they have heart disease or not. They can find out by entering details such as their heart rate, cholesterol blood pressure etc. A dashboard is also attached along with the results for better understanding where they can compare their blood pressure and similar metrics with other users
8. CHANNELS of BEHAVIOUR
CH
8.1 ONLINE
What kind of actions do customers take online? Extract online channels from #7
1. Talk with friends/family
2. Browse health related websites
8.2 OFFLINE
What kind of actions do customers take offline? Extract offline channels from #7 and use them for customer development.
1. Reach out to the nearest cardiologist
Extract online & offline CH of BE

4. REQUIREMENT ANALYSIS:

4.1 FUNCTIONAL REQUIREMENT:

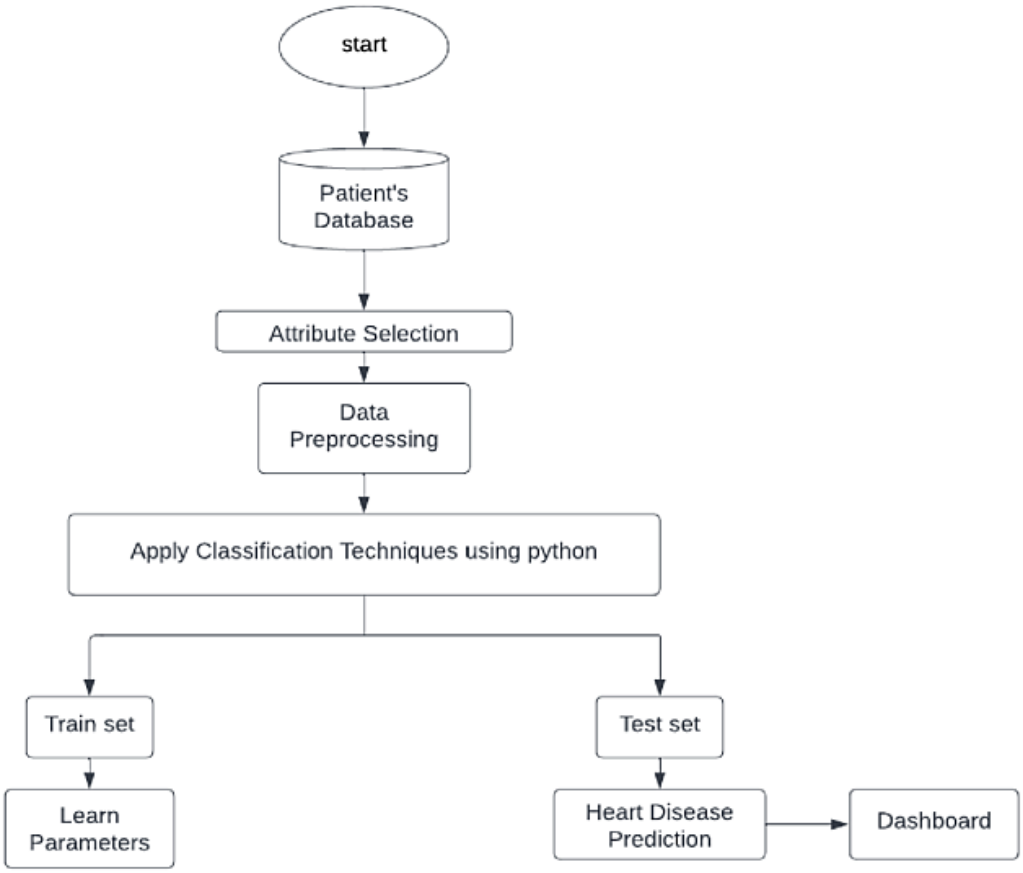
FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	User Registration	Registration through dashboard Registration through app Registration through link
FR-2	User Fill the Particular	User fill through the online User fill through the application
FR-3	User Confirmation	User confirmation through Gmail User confirmation through notification

4.2 NON - FUNCTIONAL REQUIREMENT:

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Used to improve the accuracy of the Heart Diseases Prediction
NFR-2	Security	In this project we secure more lives early
NFR-3	Reliability	Reliability for accessing the attributes of cardiovascular patients about the Illness
NFR-4	Performance	The performance of this project is to Improve the accuracy of the diseases prediction
NFR-5	Availability	The availability solution is more beneficial for all type persons to predict the heart diseases

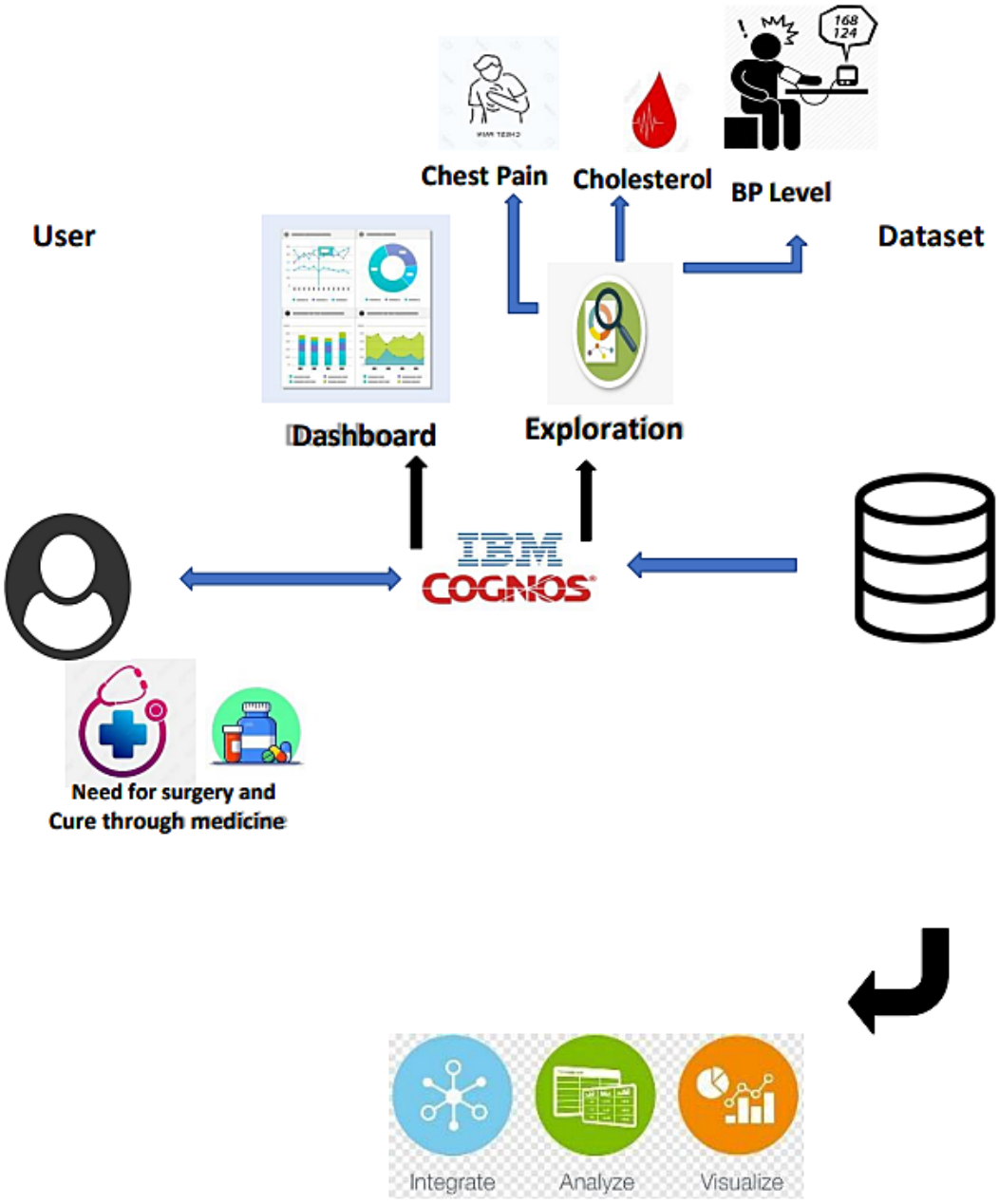
5. PROJECT DESIGN:

5.1 DATA FLOW DIAGRAMS:



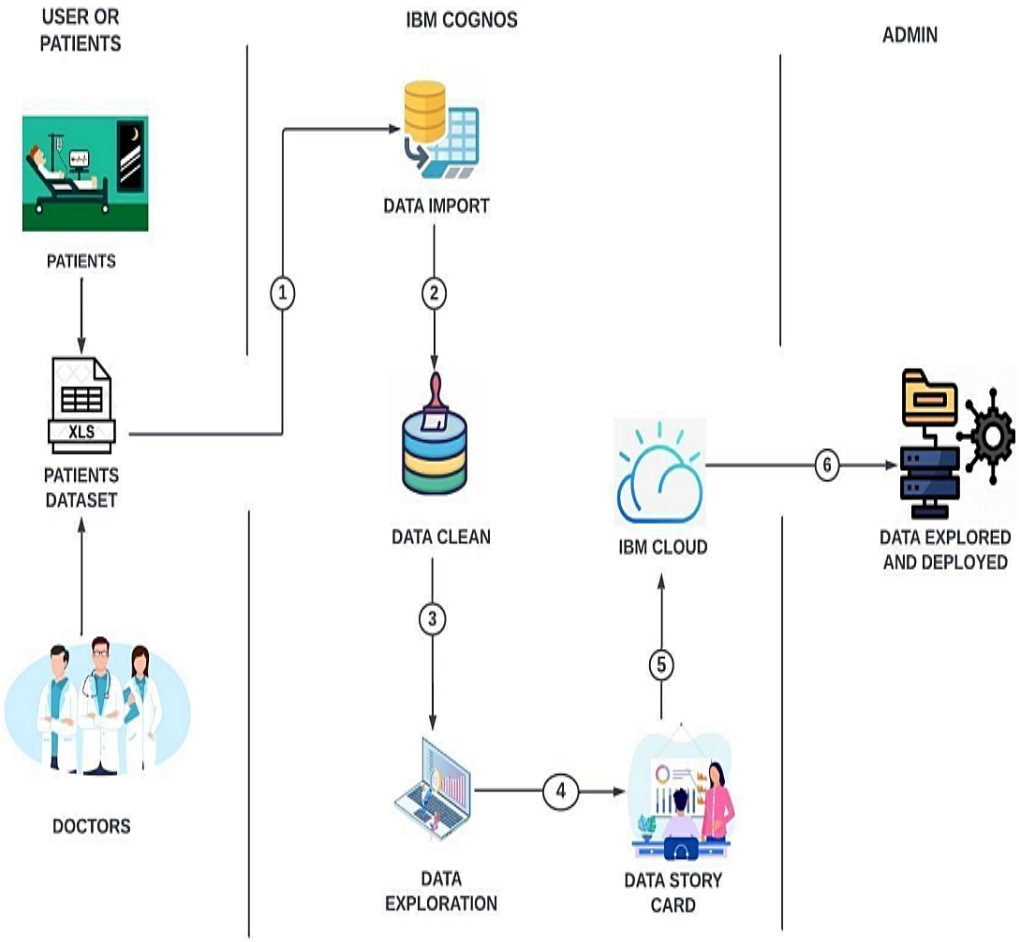
5.2 SOLUTION & TECHNICAL ARCHITECTURE:

Solution Architecture:



Technology Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table2



5.3 USER STORIES:

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-1
		USN-4	As a user, I can register for the application through Gmail	I can register & access the dashboard with Gmail Login	Medium	Sprint-1
	Login	USN-5	As a user, I can log into the application by entering email & password	I can register & access the dashboard with Gmail Login and password	High	Sprint-1
Customer (Web user)	Dashboard	USN-6	As a user , I can view his/her complete medical analysis and accuracy of disease prediction.	I can view my medical analysis in the dashboard	High	Sprint-2
		USN-7	As a user, I can check the risk factors and prevention tips	I can read the prevention tips	High	Sprint-2
		USN-8	As a user, I can check the treatment options	I can read the treatment options	High	Sprint-2
Customer Care Executive	Helpdesk	USN-9	As a customer care executive, he/she can view the customer queries	I can post my queries in the dashboard	High	Sprint-3
		USN-10	As a customer care executive, he/she can answer the customer queries.	I can get support from helpdesk	High	Sprint-3
Administrator	User Profile	USN-11	As an admin, he/she can update the health details of users.	I can view my updated health details	High	Sprint-4
		USN-12	As an admin, he/she can add or delete users	I can access my account/Dashboard when logged in	High	Sprint-4
		USN-13	As an admin, he/she can update the risk and prevention tips	I can update the risk factors and prevention tips	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	Registration	USN-1	As a user, I can register for the application by entering my email, password, and confirming my password.	2	High	1
Sprint-1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	High	2
Sprint-2		USN-3	As a user, I can register for the application through Facebook	2	Low	3
Sprint-1		USN-4	As a user, I can register for the application through Gmail	2	Medium	3
Sprint-1	Login	USN-5	As a user, I can log into the application by entering email & password	1	High	2
Sprint-2	Dashboard	USN-6	Profile - view & update your profile	2	High	3
Sprint-1		USN-7	Change Password - user can change the password	1	High	2
Sprint-1		USN-8	Home - Analyse your Heart	2	High	3

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3		USN-9	The user will have to fill in the below 13 fields for the system to predict a disease -Age in Year -Gender -Chest Pain Type -Fasting Blood Sugar -Resting Electrographic Results -Exercise Induced Angina -The slope of the peak exercise ST segment -CA – Number of major vessels coloured by fluoroscopy -Thal -Trest Blood Pressure -Serum Cholesterol -Maximum heart rate achieved -ST depression induced by exercise	2	High	3
		USN-10	View Doctors - view doctor detail by searching by names or filter by specialty	1	Medium	3
Sprint-3	System Requirement	USN-11	I. Hardware Requirement i. Laptop or PC □ I5 processor system or higher	2	High	2

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
			• 4 GB RAM or higher • 128 GB ROM or higher ii. Android Phone (12.0 and above)			
Sprint-3		USN-12	II.Software Requirement iii. Laptop or PC ➢ Window 10or higher ➢ Android Studio	2	Medium	2
Sprint-4	Dashboard	USN-13	Query	1	High	1
		USN-14	Toll Free	1	High	1
		USN-15	Ratings	2	Medium	2
		USN-16	Verification	2	High	2
		USN-17	Validation	1	High	2
		USN-18	Feedback – send feedback to the Admin	2	Medium	3

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	18	06 Nov 2022
Sprint-3	20	6 Days	07 Nov 2022	12 Nov 2022	20	11 Nov 2022
Sprint-4	20	6 Days	14 Nov 2022	19 Nov 2022	19	19 Nov 2022

7.CONCLUSION & FUTURE SCOPE:

Heart diseases are a major killer in India and worldwide, application of promising technology like machine learning to the initial prediction of heart diseases will profoundly impact 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 medicine. The number of people facing heart diseases is on a rise 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. In this paper, the seven different machine learning algorithms used to measure the performance are SVM, Decision Tree, Random Forest, Naïve Bayes, Logistic Regression, Adaptive Boosting, and Extreme Gradient Boosting applied on the dataset. The expected attributes leading to heart disease in patients are available in the dataset which contains 76 features and 14 important features that are useful to evaluate the system are selected among them. If all the features taken into consideration then the efficiency of the system the author gets is less. To increase efficiency, attribute selection is done. In this n features have to be selected for evaluating the model which gives more accuracy. The correlation of some features in the dataset is almost equal and so they are removed. If all the attributes present in the dataset are taken into account then the efficiency decreases considerably. All the seven machine learning methods accuracies are compared based on which one prediction model is generated. Hence, the aim is to use various evaluation metrics like confusion matrix, accuracy, precision, recall, and f1-score which predicts the disease efficiently. Comparing all seven the extreme gradient boosting classifier gives the highest accuracy of 81%.

8. APPENDIX:

GIT HUB LINK:

https://github.com/IBM-EPBL/IBM-Project-52519-1661008941

PROJECT DEMO LINK:

https://clipchamp.com/watch/BKJwJ9eIrFA