VISUALIZING AND PREDICTING HEART DISEASE WITH AN INTERACTIVE DASHBOARD

A PROJECT REPORT

SUBMITTED BY

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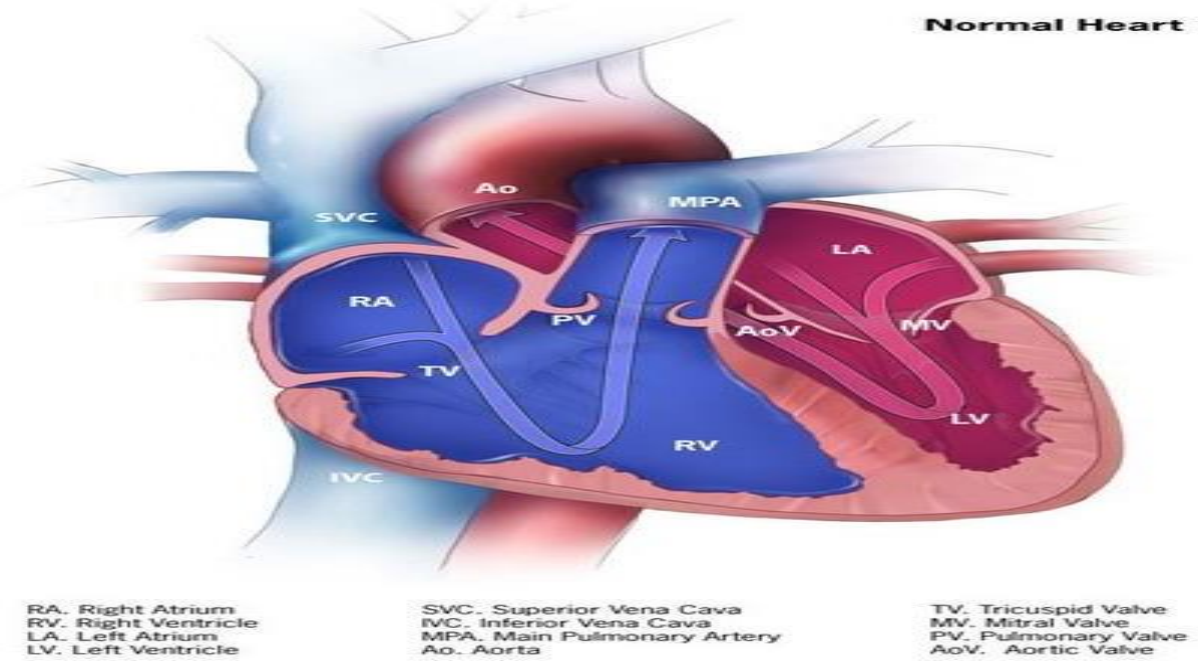
INTRODUCTION

Heart disorder has created a whole lot of extreme concerned among researches; one of the primary challenges in coronary heart disease is accurate detection and finding presence of it inner a human. Early techniques have no longer been a lot efficient in locating it even medical professor are not a lot green sufficient in predicating the heart ailment. There are various medical contraptions available in the marketplace for predicting coronary heart disease there are two principal issues in them, the first one is that they're very lots steeply-priced and second one is that they are no longer correctly capable of calculate the threat of coronary heart sickness in human. According to trendy survey conducted by using WHO, the scientific expert able to correctly predicted best 67% of coronary heart sickness so there's a huge scope of research in place of predicating coronary heart disease in humanWith development in computer technology has added good sized possibilities in exceptional regions, medical technological know-how is one of the fields in which the device of computer science may be used. In software regions of pc science varies from metrology to ocean engineering. Medical technological know-how also used a number of the primary available tools in computer technology; in ultimate decade artificial intelligence has gained its second due to development in computation electricity. Machine Learning is one such tool which is broadly utilized in different domain names as it doesn't require specific algorithm for exceptional dataset. Reprogrammable capacities of system getting to know carry a whole lot of energy and opens new doorways of opportunities for vicinity like clinical technological know-howIn medical technological know-how coronary heart ailment is one of the major demanding situations; due to the fact a number of parameters and technicality is involve for accurately predicating this sickness. Machine learning will be a higher preference for reaching high accuracy for predicating not best coronary heart disorder however additionally another illnesses because this vary tool makes use of feature vector and its diverse statistics kinds under numerous circumstance for predicating the heart disease, algorithms which includes Naïve Bayes, Decision Tree, KNN, Neural Network, are used to predicate danger of heart sicknesses every algorithm has its speciality consisting of Naive Bayes used possibility for predicating coronary heart ailment, whereas decision tree is used to provide classified record for the heart ailment, while the Neural Network provides opportunities to minimise the mistake in predication of heart disorder. All those techniques are the usage of vintage patient report for purchasing predication about new affected person. This predication machine for coronary heart ailment helps medical doctors to are expecting heart disorder within the early stage of sickness resulting in saving millions of existence.

The symptoms of the Heart Attack :

1. Chest Pain: The maximum commonplace signal of a coronary heart attack is chest pain. It mainly takes place purpose of the blockage of the coronary vessel of the frame due to the plaque.
2. Arms pain: The ache typically begins within the chest and circulate in the direction of the arm mainly left arm.
3. Low in oxygen: Because of the plaque the extent of oxygen drops within the body and causes the dizziness and loss of stability.
4. Tiredness: this purpose for fatigues way easy chores come to be harder to do.
5. Excessive Sweating: Another not unusual symptom is sweating.
6. Heart disease prediction
7. Diabetics: In this, the patients have a heart price of ~ 100 bpm and also once in a while having a heart rate of 130bpm.
8. Bradycardia: In this, the patient will have a slower heartbeat of 60 bpm.
9. Cerebrovascular Disease: The affected person could have a excessive heart fee than regular typically of two hundred bpm and better than this could cause a Heart assault.



This survey paper is devoted for huge scope survey within the discipline of gadget mastering approach in heart disorder. Later part of this survey paper will discusses approximately diverse machine studying set of rules for coronary heart disease and their relative contrast on the numerous parameter. It additionally shows destiny prospectus of device mastering set of rules in coronary heart ailment. This paper also does a deep analysis on utilization of deep learning in discipline of predicting heart disease.

PROJECT OVERVIEW

Several experiments are carried out on clinical statistics sets the usage of a couple of classifiers and features choice techniques. There is little studies at the classification of the heart disease dataset. Many of them show desirable type accuracy. Proposed a hybrid technique in which system getting to know algorithms, Support Vector Machine (SVM) and Genetic Algorithm (G.A), are efficiently combined with the wrapper approach. The LIBSVM and the WEKA statistics mining tool are used to analyse the effects of this technique. Five statistics sets (Iris, diabetes disorder, breast cancer sickness, coronary heart disorder and hepatitis) are gathered from the Irvine UC gadget gaining knowledge of repository for this test. After applying the hybrid GA and SVM approach, an accuracy of 84.07% is acquired for coronary heart ailment. For all diabetes information, 78.26% accuracy is done. The accuracy for breast most cancers is 76.20%. The 86.12% accuracy is the result of hepatitis disease.

Coronary artery disease is detected and monitored with the aid of the proposed gadget. Cleveland Heart records are taken from the UCI. This dataset includes 303 cases and 76 attributes/functions. Thirteen features are used out of 76 capabilities. Two tests with three algorithms: Bayes Naive, Support vector gadget, and Functional Trees FT are executed for detection functions. The WEKA device is used for detection. After checking out the Holdout test, the 88.03% accuracy is finished the use of the SVM technique. In the move-validation test, SVM and Bayes internet offer eighty 3.08% accuracy. The accuracy of 81.5 % is executed after the usage of FT. The 7 high- quality capabilities are selected the usage of the Best First selection algorithm. For validation, cross-validation exams are used. By making use of the take a look at to the 7 excellent functions decided on, Bayes Naive achieved eighty 4.05% accuracy, SVM offers 85.01% accuracy and FT classifies 84.05% efficaciously.

2.PURPOSE

We purpose to design an give up to cease analytical model for prediction of heart sickness where inside the final diagnosis we use a complete of 14 attributes to expect the hazard chance of cardio-vascular disorder in patients body. We have a tendency to make our approach quite sturdy and scalable. It have to accomplish the centred purpose of information science studies To resolve real world eventualities (ex. Estimating the pattern and trends of coronary heart disease in a area of a rustic).

LITERATURE SURVEY

There are 35 studies papers that discover the computational strategies to predict heart illnesses. The summaries of them were offered in a nutshell. Shaikh Abdul Hannan . used a Radia Basis Function(RBF) to predict the scientific prescription for coronary heart disorder. About 300 patient's facts have been accumulated from the Sahara Hospital, Aurangabad. RBFNN (Radial Basis Function–Neural Network) may be described as a 3-layer feed ahead structure. The three layers are the enter layer, hidden layer and output layer. The hidden layer consists of a number of RBF units (nh) and bias (bk). Each neuron at the hidden layer uses a radial foundation characteristic as a nonlinear switch characteristic to perform on the enter statistics. The most often used RBF is often a Gaussian function. Designing a RBFNN entails choosing centres, number of hidden layer gadgets, width and weights. The diverse approaches of choosing the centres are random subset choice, k-manner clustering and others. The method was implemented in MATLAB. Obtained outcomes display that radial basis feature can be effectively used (with an accuracy of 90 to 97%) for prescribing the drugs for coronary heart disease.

AH Chen provided a heart ailment prediction system which can useful resource doctors in predicting coronary heart disease repute based on the clinical information of patients. Thirteen crucial clinical capabilities such as age, sex, chest pain kind have been selected. An synthetic neural network algorithm turned into used for classifying coronary heart disorder based totally on Those medical features. Data was collected from device gaining knowledge of repository of UCI. The artificial neural network version contained three layers i.E. The input layer, the hidden layer and the output layer having thirteen neurons, 6 neurons and 2 neurons respectively. Learning Vector Quantization (LVQ) changed into used in this observe. LVQ is a unique case of an artificial neural community that applies a prototype-based supervised category set of rules. C programming language was used as a tool to enforce coronary heart ailment category and prediction skilled via synthetic neural network. The system become advanced in C and C# surroundings. The accuracy of the proposed approach for prediction is near to 80%

Mrudula Gudadhe presented a selection help machine for coronary heart sickness type. Support vector system (SVM) and synthetic neural network (ANN) had been the main strategies used in this machine. A multilayer perceptron neural network (MLPNN) with three layers turned into hired to increase a choice assist gadget for the diagnosis of heart disorder. This multilayer perceptron neural network changed into trained by way of back-propagation set of rules which is computationally technique. Results confirmed that a MLPNN with returned-propagation technique can be successfully used for diagnosing heart ailment.

Manpreet Singh proposed a heart disease prediction machine based on Structural Equation Modelling (SEM) and Fuzzy Cognitive Map (FCM). They used Canadian Community Health Survey (CCHS) 2012 dataset. Here, twenty tremendous attributes have been used. SEM is used to generate the burden matrix for the FCM model which then predicts a opportunity of cardiovascular illnesses. A SEM version is defined with correlation among CCC 121(a variable which defines whether or not the respondent has coronary heart disorder) along with 20 attributes. To construct FCM a weight matrix representing the strength of the causal courting among ideas must be constructed first. The SEM described within the previous segment is now used because the FCM even though they have carried out the required ingredients (i.E. Weight matrix, ideas and causality).80% of the information set was used for education the SEM version and the ultimate 20% for checking out the FCM model. The accuracy acquired by using the use of this version became 74%

Carlos Ordonez has studied association rule mining with the educate and check idea on a dataset for heart disease prediction. Association rule mining has a downside that it produces extremely massive wide variety of regulations most of which are medically inappropriate. Also in standard, affiliation guidelines are mined on the complete records set without validation on an independent sample. In order to remedy this, the writer has devised an set of rules that uses seek constraints to reduce the number of rules. The algorithm then searches for association policies on a schooling set and eventually validates them on an independent check set. The scientific importance of found guidelines is then evaluated with assist, confidence and lift. Search constraints and take a look at set validation considerably reduce the wide variety of affiliation guidelines and convey a hard and fast of rules with high predictive accuracy. These policies constitute valuable clinical expertise.

Prajakta Ghadge have laboured on an smart coronary heart assault prediction device the use of big data. Heart attack wishes to be identified timely and successfully because of its excessive incidence. The objective of this research article is to find a prototype wise coronary heart attack prediction machine that makes use of huge facts and data mining modelling techniques. This gadget can extract hidden information (patterns and relationships) associated with heart disease from a given ancient heart disease database. This method uses Hadoop that's an open-supply software framework written in Java for allotted processing and garage of large datasets. Apache Mahout produced via Apache Software Foundation affords loose implementation of disbursed or scalable machine gaining knowledge of algorithms. Record set with thirteen attributes (age, sex, serum cholesterol, fasting blood sugar and so forth.) become obtained from the Cleveland Heart Database which is to be had at the internet. The patterns had been extracted using 3 strategies i.E. Neural community, Naïve Bayes and Decision tree. The destiny scope of this system objectives at giving greater sophisticated prediction fashions, danger calculation equipment and function extraction gear for other medical dangers.

Asha Rajkumar laboured on analysis of coronary heart disease using classification based totally on supervised device studying. Tanagra device is used to categorise the facts, 10 fold pass validation is used to evaluate the information and the effects are as compared. Tanagra is a loose facts mining software program for academic and\research functions. It indicates numerous records mining strategies from explanatory facts evaluation, statistical learning, system learning and database place. The datasetis split into components, eighty% data is used for education and 20% for trying out. Among the three strategies, Naïve Bayes shows decrease error ratio and takes the least quantity of time.

1.Existing system

The healthcare enterprise collects big quantities of healthcare facts which, unluckily, are not “mined” to find out hidden information. Clinical decisions are frequently made based totally on docs‟ intuition and enjoy instead of at the knowledge wealthy statistics hidden in the database. This exercise ends in unwanted biases, errors and excessive medical.

- The existing process is very slow to give the result.
- It is very difficult to find heart disease or not.

2.References

- https://www.academia.edu

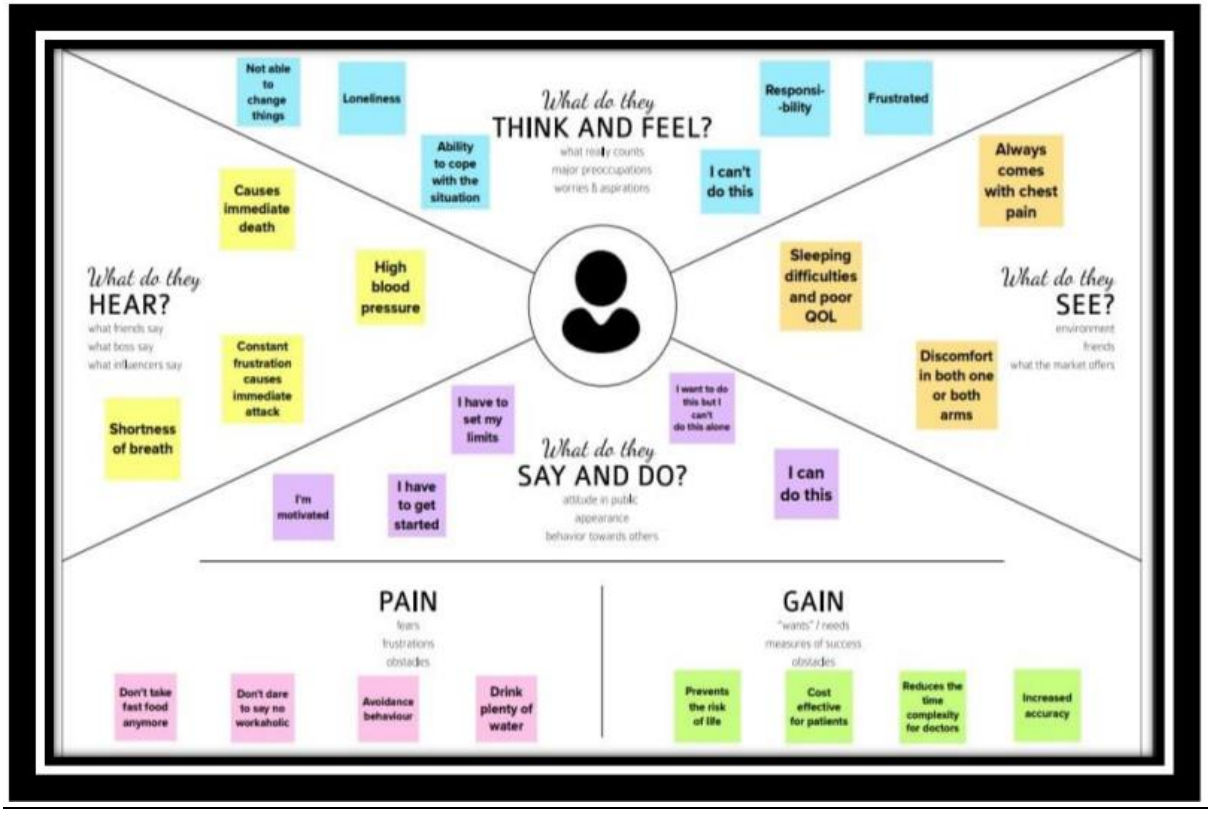
- https://en.wikipedia.org/wiki/Clinical_data_management
- https://shodh.inflibnet.ac.in:8080/jspui/bitstream/123456789/4170/3/03_literature%20review

3. Problem Statement Definition

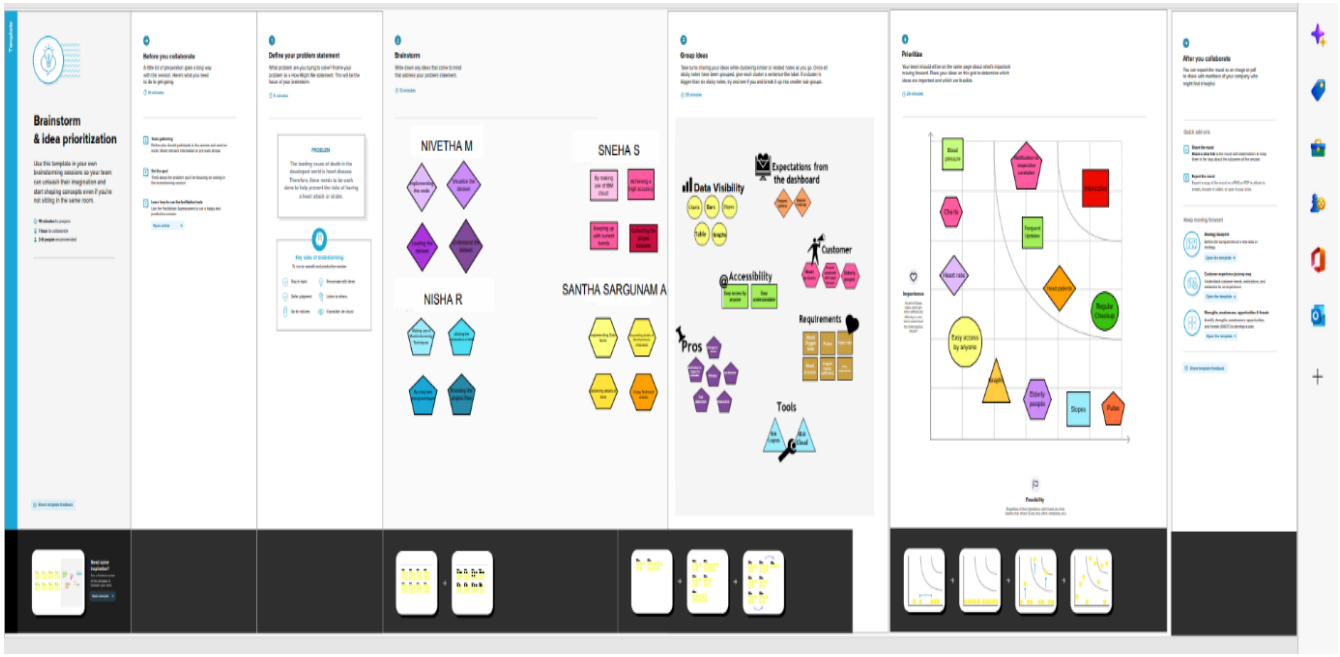
From the given data create a Machine Learning model that can predict heart disease most accurately. Previous studies has tested the software of machine getting to know strategies for the prediction and category of Heart disorder. However, these research focus on the precise impacts of specific gadget getting to know strategies and now not at the optimization of those techniques using optimised techniques. In addition, few researchers attempt to use hybrid optimization techniques for an optimized classification of system getting to know. The most proposed research in the literature make the most optimized strategies which includes Particle Swarm Optimization and Ant Colony Optimization with a particular ML method together with SVM, KNN or Random Forest

3.IDEATION & PROPOSED SOLUTION

1.EMPATHY MAP CANVAS



2. Ideation & Brainstorming

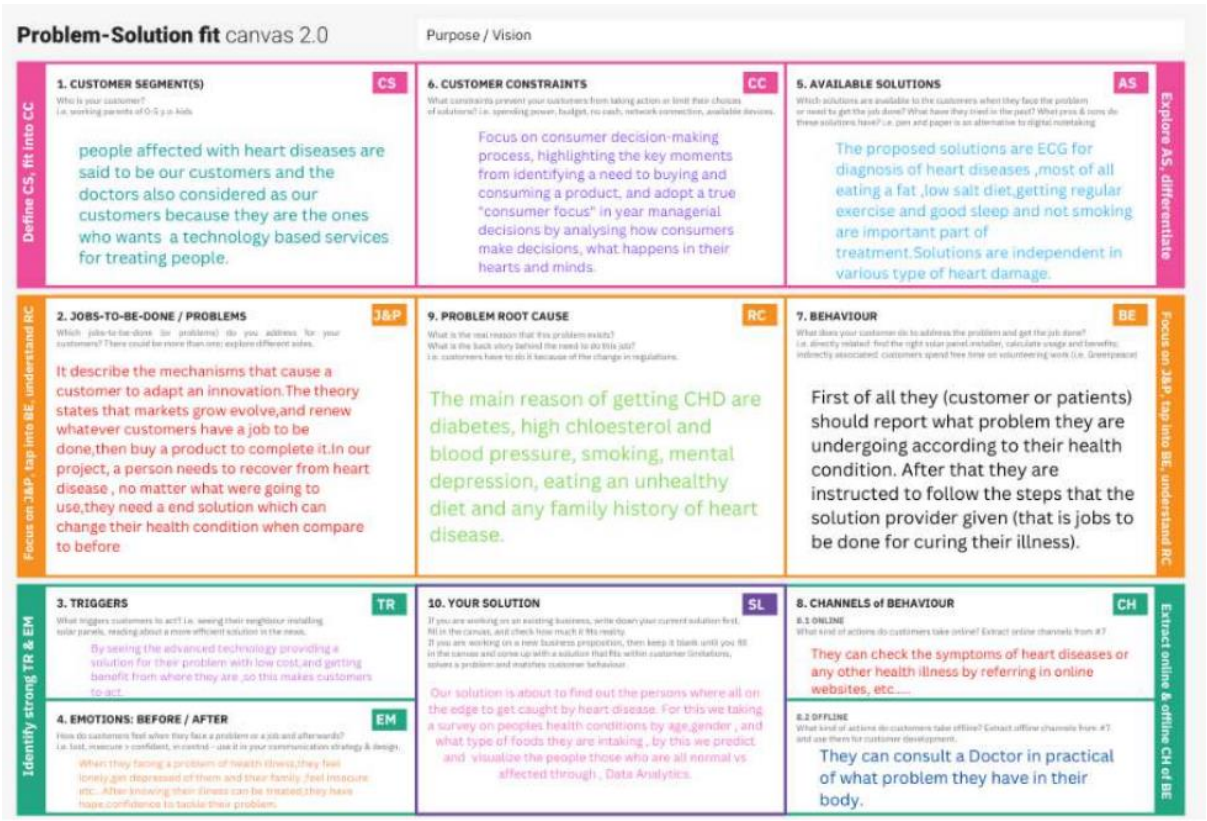


3. Proposed Solution

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	Analyzing data and identifying the heart disease using Cognos analysis.
3.	Novelty/Uniqueness	Hoping to achieve maximum accuracy to provide prior treatment to the patients and reduce the fatality rate.
4.	Social Impact/Customer Satisfaction	¬ Saving lives, user friendlyinterac tivedashboard ¬ Reduces the exorbitant medical cost of the patients. ¬ Reduces the biases andmistakes caused by the decisions of doctors based

		ontheirintuition sand 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. PROBLEM SOLUTION FIT



4.REQUIREMENT ANALYSIS

1.Functional requirements

Following are the functional requirements of the proposed solution.

FR NO	Functional Requirement (Epic)	
FR 1	User registration	Enables user to make registration for the application through Gmail
FR 2	User confirmation	Once after registration, the user will get confirmation via email
FR 3	Visualizing Data	User can visualize the trends on the heart disease through Dashboard created using IBM Cognos Analytics
FR 4	Generating report	User can view his/her health report and can make decisions accordingly

2. Non-Functional requirements

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

NFRNo.	Non-Functional	Requirement Description
NFR-1	Usability	The application will have a simple and userfriendly graphical interface. Users will be able to understand and use all the features of the application easily. Any action has to be performed with just a few clicks
NFR-2	Security	For security of the application the technique known as database replication should be used so that all the important data should be kept safe. In case of crash, the system should be able to backup and recover the data

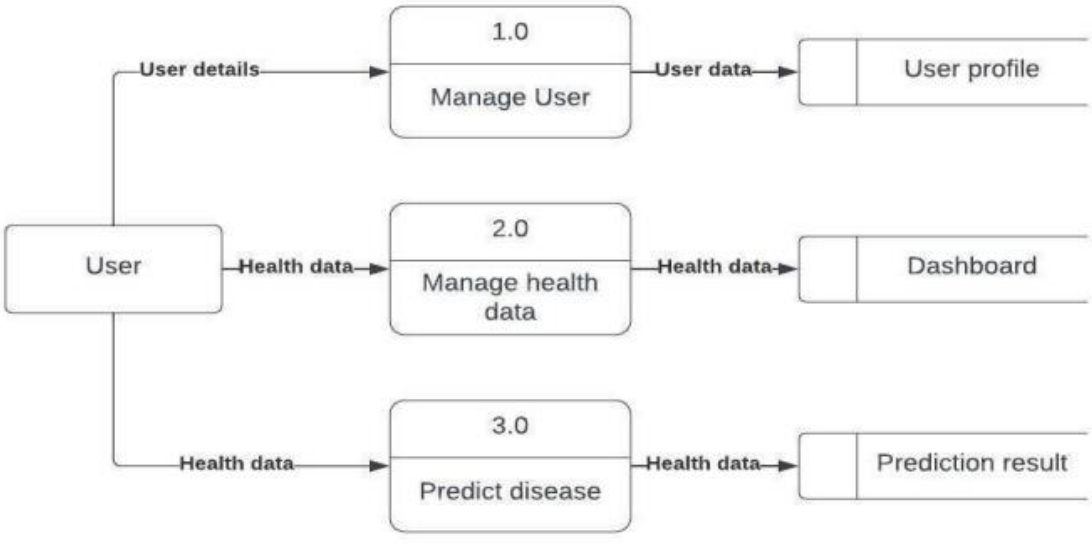
NFR-3	Reliability	The application has to be consistent at every scenario and has to work without failure in any environment
NFR-4	Performance	Performance of the application depends on the response time and the speed of the data submission. The response time of the application is direct and faster which depends on the efficiency of implemented algorithm
NFR-5	Availability	The application has to be available 24 x 7 for users without any interruption
NFR-6	Scalability	The application can withstand the increase in the no. of users and has to be able to develop Higher version

5.PROJECT DESIGN

1. Data Flow Diagrams

A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

Data Flow Diagram for Heart Disease Prediction Dashboard:



Flow:

1) User creates an account in the application.

2) User enters the medical records in the dashboard.

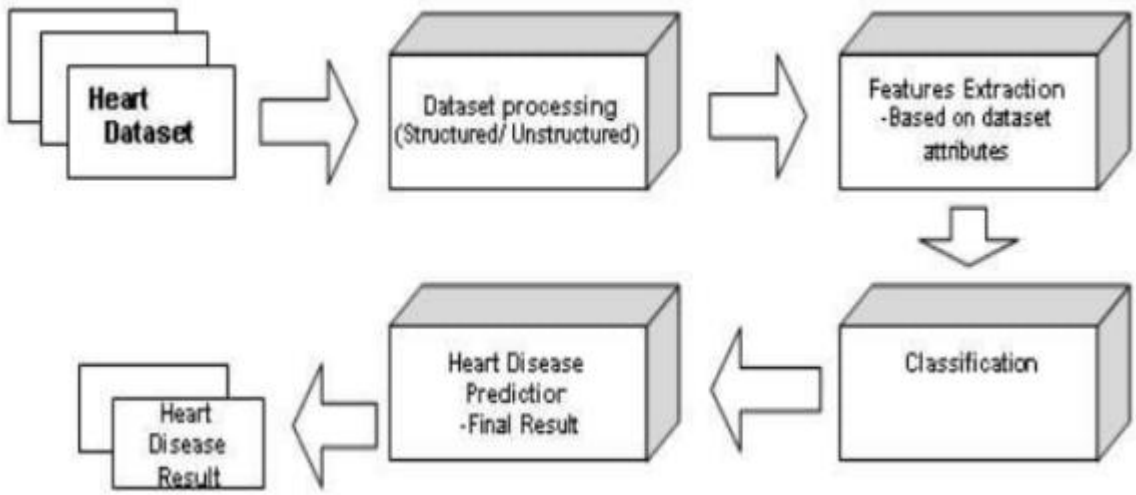
3) User can view the visualizations of trends in the form of graphs and charts for his/her medical records with the trained dataset.

4) User can view the accuracy of probability of occurrence of heart disease in the dashboard

2. Solution and Technical architecture

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Example: Order processing during pandemics for offline mode



Guidelines:

1. Include all the processes (As an application logic / Technology Block)
2. Provide infrastructural demarcation (Local / Cloud)
3. Indicate external interfaces (third party API's etc.)
4. Indicate Data Storage components / services
5. Indicate interface to machine learning models (if applicable)

Table-1 : Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	How user interacts with application e.g. Web UI, Mobile App, Chatbot etc.	HTML, CSS, JavaScript / Angular Js / React Js etc.
2.	Application Logic-1	Logic for a process in the application	Java / Python
3.	Application Logic-2	Logic for a process in the application	IBM Watson STT service
4.	Application Logic-3	Logic for a process in the application	IBM Watson Assistant
5.	Database	Data Type, Configurations etc.	MySQL, NoSQL, etc.
6.	Cloud Database	Database Service on Cloud	IBM DB2, IBM Cloudant etc.
7.	File Storage	File storage requirements	IBM Block Storage or Other Storage Service or Local Filesystem
8.	External API-1	Purpose of External API used in the application	IBM Weather API, etc.
9.	External API-2	Purpose of External API used in the application	Aadhar API, etc.
10.	Machine Learning Model	Purpose of Machine Learning Model	Object Recognition Model, etc.
11.	Infrastructure (Server / Cloud)	Application Deployment on Local System / Cloud Local Server Configuration: Cloud Server Configuration :	Local, Cloud Foundry, Kubernetes, etc.

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	List the open-source frameworks used	Technology of Open source framework
2.	Security Implementations	List all the security / access controls implemented, use of firewalls etc.	e.g. SHA-256, Encryptions, IAM Controls, OWASP etc.
3.	Scalable Architecture	Justify the scalability of architecture (3 – tier, Micro-services)	*Technology used -Iaas,Paas, Saas(IBM CLOUD)*
4.	Availability	Justify the availability of application (e.g. use of load balancers, distributed servers etc.)	Technology used-The availbility of getting software is accessing IBM Cognos analytics and IBM cloud.
5.	Performance	Design consideration for the performance of the application (number of requests per sec, use of Cache, use of CDN's) etc.	Technology used -The fast performance should be fast relaying.

3. User Stories

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Customer (Web user)	Registration	USN-1	As a user, I can register 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
	Login	USN-3	As a user, I can log into the application by entering email & password	I can access my account / Dashboard whenlogged in	High	Sprint-1
Customer (Web user)	Dashboard	USN-4	User 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-5	User can view the accuracy of occurrence of heart disease	I can view the accuracy of heart disease in the dashboard	High	Sprint-2
Customer Care Executive	Helpdesk	USN-6	As a customer care executive, he/she can view the customer queries.	I can post my queries in the dashboard	Medium	Sprint-3
		USN-7	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-8	As an admin, he/she can update the health details of users.	I can view my updated health details.	High	Sprint-4

6. PROJECT PLANNING & SCHEDULING

1. Sprint Planning & Estimation

Product Backlog, Sprint Schedule and 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	Nisha.R
Sprint 1		USN-2	As a user, I will receive confirmation email once I have registered for the application	1	high	Nivetha.M Santha sargunam.A
Sprint 2		USN-3	As a user, I can register for the application through Mobile number	2	Low	Nisha.R Nivetha.M Santha sargunam.M Sneha.S
Sprint 1		USN-4	As a user, I can register for the application through Gmail	2	medium	Nisha.R Vinothini.P Sneha.S
Sprint 1	Login	USN-5	As a user, I can log into the application by entering email & password	1	high	Nisha.R Santha sargunam.A
Sprint 2	Dashboard	USN-6	Profile - view & update your profile	2	High	Nisha.R Nivetha.M Santha sargunam.A Vinothini.P
Sprint 1		USN-7	Change Password - user can change the password	1	High	Nisha.R Nivetha.M
Sprint 1		USN-8	Home - Analyze your Heart	2	High	Nisha.R Nivetha.M Santha sargunam.M Sneha.S

Sprint 3		USN-9	The user will have to fill in the below 13 fieldsfor the system to predict a disease -Age in Year -Gender -Chest Pain Type -Fasting Blood Sugar -Resting Electrographic Results(Restecg) -Exercise Induced Angina(Exang) -The slope of the peak exercise ST segment -CA –Number of major vessels colored by fluoroscopy -Thal -Trest Blood Pressure -Serum Cholesterol -Maximum heart rate achieved(Thalach) -ST depression induced by exercise(Oldpeak)	2	High	Nisha.R Sneha.S Vinothini.P Nivetha.M
Sprint		USN-10	View Doctors -view doctor detail by searching by names or filter by specialty	1	Medium	

Sprint Delivery Schedule :

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-3	System Requirement	USN-11	I. Hardware Requirement i. Laptop or PC • I5 processor system or higher • 4 GB RAM or higher • 128 GB ROM or higher ii. Android Phone (12.0 and above)	2	High	Nisha.R Sneha.S
Sprint-3		USN-12	II. Software Requirement iii. Laptop or PC • Windows 10 or higher • Android Studio	2	Medium	Santha sargunam.A Nivetha.m
Sprint-2		USN-13	As a user, I can log into the application by entering email & password	2	High	Nisha.R
Sprint-2		USN-14	User can view his/her complete medical analysis and accuracy of disease prediction	2	High	Santha sagunam.A
Sprint-4	Helpdesk	USN-15	Query	1	High	Nisha.R
		USN-16	Ratings	2	Medium	Sneha.S Santha sargunam.A
	Dashboard	USN-17	Verification	2	High	Vinothini.P Nisha.R
		USN-18	Validation	1	High	Santha sargunam.A Nivetha.M
		USN-19	Feedback - send feedback to the Admin.	2	Medium	Nisha.R Nivetha.m Santha sargunam.A Sneha.S

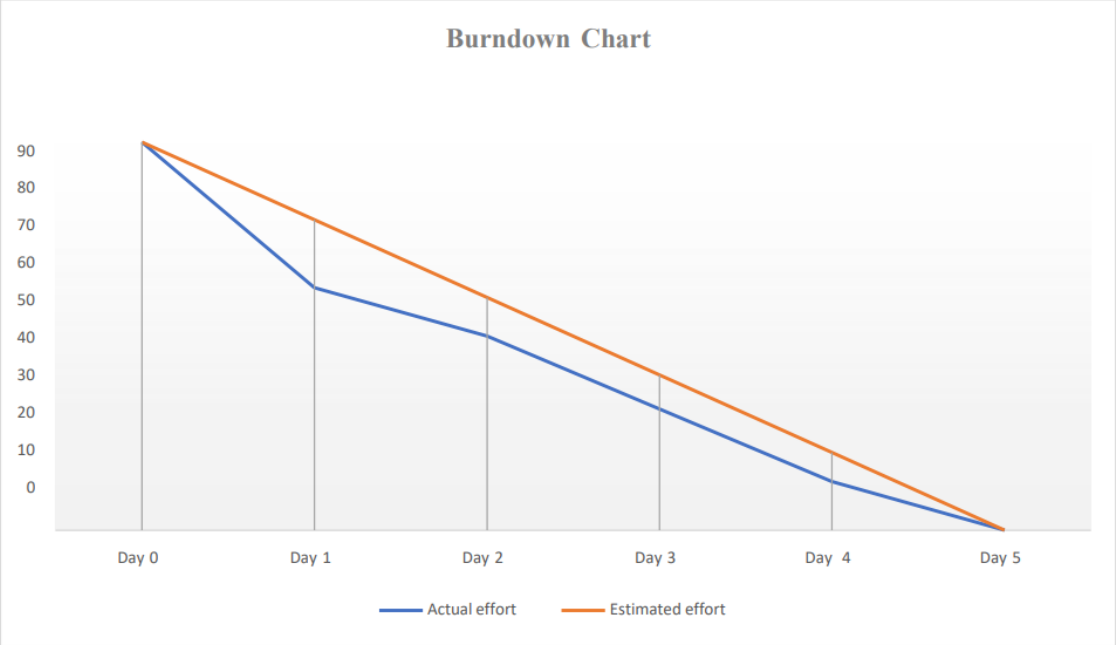
Velocity

Imagine we have a 10-day sprint duration, and the velocity of the team is 20 (points per sprint). Let's calculate the team's average velocity (AV) per iteration unit (story points per day)

$$AV = \frac{sprint\ duration}{velocity} = \frac{20}{10} = 2$$

Burndown Chart:

A burn down chart is a graphical representation of work left to do versus time. It is often used in agile software development methodologies such as Scrum.However, burn down charts can be applied to any project containing measurable progress over time.



CODING & SOLUTIONING

FEATURE 1:

login.html

```
 <!DOCTYPE html>
<html lang="en" dir="ltr">
<head>
<meta charset="UTF-8">
<link rel="stylesheet" href="register.css">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
</head>
<body background="heart.jpg">
<div class="container">
<div class="title">Login</div>
<div class="content">
<form action="{{url_for('register')}}" method="POST" class="login email">
<div class="user-details">
<div class="input-box">
<span class="details">Username</span>
<input type="text" placeholder="Enter your username"
name="username">
</div>
[1:48 PM, 11/17/2022] Nisha CSE: <br><br>
<div class="input-box">
<span class="details">Password</span>
```

```
<input type="password" placeholder="Enter your password"
name="passwords">
</div>
</div>
<div class="button">
<a href="file:///C:/Users/Bhavisha/Desktop/New folder/register.html">
<input type="submit" value="login" onClick="myfunction()">
<script>
function myfunction(){
window.location.href="file:///C:/Users/Bhavisha/Desktop/New folder/register.html";
}
</script>
</a>
<br><br>
not registered?
 <a href="register.html"> register </a>
</div>
</form>
</div>
</div>
</body>
</html>
```

register.html:

```
    <!DOCTYPE html>
<html lang="en" dir="ltr">
<head>
<meta charset="UTF-8">
<link rel="stylesheet" href="register.css">
<meta name="viewport" content="width=device-width, initial-scale=1.0">
</head>
<body background="heart.jpg">
<div class="container">
<div class="title">Registration</div>
<div class="content">
<form action="{{url_for('register')}}" method="POST" class="login email">
<div class="user-details">
<div class="input-box">
<span class="details">Full Name</span>
<input type="text" placeholder="Enter your name" name="fullname">
</div>
<div class="input-box">
<span class="details">Username</span>
<input type="text" placeholder="Enter your username"
name="username">
</div>
<div class="input-box">
```

```
<span class="details">Email</span>
<input type="text" placeholder="Enter your email" name="email">
</div>
<div class="input-box">
<span class="details">Phone Number</span>
<input type="text" placeholder="Enter your number"
name="phonenumber">
</div>
<div class="input-box">
<span class="details">Password</span>
<input type="password" placeholder="Enter your password"
name="passwords">
</div>
<div class="input-box">
<span class="details">Confirm Password</span>
<input type="password" placeholder="Confirm your password"
name="cpassword">
</div>
</div>
<div class="button">
<input type="submit" value="Register" onclick="myfunction1()">
<script>
  function myfunction1() {
     location.replace("file:///C:/Users/Bhavisha/Desktop/New folder/login.html")
    }
</script><br><br>
already registered?
 <a href="login.html"> login </a>
</div>
</form>
</div>
</div>
</body>
</html
```

register.css:

```
     *{
margin: 0;
padding: 0;
box-sizing: border-box;
font-family: 'Poppins',sans-serif;
}
body{
height:100vh;
display: flex;
justify-content: center;
align-items: center;
padding: 10px;
}
.container{
```

```
max-width: 900px;
width: 300%;
background-color: #fff; /* linear-gradient(135deg, #71b7e6, #9b59b6)*/
padding: 25px 30px;
border-radius: 5px;
box-shadow: ;
}
.container .title{
font-size: 50px;
font-weight: 500;
position: relative;
}
.container .title::before{
content: "";
position: absolute;
left: 0;
bottom: 0;
height: 3px;
width: 30px;
border-radius: 5px;
background: linear-gradient(135deg, #71b7e6, #9b59b6);
}
.content form .user-details{
display: flex;
flex-wrap: wrap;
justify-content: space-between;
margin: 20px 0 12px 0;
}
form .user-details .input-box{
margin-bottom: 15px;
width: calc(100% / 2 - 20px);
}
form .input-box span.details{
display: block;
font-weight: 500;
margin-bottom: 5px;
}
.user-details .input-box input{
height: 45px;
width: 100%;
outline: none;
font-size: 16px;
border-radius: 5px;
padding-left: 15px;
border: 1px solid #ccc;
border-bottom-width: 2px;
transition: all 0.3s ease;
}
.user-details .input-box input:focus,
.user-details .input-box input:valid{
```

```
border-color: #9b59b6;
}
form .gender-details .gender-title{
font-size: 20px;
font-weight: 500;
}
form .category{
display: flex;
width: 80%;
margin: 14px 0 ;
justify-content: space-between;
}
form .category label{
display: flex;
align-items: center;
cursor: pointer;
}
form .category label .dot{
height: 18px;
width: 18px;
border-radius: 50%;
margin-right: 10px;
background: #d9d9d9;
border: 5px solid transparent;
transition: all 0.3s ease;
}
#dot-1:checked ~ .category label .one,
#dot-2:checked ~ .category label .two,
#dot-3:checked ~ .category label .three{
background: #9b59b6;
border-color: #d9d9d9;
}
form input[type="radio"]{
display: none;
}
form .button{
height: 45px;
margin: 35px 0
}
form .button input{
height: 100%;
width: 100%;
border-radius: 5px;
border: none;
color: #fff;
font-size: 18px;
font-weight: 500;
letter-spacing: 1px;
cursor: pointer;
transition: all 0.3s ease;
```

```
background: linear-gradient(135deg, #71b7e6, #9b59b6);
}
form .button input:hover{
/* transform: scale(0.99); */
background: linear-gradient(-135deg, #71b7e6, #9b59b6);
}
@media(max-width: 584px){
.container{
max-width: 100%;
}
form .user-details .input-box{
margin-bottom: 15px;
width: 100%;
}
form .category{
width: 100%;
}
.content form .user-details{
max-height: 300px;
overflow-y: scroll;
}
.user-details::-webkit-scrollbar{
width: 5px;
}
}
@media(max-width: 459px){
.container .content .category{
flex-direction: column;
}
}
```

heart-disease-clasifier.html

```
<html>
<head>
<!-- Bootstrap CSS -->
<link rel="stylesheet"
href="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/css/bootstrap.min.cs
s"
integrity="sha384-
JcKb8q3iqJ61gNV9KGb8thSsNjpSL0n8PARn9HuZOnIxN0hoP+VmmDGMN5
t9UJ0Z"
crossorigin="anonymous">
<script src="https://code.jquery.com/jquery-3.5.1.slim.min.js"
integrity="sha384-
DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+OrCX
aRkfj"
crossorigin="anonymous"></script>
<script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"
```

```
integrity="sha384-
9/reFTGAW83EW2RDu2S0VKaIzap3H66lZH81PoYlFhbGU+6BZp6G7niu735
Sk7lN"
crossorigin="anonymous"></script>
<script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"
integrity="sha384-
B4gt1jrGC7Jh4AgTPSdUtOBvfO8shuf57BaghqFfPlYxofvL8/KUEfYiJOMMV+r
V"
crossorigin="anonymous"></script>
<title>Heart Disease Test</title>
</head>
<body>
<!-- Java Script -->
<script src="https://code.jquery.com/jquery-3.5.1.slim.min.js"
integrity="sha384-
DfXdz2htPH0lsSSs5nCTpuj/zy4C+OGpamoFVy38MVBnE+IbbVYUew+OrCX
aRkfj"
crossorigin="anonymous"></script>
<script
src="https://cdn.jsdelivr.net/npm/popper.js@1.16.1/dist/umd/popper.min.js"
integrity="sha384-
9/reFTGAW83EW2RDu2S0VKaIzap3H66lZH81PoYlFhbGU+6BZp6G7niu735
Sk7lN"
crossorigin="anonymous"></script>
<script
src="https://stackpath.bootstrapcdn.com/bootstrap/4.5.2/js/bootstrap.min.js"
integrity="sha384-
B4gt1jrGC7Jh4AgTPSdUtOBvfO8shuf57BaghqFfPlYxofvL8/KUEfYiJOMMV+r
V"
crossorigin="anonymous"></script>
<!-- Navbar-->
<nav class="navbar navbar-dark" style="background-color: rgb(13, 102, 87);">
<span class="navbar-brand mb-0 h1">Heart Disease Test</span>
</nav>
<div class="container">
<br>
<!--Form-->
<form action = "{{url_for('predict')}}" method ="POST" >
<fieldset>
<legend style="color: rgb(41, 15, 134);"><b>Heart Disease Test
Form</b></legend><br>
<div class="card card-body" style="background-color: rgb(194 245 236 /
56%);">
<div class="form-group row">
<div class="col-sm-3">
<label for="age">Age</label>
<input type="number" class="form-control" id="age" name="age" required>
</div>
<div class="col-sm-3">
```

```
<label for="sex">Sex</label>
<select class="form-control" id="sex" name="sex" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "0">Female</option>
<option value = "1">Male</option>
</select>
</div>
</div>
<br>
<div class="form-group row">
<div class="col-sm">
<label for="cp">Chest Pain Type</label>
<select class="form-control" id="cp" name = "cp" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "1">Typical Angina</option>
<option value = "2">Atypical Angina</option>
<option value = "3">Non-anginal Pain</option>
<option value = "4">Asymptomatic</option>
</select>
</div>
<div class="col-sm">
<label for="trestbps">Resting Blood Pressure in mm Hg</label>
<input type="number" class="form-control" id="trestbps" name="trestbps"
required>
</div>
<div class="col-sm">
<label for="chol">Serum Cholestoral in mg/dl</label>
<input type="number" class="form-control" id="chol" name="chol" required>
</div>
<div class="col-sm">
<label for="fbs">Fasting Blood Sugar > 120 mg/dl</label>
<select class="form-control" id="fbs" name="fbs" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "0">False</option>
<option value = "1">True</option>
</select>
</div>
</div>

<br>
<div class="form-group row">
<div class="col-sm">
<label for="restecg">Resting ECG Results </label>
<select class="form-control" id="restecg" name="restecg" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "0">Normal </option>
<option value = "1">Having ST-T wave abnormality </option>
<option value = "2">Probable or definite left ventricular hypertrophy</option>
</select>
</div>
```

```
<div class="col-sm">
<label for="thalach">Maximum Heart Rate</label>
<input type="number" class="form-control" id="thalach" name="thalach" required>
</div>
<div class="col-sm">
<label for="exang">Exercise Induced Angina </label>
<select class="form-control" id="exang" name="exang" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "0">No</option>
<option value = "1">Yes</option>
</select>
</div>
<div class="col-sm">
<label for="oldpeak">ST Depression Induced</label>
<input type="number" step="any" class="form-control" id="oldpeak" name="oldpeak"
required>
</div>
</div>
<br>
<div class="form-group row">
<div class="col-sm">
<label for="slope">Slope of the Peak Exercise ST Segment </label>
<select class="form-control" id="slope" name="slope" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "1">Upsloping</option>
<option value = "2">Flat</option>
<option value = "3">Downsloping</option>
</select>
</div>
<div class="col-sm">
<label for="ca">Number of Vessels Colored by Flourosopy</label>
<select class="form-control" id="ca" name = "ca" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "0">0</option>
<option value = "1">1</option>
<option value = "2">2</option>
<option value = "3">3</option>
</select>
</div>
<div class="col-sm">
<label for="thal">Thalassemia</label>
<select class="form-control" id="thal" name = "thal" required>
<option disabled selected value> -- Select an Option -- </option>
<option value = "3">Normal</option>
<option value = "6">Fixed defect</option>
<option value = "7">Reversable defect</option>
</select>
</div>
```

```
</div>
<br>
<div class="form-group">
<input class="btn btn-primary" type="submit" value="Result">
</div>

<!--Prediction Result-->
<div id ="result">
<strong style="color:red">{{result}}</strong>
</div>
</div>
</fieldset>
</form>
</div>
</body>
</html>
```

embedded cognos dashboard.html

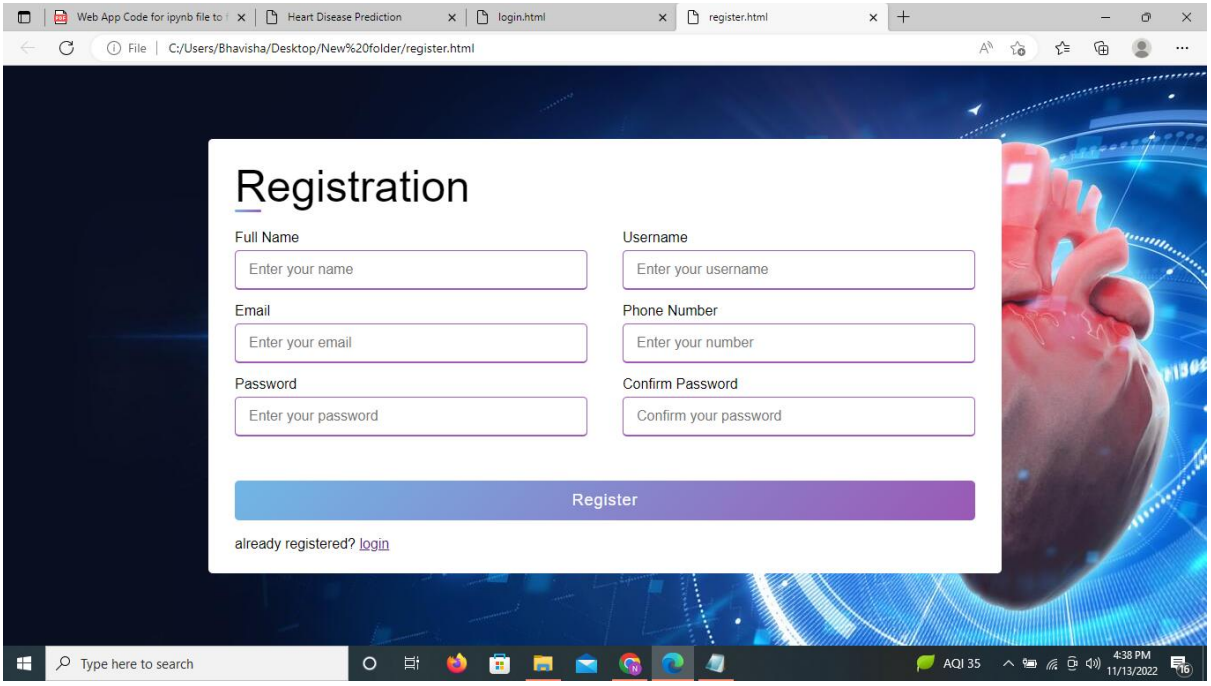
```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Heart Disease Prediction</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link
href="https://cdn.jsdelivr.net/npm/bootstrap@5.2.1/dist/css/bootstrap.min.css"
rel="stylesheet">
<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.1/dist/js/bootstrap.bundle.min.
js"></scri
pt>
</head>
<body>
<div class="container-fluid p-5 bg-primary text-white text-center"> <h1>
Visualizing and
Predicting Heart Diseases with an Interactive Dashboard</h1>
<p>Heart Disease Prediction dashboard</p>
<p><iframe
src="https://us3.ca.analytics.ibm.com/bi/?pathRef=.my_folders%2FIBM%2BP
ROJECT%2FRe
port%2FHeart%2BDisease%2BPrediction%2Breport&amp;closeWindowOnLa
stView=true&a
mp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedded&amp
;action=run&
amp;format=HTML&amp;prompt=false" width="1300" height="600"
frameborder="0"
gesture="media" allow="encrypted-media" allowfullscreen=""></iframe></p>
</div>
</body>
```

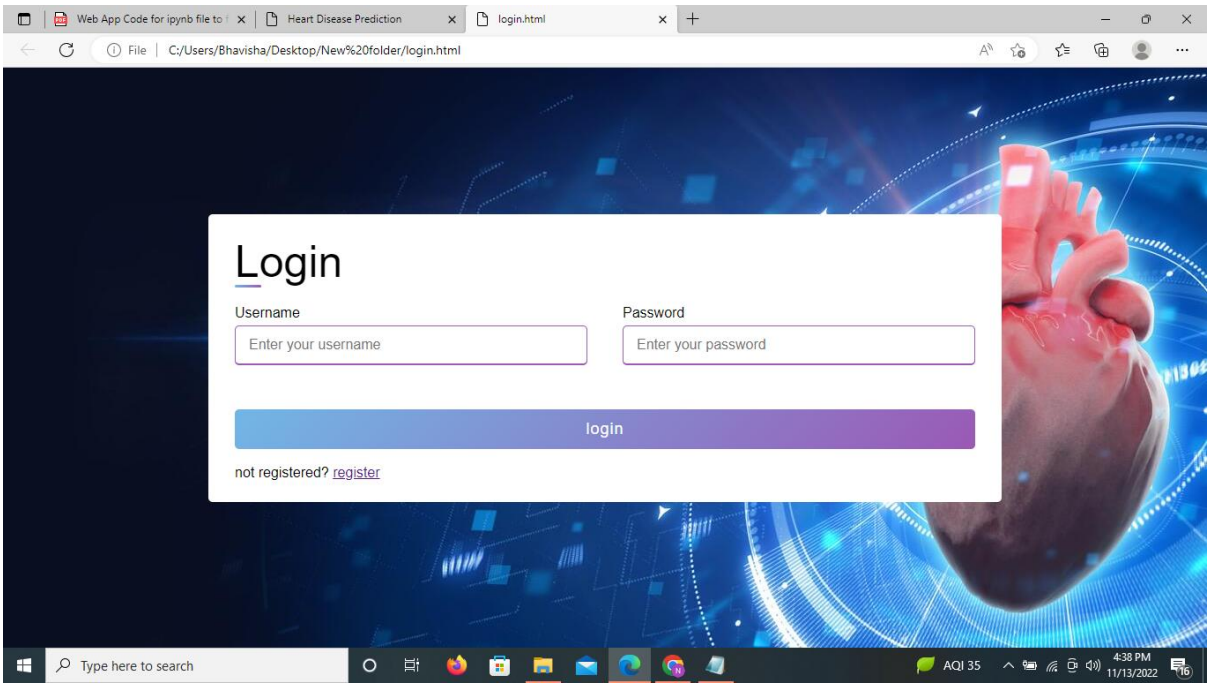
</html

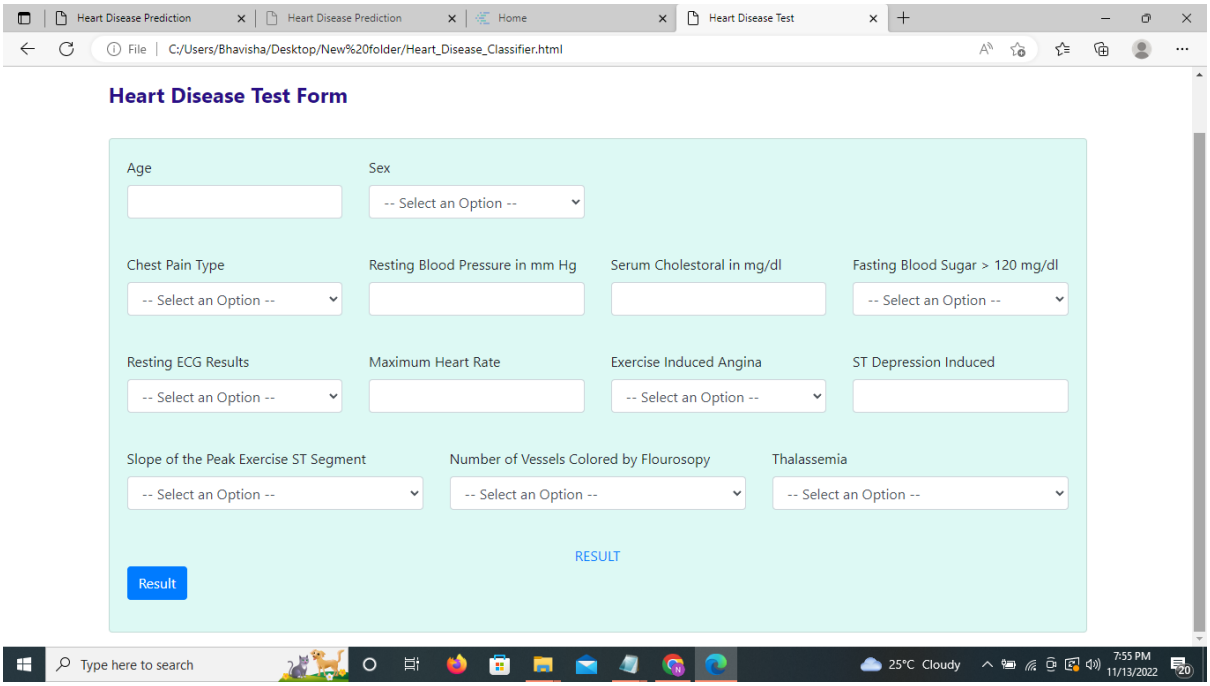
embedded cognos story.html

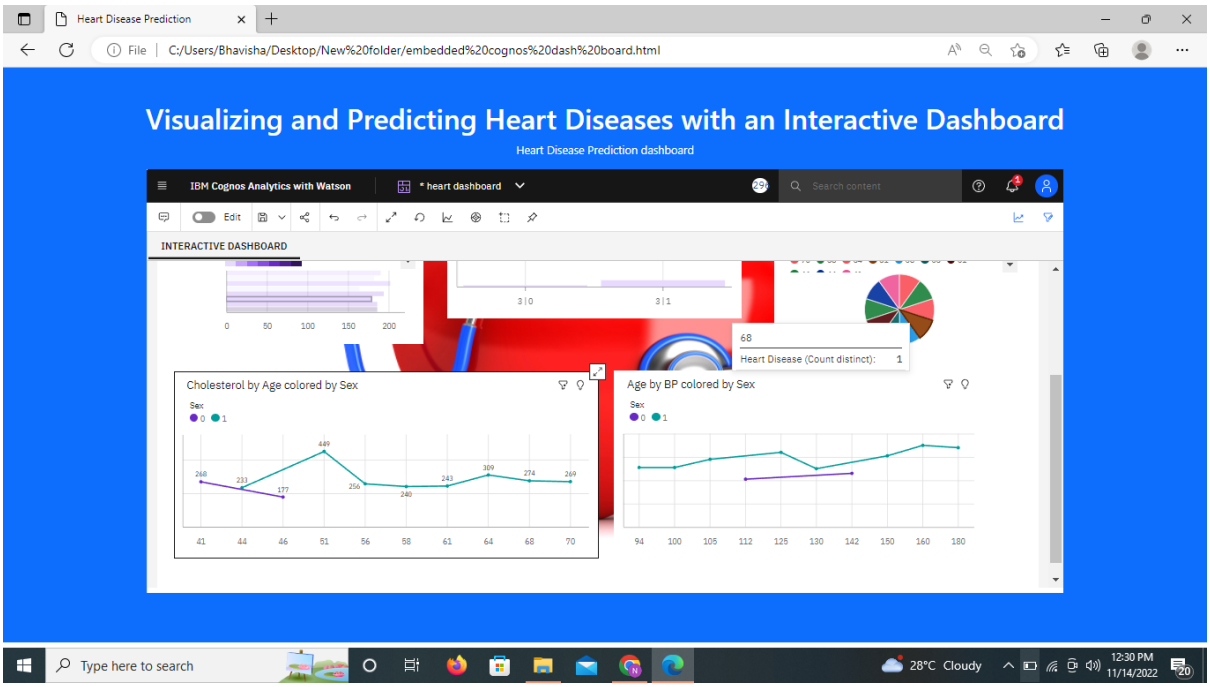
```
<!DOCTYPE html>
<html lang="en">
<head>
<title>Heart Disease Prediction</title>
<meta charset="utf-8">
<meta name="viewport" content="width=device-width, initial-scale=1">
<link href="https://cdn.jsdelivr.net/npm/bootstrap@5.2.1/dist/css/bootstrap.min.css"
rel="stylesheet">
<script
src="https://cdn.jsdelivr.net/npm/bootstrap@5.2.1/dist/js/bootstrap.bundle.min.js"></scri
pt>
</head>
<body>
<div class="container-fluid p-5 bg-primary text-white text-center"> <h1> Visualizing and
Predicting Heart Diseases with an Interactive Dashboard</h1>
<p>Story of Heart Disease Prediction</p>
<p><iframe
src="https://us3.ca.analytics.ibm.com/bi/?perspective=story&amp;pathRef=.my_folders%2
FIBM%2BPROJECT%2FStory%2FHeart%2BDisease%2BPrediction%2BStory&amp;closeWindo
wOnLastView=true&amp;ui_appbar=false&amp;ui_navbar=false&amp;shareMode=embedd
ed&amp;action=view&amp;sceneId=model000001843796678f_00000000&amp;sceneTime
=0" width="1300" height="650" frameborder="0" gesture="media" allow="encrypted   media" allowfullscr
</div>
</body>
</html>
```

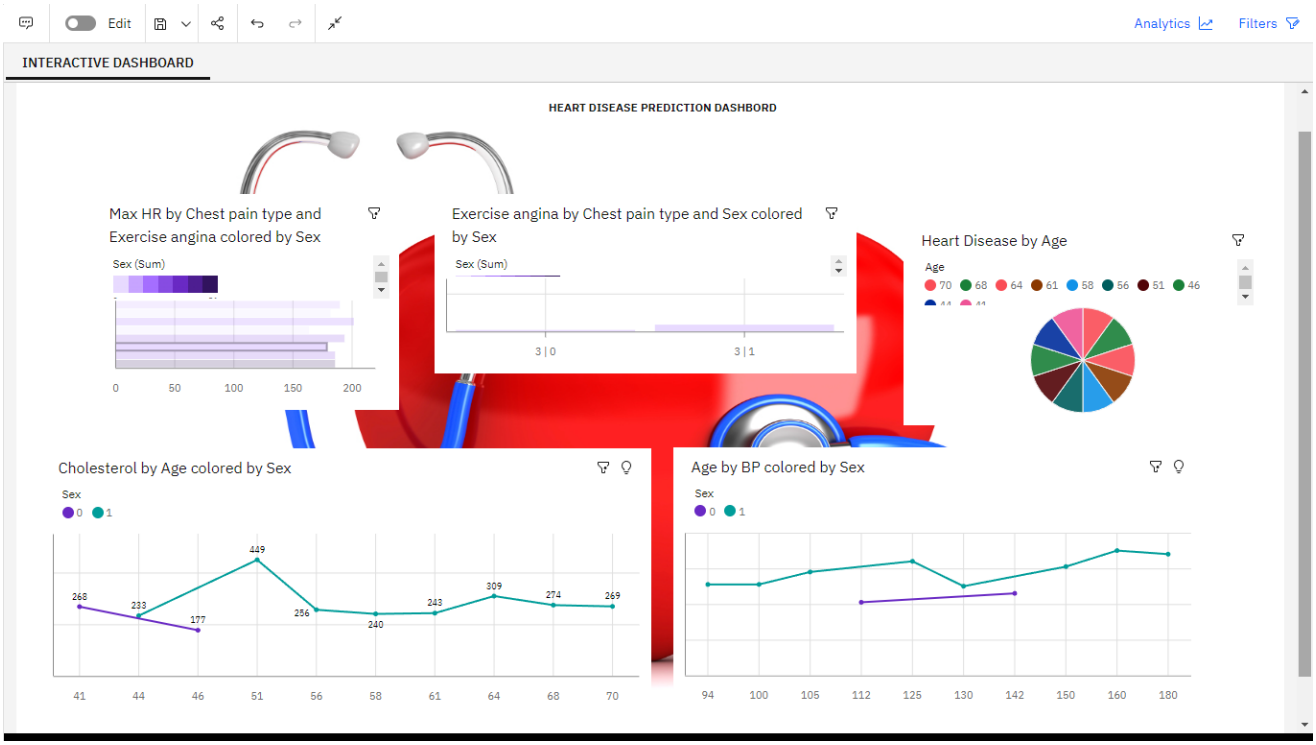
RESULTS:

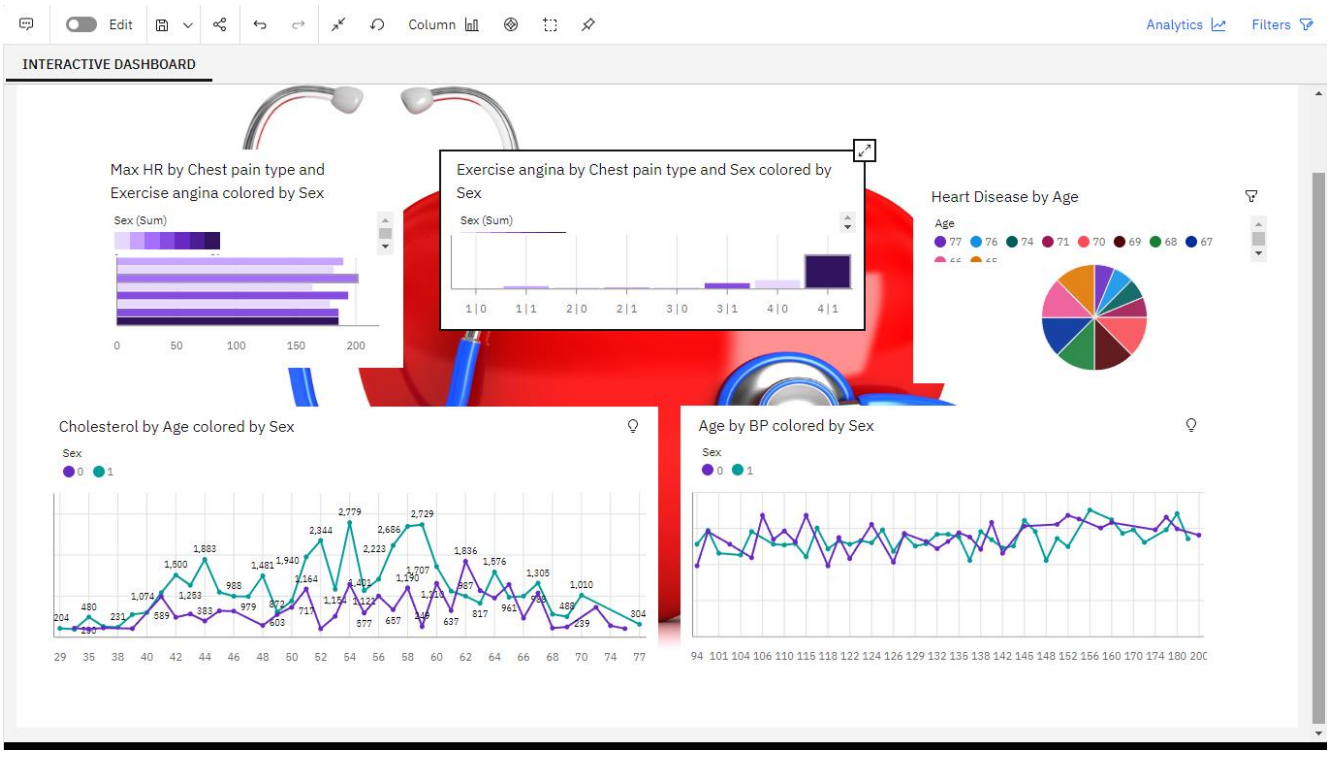

Web App Code for ipynb file to
Heart Disease Prediction
login.html
register.html
File | C:/Users/Bhavisha/Desktop/New%20folder/register.html
Registration
Full Name
Enter your name
Username
Enter your username
Email
Enter your email
Phone Number
Enter your number
Password
Enter your password
Confirm Password
Confirm your password
Register
already registered? login
Type here to search
AQI 35
4:38 PM
11/13/2022


Web App Code for ipynb file to
Heart Disease Prediction
login.html
File | C:/Users/Bhavisha/Desktop/New%20folder/login.html
Login
Username
Enter your username
Password
Enter your password
login
not registered? register
Type here to search
AQI 35
4:38 PM
11/13/2022


Heart Disease Prediction
Heart Disease Prediction
Home
Heart Disease Test
File | C:/Users/Bhavisha/Desktop/New%20folder/Heart_Disease_Classifier.html
Heart Disease Test Form
Age
Sex
-- Select an Option --
Chest Pain Type
Resting Blood Pressure in mm Hg
Serum Cholestoral in mg/dl
Fasting Blood Sugar > 120 mg/dl
Resting ECG Results
Maximum Heart Rate
Exercise Induced Angina
ST Depression Induced
Slope of the Peak Exercise ST Segment
Number of Vessels Colored by Flourosopy
Thalassemia
RESULT
Result
Type here to search
25°C Cloudy
7:55 PM
11/13/2022


Heart Disease Prediction
File | C:/Users/Bhavisha/Desktop/New%20folder/embedded%20cognos%20dash%20board.html
Visualizing and Predicting Heart Diseases with an Interactive Dashboard
Heart Disease Prediction dashboard
IBM Cognos Analytics with Watson
* heart dashboard
Search content
Edit
INTERACTIVE DASHBOARD
Heart Disease (Count distinct): 1
Cholesterol by Age colored by Sex
Age by BP colored by Sex
Sex
Type here to search
28°C Cloudy
12:30 PM
11/14/2022


Edit
Analytics
Filters
INTERACTIVE DASHBOARD
HEART DISEASE PREDICTION DASHBORD
Max HR by Chest pain type and Exercise angina colored by Sex
Sex (Sum)
Exercise angina by Chest pain type and Sex colored by Sex
Sex (Sum)
Heart Disease by Age
Age
Cholesterol by Age colored by Sex
Sex
Age by BP colored by Sex
Sex


Edit
Column
Analytics
Filters
INTERACTIVE DASHBOARD
Max HR by Chest pain type and Exercise angina colored by Sex
Sex (Sum)
Exercise angina by Chest pain type and Sex colored by Sex
Sex (Sum)
Heart Disease by Age
Age
Cholesterol by Age colored by Sex
Sex
Age by BP colored by Sex
Sex

ADVANTAGES

1. Increased accuracy for effective heart disease diagnosis.
2. Handles roughest(enormous) amount of data using random forest algorithm and feature s
3. Reduce the time complexity of doctors.
4. Cost effective for patients.

DISADVANTAGES

1. Prediction of cardiovascular disease results is not accurate.
2. Data mining techniques does not help to provide effective decision making.
3. Cannot handle enormous datasets for patient records.

SCOPE:

Here the scope of the project is that integration of clinical decision support with computer-based patient records could reduce medical errors, enhance patient safety, decrease unwanted practice variation, and improve patient outcome. This suggestion is promising as data modeling and analysis tools, e.g., data mining, have the potential to generate a knowledge-rich environment which can help to significantly improve the quality of clinical decisions

CONCLUSION

Project introduction is the first step in building a system. Basically it will tell what is the application or a system That we are intended to build what it will look like, brief describe on the proposed project, setting up the projectScope , defining project objective, problem statement of the project and also expected outcome. This stage will be Used as a reference to ensure system meet the project scope and project objective.

Heart attack is vital health hassle in human society. This paper has summarized kingdom of art technique and to be Had techniques for prediction of this sickness. Deep studying an raising region of artificial intelligence showed a Few promising bring about different area of clinical diagnose with excessive accuracy .It continues to be an open Area waiting to get applied in heart disease prediction. Some strategies of deep studying has been discussed which May be implemented for heart disease prediction, alongside pioneer machine getting to know algorithms.An analytical assessment has been completed for locating out best available algorithm for clinical dataset. In Future our purpose is to carry ahead the work of temporal scientific dataset, where in dataset varies with time and Retraining of dataset is needed.

GitHub & Project Demo Link

GITHUB LINK: https://github.com/IBM-EPBL/IBM-Project-44521-1660725017

DEMO LINK: https://photos.app.goo.gl/xVvUt63k1SHe1mQs5