Project Report

Heart Disease Analysis

Date	12 February 2026
Team ID	LTVIP2026TMIDS74725
Project Name	Heart Disease Analysis
Maximum Marks	

1. INTRODUCTION

1.1 Project Overview

The **Heart Disease Analysis System** focuses on analysing patient health data to identify risk factors and patterns associated with heart disease. The project applies data preprocessing techniques and machine learning methods to evaluate medical attributes such as age, blood pressure, cholesterol levels, heart rate, and other clinical parameters. Interactive visualizations and dashboards are used to present meaningful insights that support early detection and understanding of heart disease.

1.2 Purpose

The purpose of this project is to analyse and predict the likelihood of heart disease using patient health data. It helps in identifying key risk factors, understanding health trends, and supporting early diagnosis through data-driven insights. The system provides clear visualizations and analytical results to assist healthcare professionals and individuals in making informed health decisions.

2. IDEATION PHASE

2.1 Problem Statement

Heart disease is one of the leading causes of health problems worldwide, but it is often detected only at later stages when treatment becomes more difficult. Many patients and doctors find it challenging to interpret medical data and identify risk factors early. There is a need for a simple and reliable system that can analyse patient health information and support early diagnosis. By using data analysis and prediction techniques, heart disease risk can be identified in advance. This helps in timely treatment, better prevention, and improved patient care.

Customer Problem Statement Template:

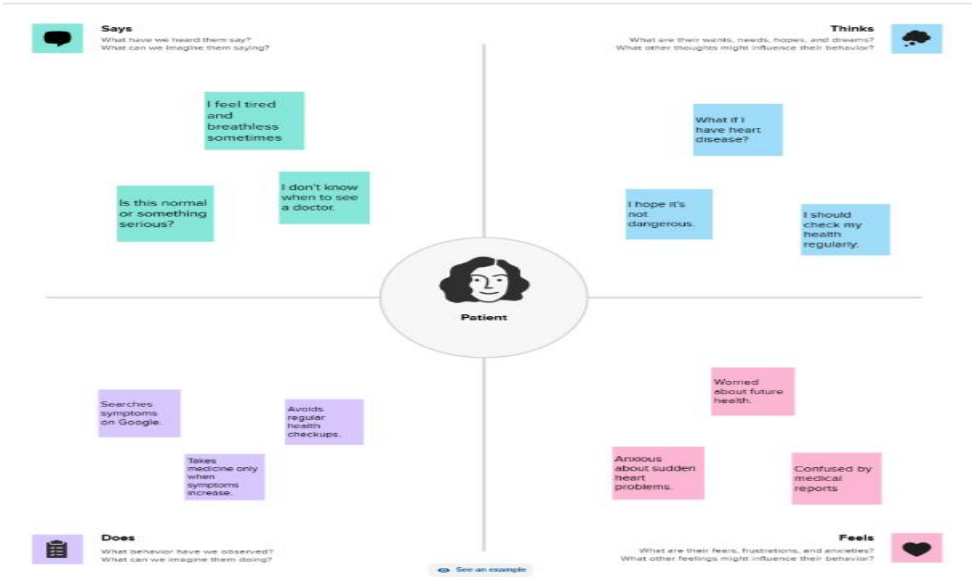
Problem Statement – 1: **THE PATIENT**

Problem Statement – 2: **THE DOCTOR**

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
The Patient					
The Doctor					

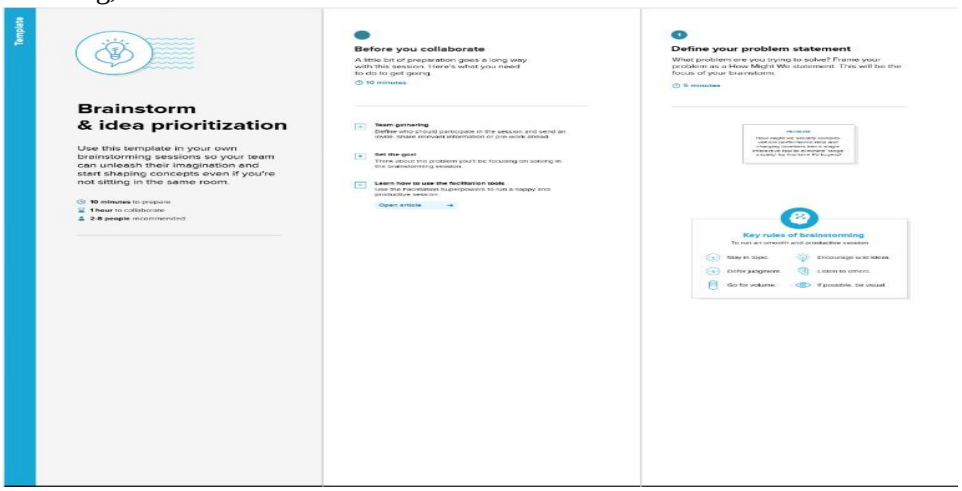
2.2 Empathy Map Canvas

The Mind of an Patient

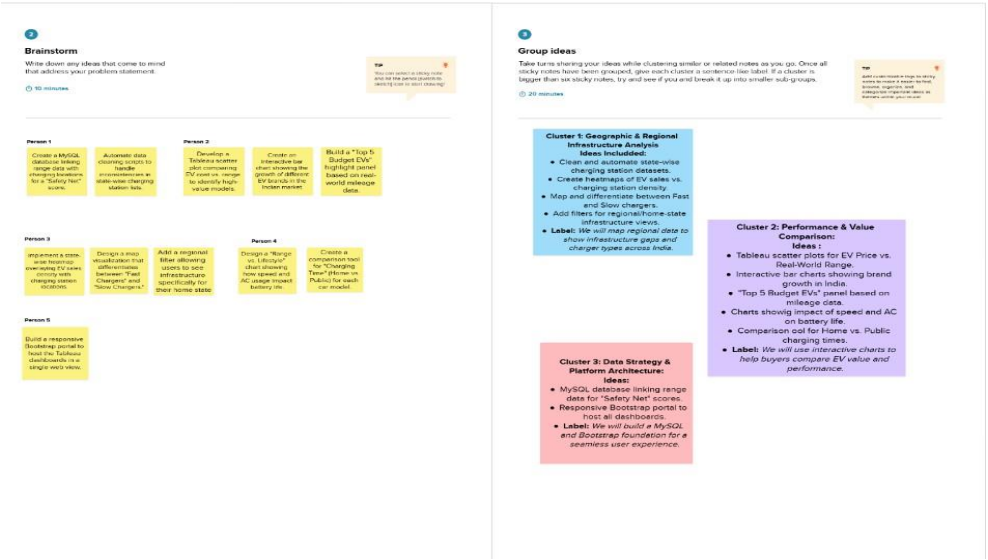


2.3 Brainstorming

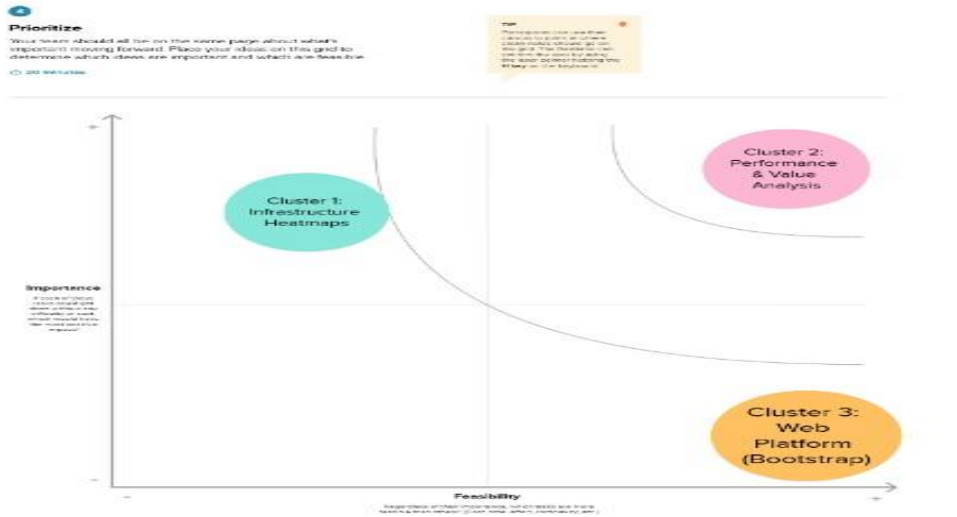
Step-1: Team Gathering, Collaboration and Select the Problem Statements



Step-2: Brainstorm, Idea Listing and Grouping



Step-3: Idea Prioritization



3. REQUIREMENT ANALYSIS

3.1 Customer Journey Map

The customer journey map shows the experience of patients and doctors while using health data to understand heart disease risk. It identifies common challenges such as difficulty in understanding medical reports, delayed diagnosis, and lack of clear risk prediction. The journey highlights decision-making problems and gaps in accessing meaningful health insights. This analysis helps identify the real needs of users. It ensures the system is designed to support early detection and better medical decisions effectively.

3.2 Solution Requirement

The system analyzes patient health data to predict the risk of heart disease. It presents the results using simple visuals so users can easily understand them. The system compares important health factors such as age, blood pressure, and cholesterol to identify possible risks. Proper data cleaning and processing help ensure accurate predictions. Overall, the system is easy to use and supports early detection and better health decisions.

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	View Website	Access Home, About, Team & Contact sections
FR-2	View Heart Disease Dashboard	Load Heart Disease Dataset & Display interactive charts, Responsive dashboard view
FR-3	View Heart Disease Story	Load Tableau Story Navigate between story tabs
FR-4	Contact Form	Submit user details Validate required fields Display submission confirmation
FR-5	Admin Data Management	Upload Heart Disease dataset to Tableau Update dashboard visuals Publish dashboard

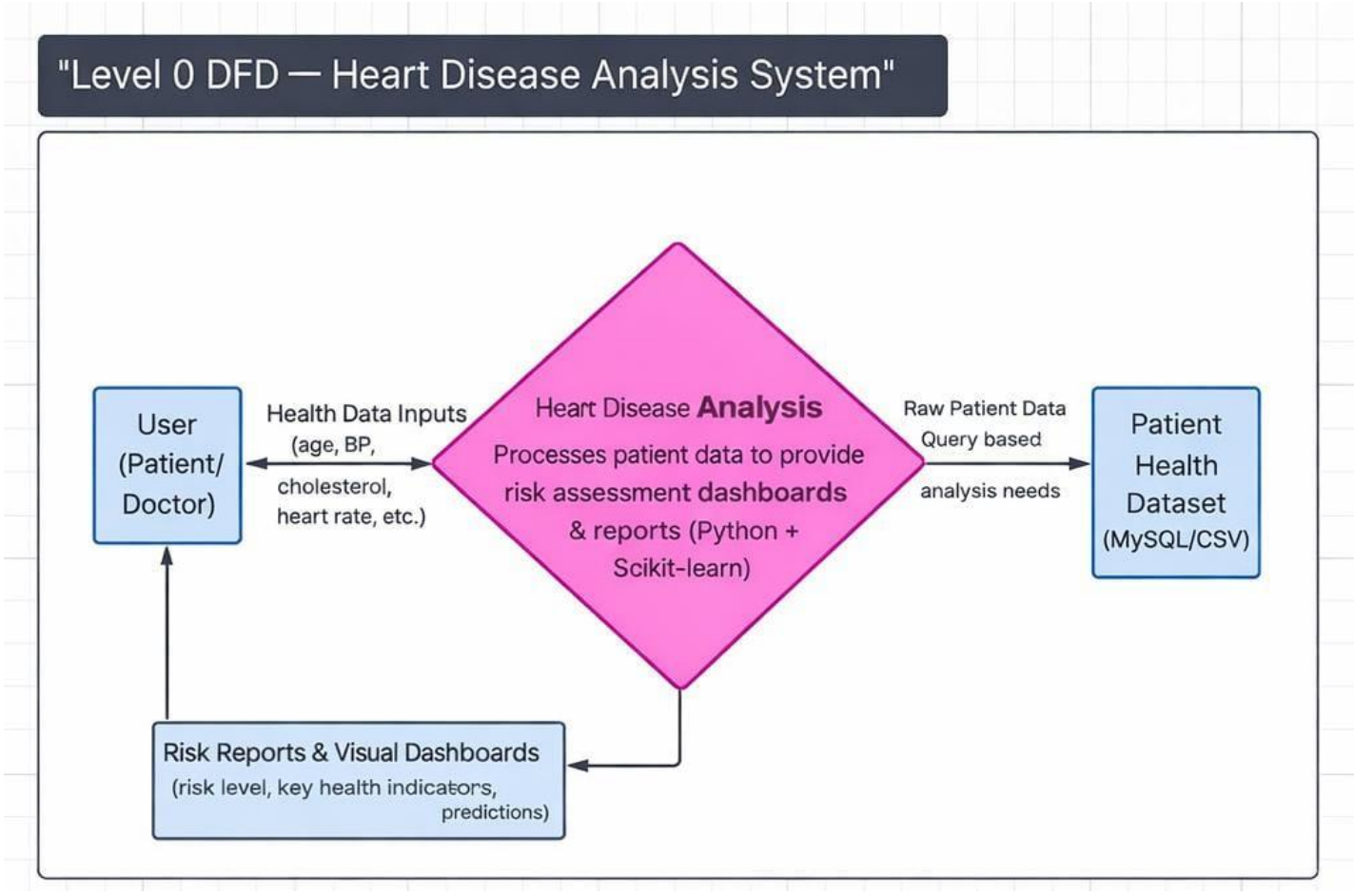
Non-functional Requirements:

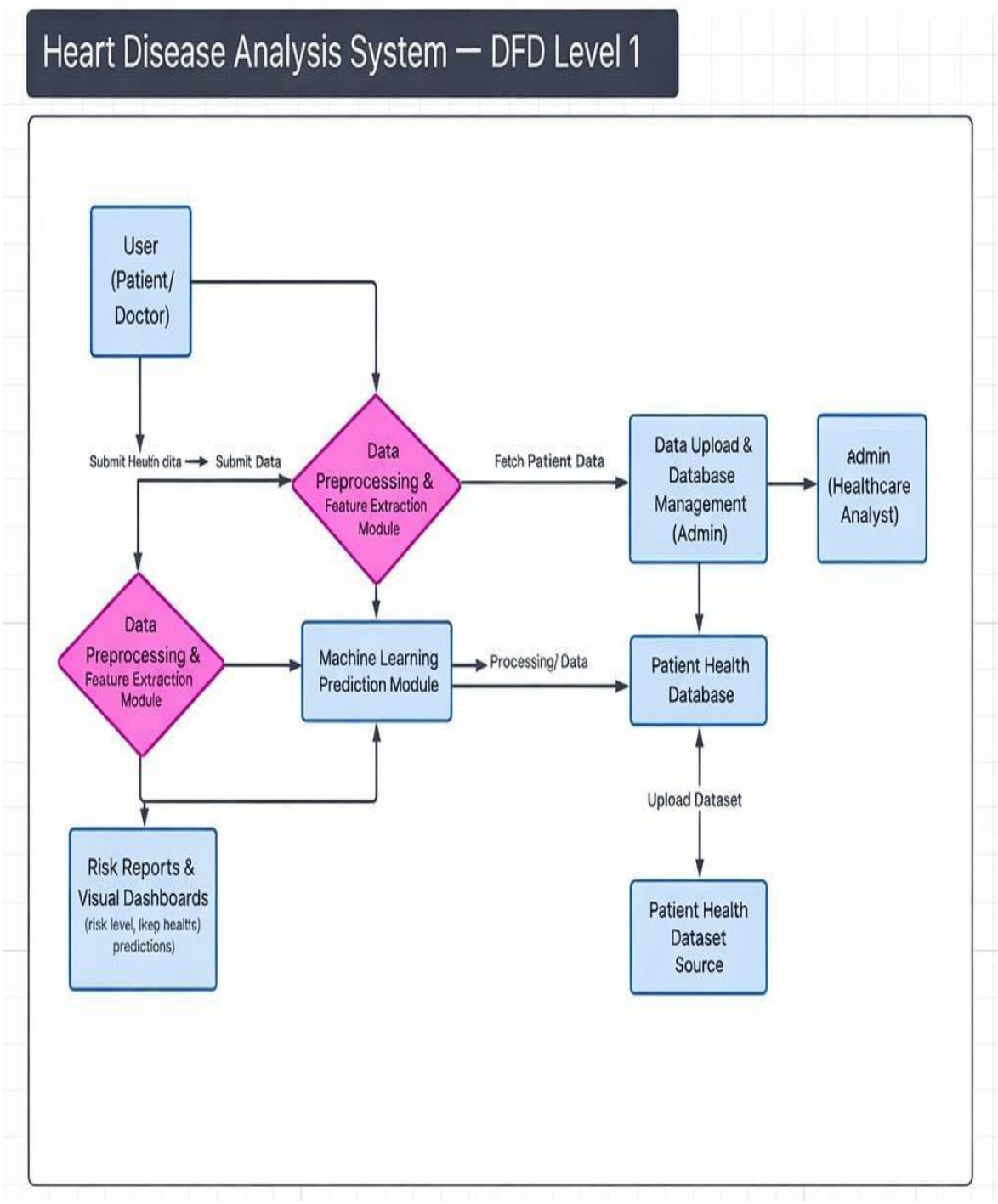
Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	**Usability**	The website should be user-friendly, easy to navigate, and visually clear with proper section alignment.
NFR-2	**Security**	User contact data must be protected and not publicly exposed. Tableau dashboards should be securely embedded.
NFR-3	**Reliability**	The system should consistently load dashboards and story without failure.
NFR-4	**Performance**	The website should load within 3–5 seconds and dashboard rendering should be responsive.
NFR-5	**Availability**	The system should be available 24/7 through web browsers.
NFR-6	**Scalability**	The system should support addition of new datasets and future dashboard extensions.

3.3 Data Flow Diagram

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.




Heart Disease Analysis System — DFD Level 1
User (Patient/ Doctor)
Submit Heulin dita
Submit Data
Data Preprocessing & Feature Extraction Module
Fetch Patient Data
Data Upload & Database Management (Admin)
admin (Healthcare Analyst)
Data Preprocessing & Feature Extraction Module
Machine Learning Prediction Module
Processing/ Data
Patient Health Database
Upload Dataset
Risk Reports & Visual Dashboards (risk level, lkeg healtts) predictions)
Patient Health Dataset Source

3.4 Technology Stack

The project uses Excel/CSV datasets for data storage. MySQL is used for database management and structured data storage. Tableau Desktop is used for data visualization and dashboard creation. Basic data preprocessing techniques are applied before visualization. These tools together ensure efficient data handling and presentation.

Table-1: Components & Technologies:

S. No	Component	Description	Technology
1.	User Interface	Web-based interface where users view Heart Disease dashboard, story and submit contact form	HTML, CSS, JavaScript, Bootstrap 5
2.	Application Logic – Dashboard Integration	Handles embedding and rendering of Tableau Dashboard inside the website.	JavaScript, Tableau Embed API
3.	Application Logic – Story Integration	Embeds Tableau Story and manages responsive display	JavaScript, Tableau Public
4.	Dataset Storage	Heart Disease dataset stored and processed within Tableau environment	Tableau Data Extract (TDE)
5.	File Storage	Heart Disease dataset files stored locally before upload to Tableau	Tableau Data Extract (TDE)
6.	Tableau Public API	Used to embed and display dashboard and story in website	Tableau Public Embed API
7.	Infrastructure (Web Hosting)	Website hosted on web server, dashboards hosted on Tableau Public Cloud:	Local Hosting / GitHub Pages / Render, Tableau Public Cloud

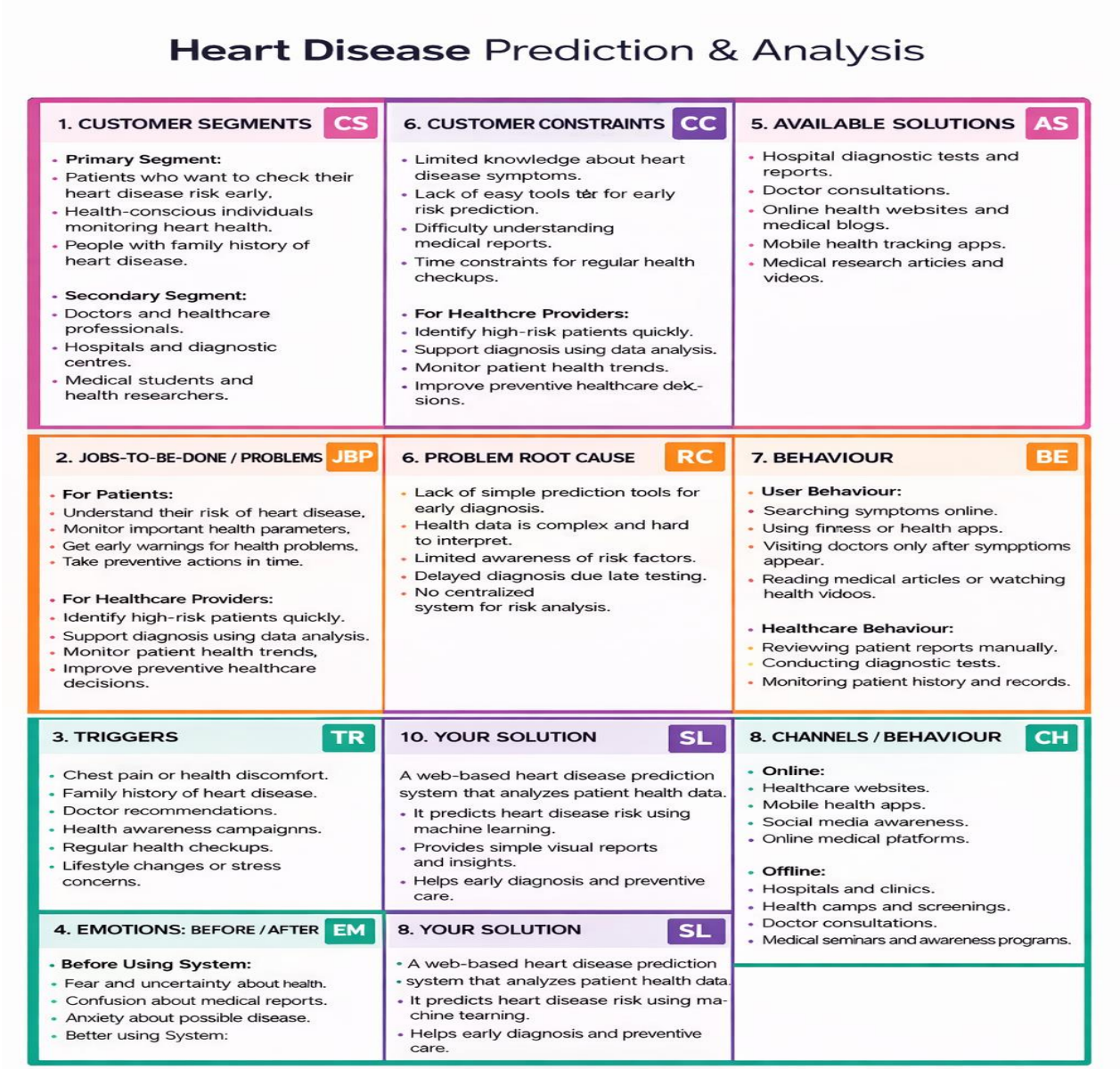
Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Open-Source Frameworks	Website built using open-source front-end frameworks	Bootstrap 5, HTML5, CSS3
2.	Security Implementations	Secure embedding of Tableau dashboards and form validation	HTTPS Protocol, Input Validation
3.	Scalable Architecture	Web-based modular structure allows addition of new dashboards and datasets	Modular Web Architecture, Cloud Hosting
4.	Availability	Dashboard available 24/7 via Tableau Public cloud	Tableau Public Cloud
5.	Performance	Optimized responsive UI and embedded dashboard loading	Bootstrap Grid System, Optimized Tableau Embed

4. PROJECT DESIGN

4.1 Problem Solution Fit

The system directly addresses the need for early detection and better understanding of heart disease risk. It combines patient health data with analytical insights to identify patterns and risk factors. Patients and doctors can easily understand how factors like age, blood pressure, cholesterol, and lifestyle affect heart health. The solution is based on user needs identified during analysis and helps support timely medical decisions.



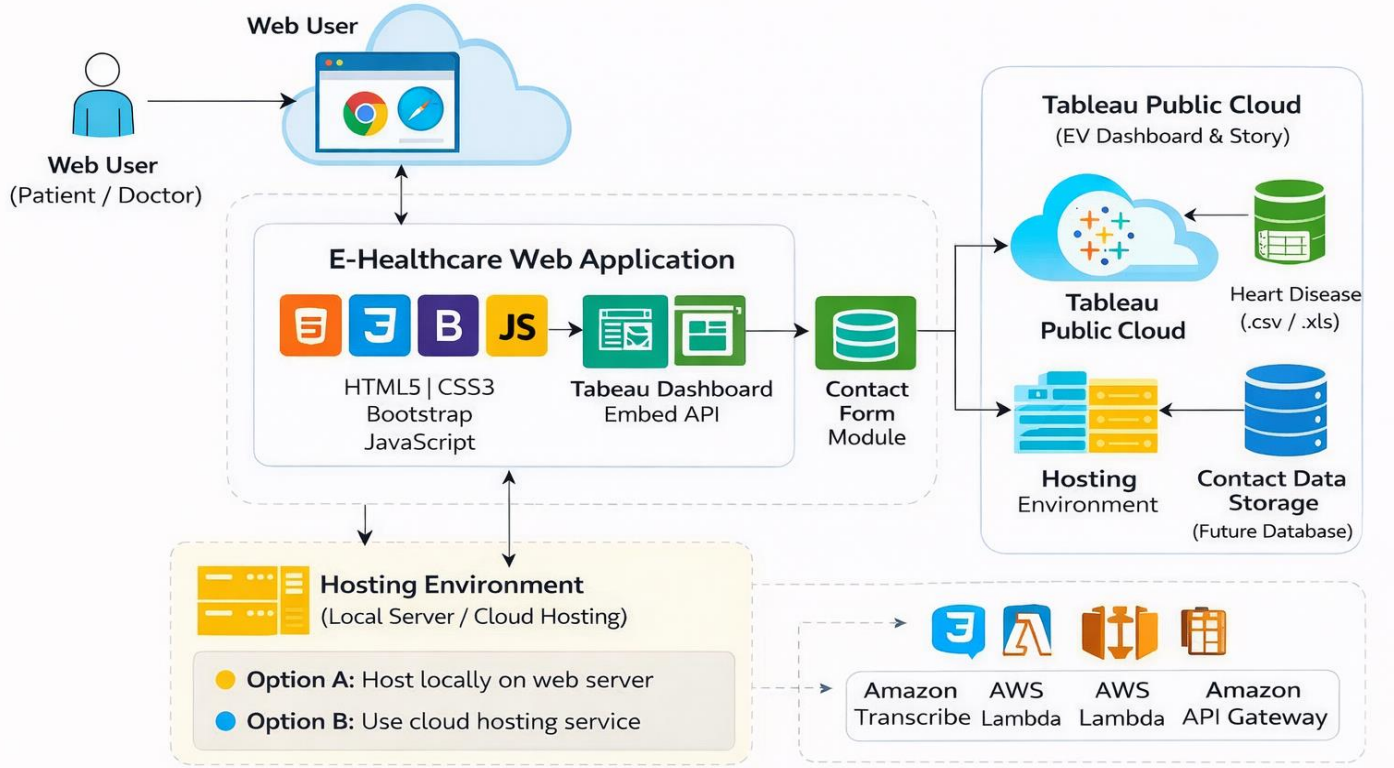
4.2 Proposed Solution

The proposed solution is a Heart Disease Analysis system with multiple visualizations and prediction features. It includes charts showing important health factors, risk level indicators, and summary insights for easy understanding. Interactive inputs allow users to explore how different health conditions affect heart disease risk. The system is designed to be simple, clear, and easy to use. It converts patient health data into meaningful insights to support early detection and better medical decisions.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Many people do not know they have heart disease until it becomes serious. Doctors need a simple system to detect heart disease early using patient health data.
2.	Idea / Solution description	We will create a system that analyzes patient health information and predicts the risk of heart disease. It helps doctors make faster and better decisions.
3.	Novelty / Uniqueness	The system uses data analysis and machine learning to give quick and accurate predictions. It reduces manual work and helps in early detection.
4.	Social Impact / Customer Satisfaction	This system helps people detect heart disease early and take treatment on time. It improves healthcare quality and saves lives.
5.	Business Model (Revenue Model)	Hospitals and clinics can use this system by paying a subscription or service fee. It can also be used in health checkup centers.
6.	Scalability of the Solution	The system can be used in many hospitals and healthcare centers. It can handle large patient data and can be expanded easily.

4.3 Solution Architecture

The architecture follows a simple data pipeline structure. Raw Herat Disease datasets are collected and cleaned. Cleaned data is stored in a database. Tableau connects to the database to create visual dashboards. Users interact with the dashboard to generate insights.



5. PROJECT PLANNING & SCHEDULING

5.1 Project Planning

The project was planned in stages: data collection, preprocessing, database integration, visualization, and testing. Each phase was executed sequentially. Timelines were set to ensure proper completion of tasks. Dashboard design and refinement were done iteratively. Proper planning ensured smooth execution.

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members
Sprint-1	Data Collection	USN-1	Download Heart Disease dataset from reliable source	3	High	P Janaki Ram
Sprint-1	Data Understanding	USN-2	Analyse and understand dataset attributes	3	High	P Janaki Ram
Sprint-1	Database Setup	USN-3	Import dataset into database	4	High	P Janaki Ram
Sprint-1	Tableau Connection	USN-4	Connect Tableau Desktop to database	4	High	P Janaki Ram
Sprint-1	Data Preparation	USN-5	Clean and prepare dataset for visualization	6	High	P Janaki Ram
Sprint-2	Data Visualization	USN-6	Create charts & Heart disease analysis visuals	5	High	P Janaki Ram
Sprint-2	Dashboard Creation	USN-7	Design interactive dashboard	5	High	P Janaki Ram
Sprint-2	Story Creation	USN-8	Create Heart Disease analytics story in Tableau	3	High	P Janaki Ram
Sprint-2	Publishing	USN-9	Publish dashboard to Tableau Public	3	High	P Janaki Ram
Sprint-2	Website Integration	USN-10	Embed dashboard into website	4	High	P Janaki Ram
Sprint-3	Website Navigation	USN-11	Develop website sections	4	High	P Janaki Ram
Sprint-3	Contact Form	USN-12	Implement form validation	4	High	P Janaki Ram
Sprint-3	Responsive Design	USN-13	Make website mobile responsive	5	Medium	P Janaki Ram
Sprint-3	Testing	USN-14	Cross-browser testing	3	Medium	P Janaki Ram
Sprint-3	Final Review	USN-15	Final deployment & bug fixing	4	High	P Janaki Ram

Project Tracker, Velocity & Burndown Chart:

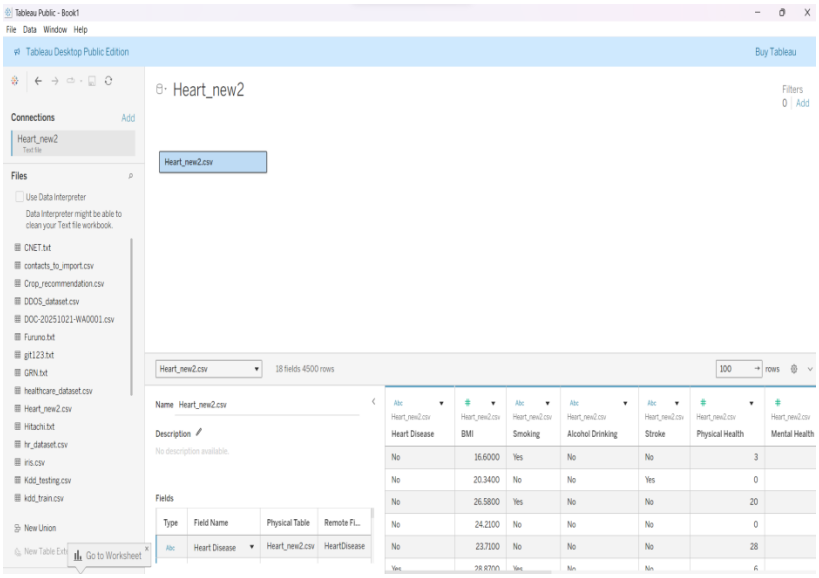
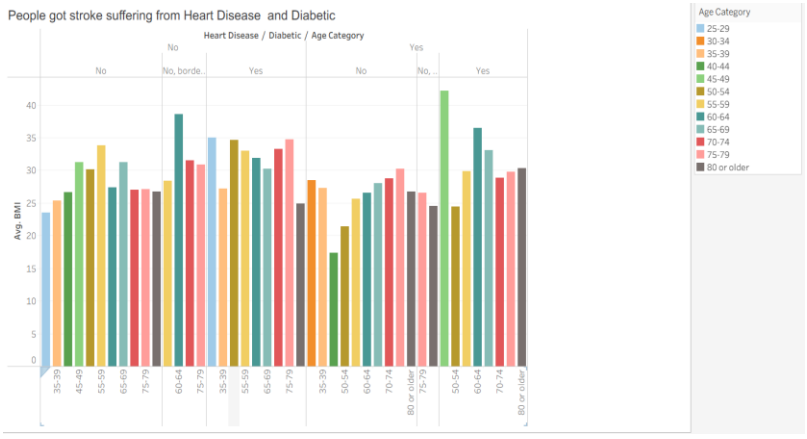
Sprint	Total Story Points	Duration	Sprint Start Date	Sprint End Date (Planned)	Story Points Completed (as on Planned End Date)	Sprint Release Date (Actual)
Sprint-1	20	7 Days	28 Jan 2026	03 Feb 2026	20	03 Feb 2026
Sprint-2	20	7 Days	04 Feb 2026	10 Feb 2026	20	10 Feb 2026
Sprint-3	20	7 Days	11 Feb 2026	14 Feb 2026	20	14 Feb 2026

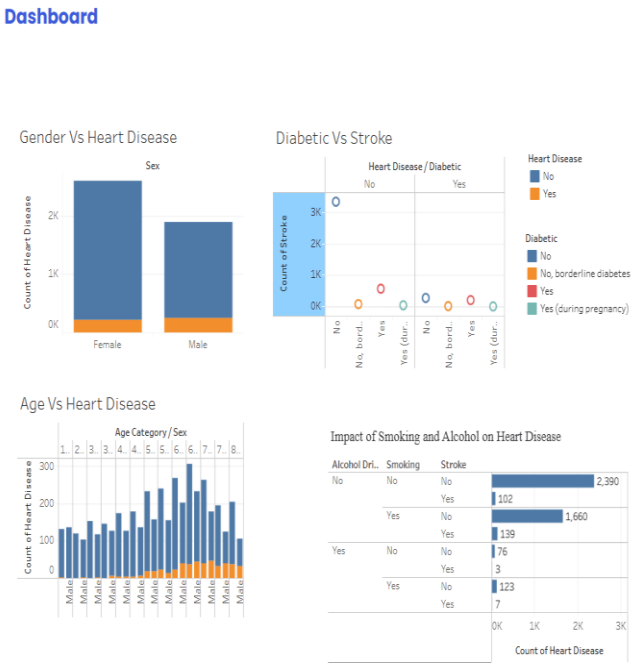
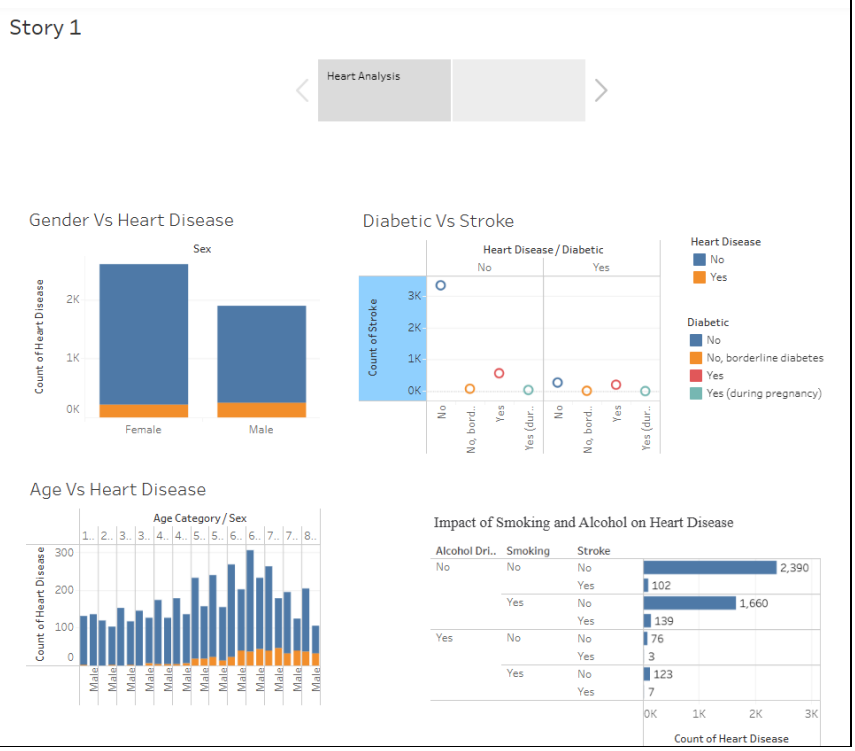
AV = Sprint duration/velocity =20/7= 2.85 ~ 3 story points per day

6. FUNCTIONAL AND PERFORMANCE TESTING

6.1 Performance Testing

The dashboard was tested for responsiveness and accuracy. Filters and interactive features were validated. Data consistency between database and visualizations was checked. Performance was monitored for loading time and smooth interaction. The system performs efficiently for the given dataset size.

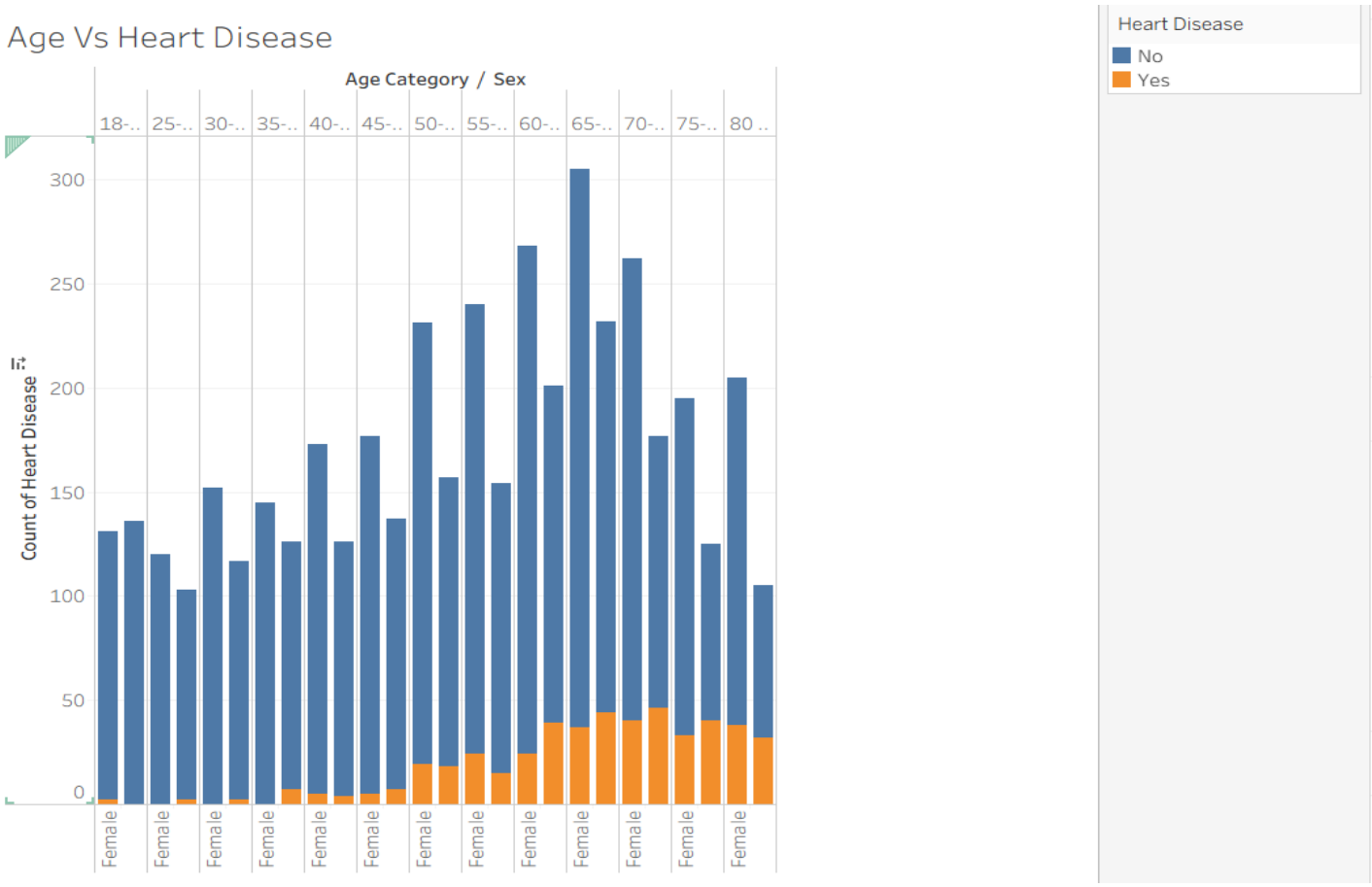
S.No.	Parameter	Screenshot / Values
1.	Data Rendered	The Heart Disease dataset was successfully rendered in Tableau Desktop. All fields including heart disease and other problems.
2.	Data Preprocessing	Data preprocessing was performed by handling missing values, removing duplicate records, correcting data types, and creating calculated fields. Units were standardized and unnecessary columns were removed before visualization. 
3.	Utilization of Filters	Filters such as Style, Vehicle Type, Charging Type, and Range were applied to enable dynamic interaction in the dashboard. 
4.	Calculation fields Used	AVG([Range]) COUNT([Vehicle Type])

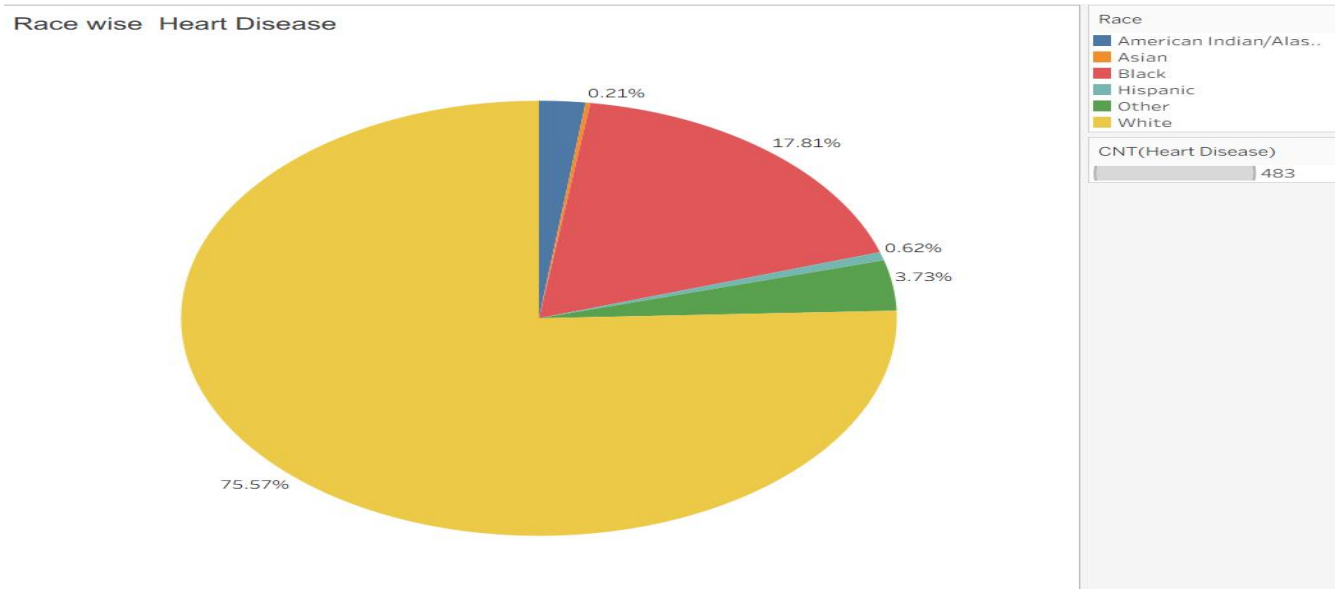
5.	Dashboard design	No of Visualizations / Graphs – 10 
6	Story Design	No of Visualizations / Graphs – 4 

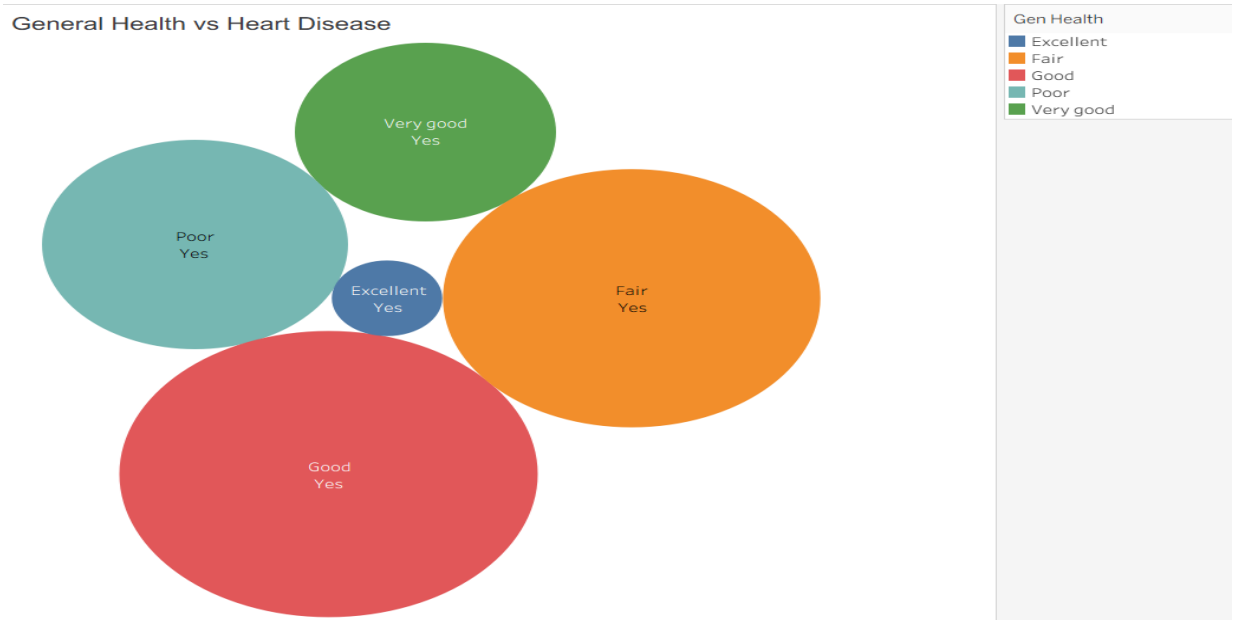
7. RESULTS

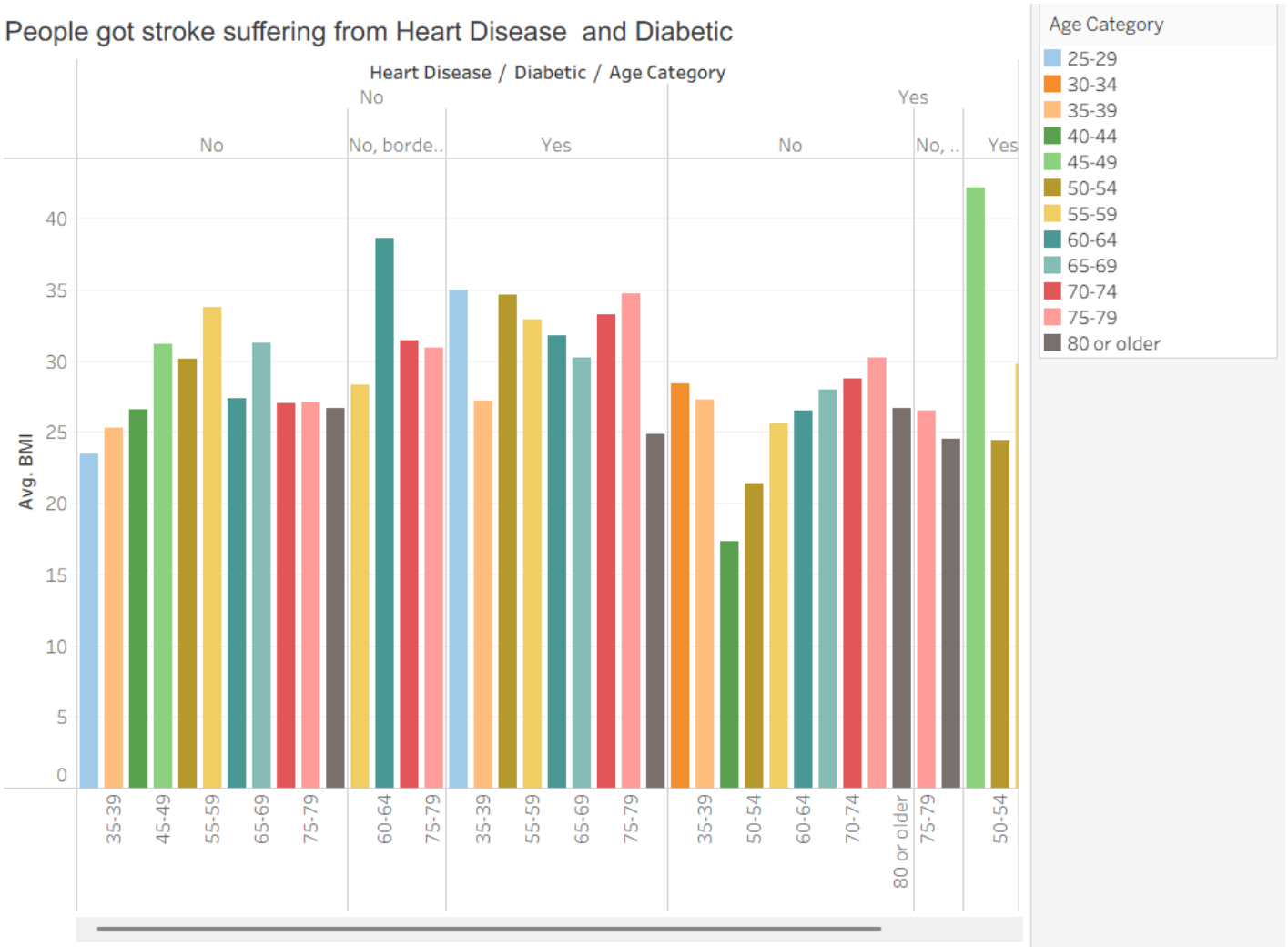
7.1 Output Screenshots

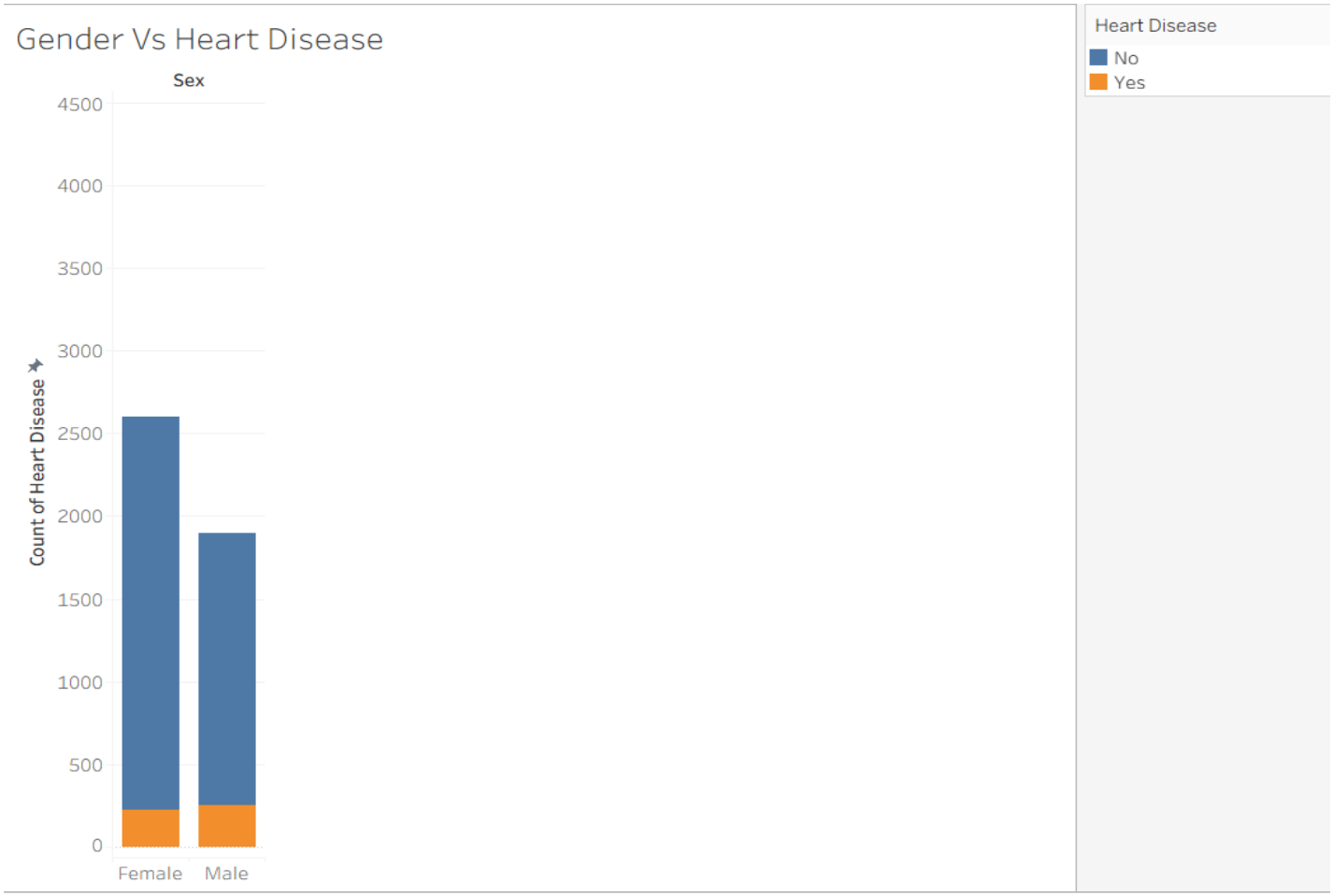
The final dashboard displays EV brand analysis, efficiency comparisons, and body style distribution. Summary cards highlight key metrics. Filters allow dynamic exploration of data. Visualizations provide clear and actionable insights. The results demonstrate successful implementation of the project objectives.

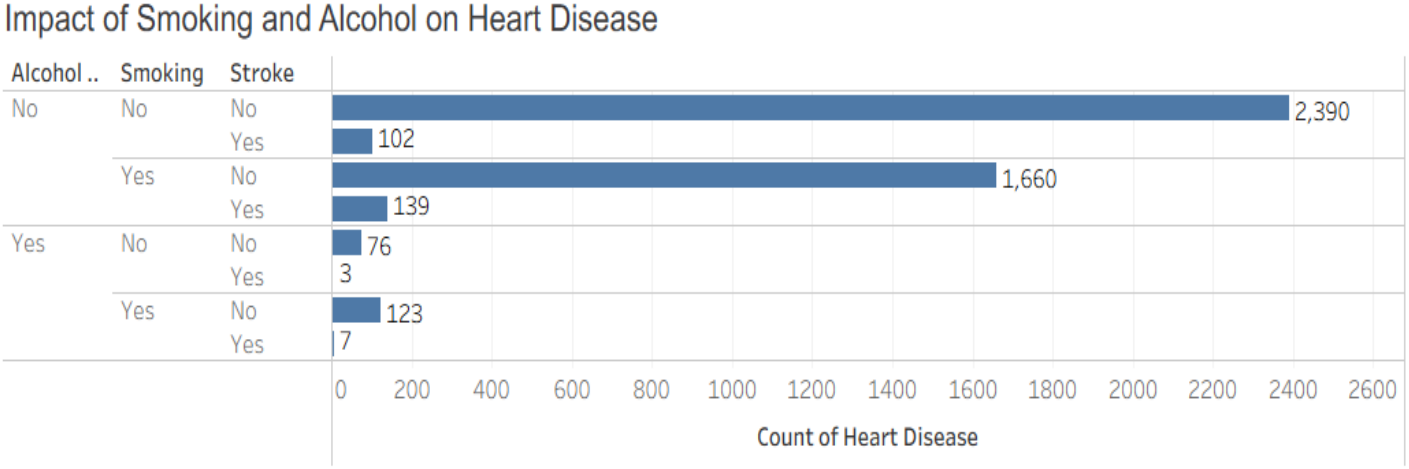


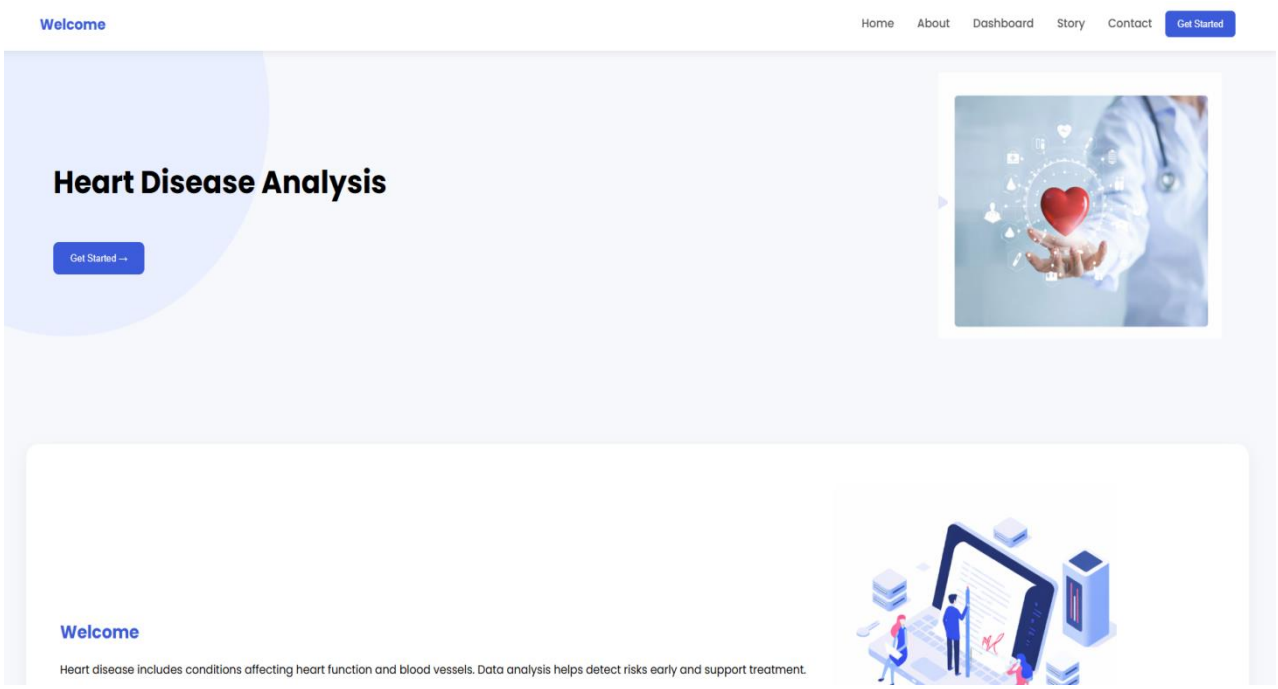



General Health vs Heart Disease
Very good
Yes
Poor
Yes
Excellent
Yes
Fair
Yes
Good
Yes
Gen Health
Excellent
Fair
Good
Poor
Very good

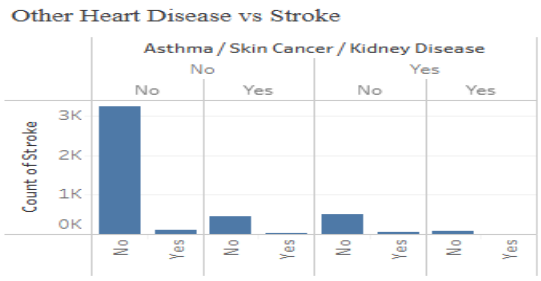

People got stroke suffering from Heart Disease and Diabetic
Heart Disease / Diabetic / Age Category
No
Yes
No
No, borde..
Yes
No
No, ..
Yes
Avg. BMI
0
5
10
15
20
25
30
35
40
35-39
45-49
55-59
65-69
75-79
60-64
75-79
35-39
55-59
65-69
75-79
35-39
50-54
60-64
70-74
80 or older
75-79
50-54
Age Category
25-29
30-34
35-39
40-44
45-49
50-54
55-59
60-64
65-69
70-74
75-79
80 or older

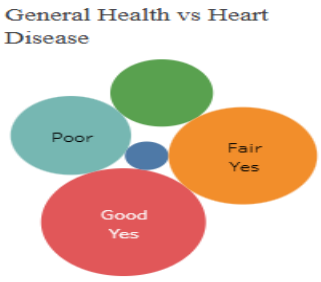

Gender Vs Heart Disease
Sex
Count of Heart Disease
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Female
Male
Heart Disease
No
Yes

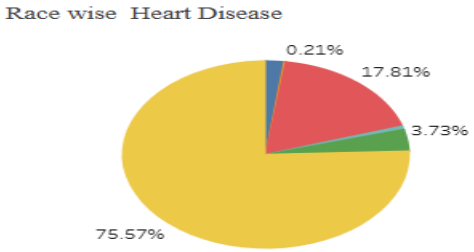

Impact of Smoking and Alcohol on Heart Disease
Alcohol ..
Smoking
Stroke
No
No
No
Yes
Yes
No
Yes
Yes
No
No
Yes
Yes
No
Yes
2,390
102
1,660
139
76
3
123
7
0
200
400
600
800
1000
1200
1400
1600
1800
2000
2200
2400
2600
Count of Heart Disease

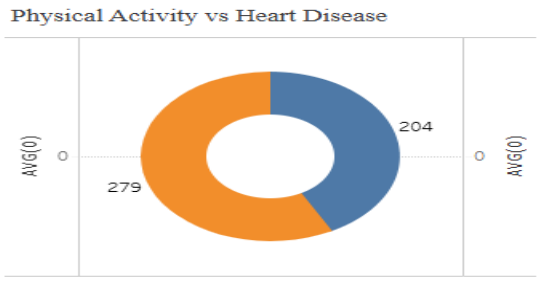

Welcome
Home
About
Dashboard
Story
Contact
Get Started
Heart Disease Analysis
Get Started →
Welcome
Heart disease includes conditions affecting heart function and blood vessels. Data analysis helps detect risks early and support treatment.

Dashboard


Other Heart Disease vs Stroke
Asthma / Skin Cancer / Kidney Disease
No
Yes
No
Yes
No
Yes
Count of Stroke
3K
2K
1K
0K
No
Yes
No
Yes
No
Yes
No
Yes


General Health vs Heart Disease
Poor
Fair
Yes
Good
Yes

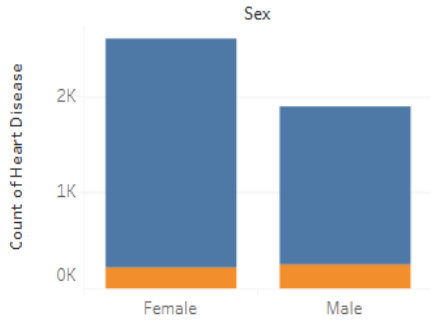

Race wise Heart Disease
0.21%
17.81%
3.73%
75.57%


Physical Activity vs Heart Disease
AVG(0)
0
204
279
0
AVG(0)

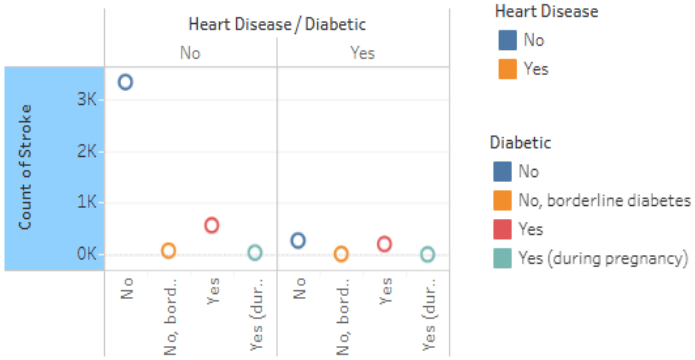
Story 1

Heart Analysis

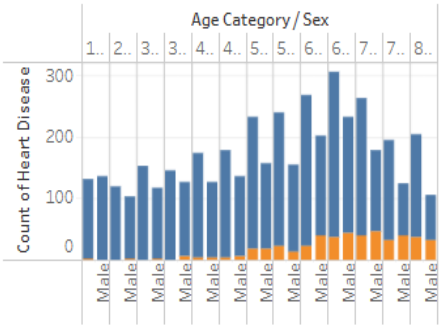
Gender Vs Heart Disease



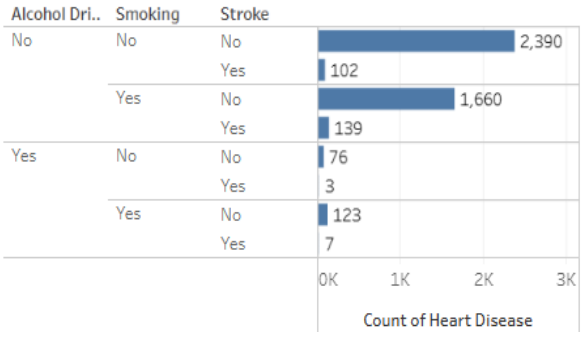
Diabetic Vs Stroke



Age Vs Heart Disease



Impact of Smoking and Alcohol on Heart Disease



8. ADVANTAGES & DISADVANTAGES

Advantages:

The system helps in early identification of heart disease risk using patient health data. It simplifies complex medical information into easy-to-understand visualizations. User-friendly inputs make the system simple for anyone to use. It supports informed health decisions and promotes preventive care.

Disadvantages:

The system depends on the quality and accuracy of the dataset used. It does not replace professional medical diagnosis. Real-time health monitoring is not included. Predictions may be limited to the features available in the dataset.

9. CONCLUSION

The Heart Disease Analysis system successfully converts patient health data into meaningful insights for risk prediction. It helps users understand important health factors and supports early detection of potential heart problems. The project demonstrates effective data preprocessing, analysis, and visualization techniques. It improves awareness and assists in better health-related decision-making. Overall, the system achieves its objective of providing a simple and useful heart disease risk analysis tool.

10. FUTURE SCOPE

The system can be enhanced by integrating real-time patient health monitoring data from wearable devices. More advanced machine learning models can be added to improve prediction accuracy. Integration with hospital databases or health apps can provide more comprehensive analysis. Personalized health recommendations can also be included. In the future, the system can be developed into a complete web or mobile healthcare support platform.

11. APPENDIX

Dataset Link:
https://drive.google.com/file/d/190Qmq27LeZZ_nWricP3Obl7ys_5otEsp/view
Github Documentation Link:
https://github.com/JanakiRamPiramalla/Heart_disease_Analysis
Github Project Link:
https://github.com/JanakiRamPiramalla/Heart_Analysis_Web_Dashboard
Project Demo Link:
https://drive.google.com/file/d/1iJwJRo3MEfjV2V8k0ux2sDSg9S3D0e0T/view?usp=sharing