



## LONG-TERM INTERNSHIP



**Dr. LANKAPALLI BULLAYYA COLLEGE  
VISAKHAPATNAM**

# HEART DISEASE ANALYSIS

## 1. Introduction:

### a. Overview

Heart Disease encompasses a range of conditions affecting the heart & blood vessels.

Analysis typically involves evaluating risk factors such as high blood pressure, high cholesterol, and smoking, along with diagnostic tests like ECG, Echocardiogram, & blood tests. Treatment strategies vary based on the specific condition but may include life style changes, medications and procedures like angioplasty or bypass surgery. Advance in data analytics have enabled more personalized approaches to prevention diagnosis and treatment.

## b. purpose:

The purpose of heart disease analysis is multifaceted.

### i. Prevention: Identifying risk

The heart is a fist-sized organ that pumps blood throughout your body.

→ The function of the heart is to contract and pump oxygenated blood to the body and deoxygenated blood to the lungs.

- The primary purpose of diagnostic testing is to detect a disease, its outlook, and its spread throughout the body.

### Treatment guidance:

The first line treatment for heart failure Loop diuretics should be used as first line agents, with thiazides added for refractory fluid overload.

Research: Our research is a crucial step towards beating heart break forever. 190 people die each from heart attacks each day.

## 2. Literature Survey:

### a. Existing problem

Specific factors that suggest a poor prognosis include hypotension, low ejection fraction, presence of coronary artery disease, troponin release, elevation of BUN, reduced LVEF, hyponatremia, and poor functional capacity.

1. Limited data access: the ability to perform large-scale analysis & develop robust predictive models.

2. Data quality issue: incomplete or inaccurate data entries, inconsistencies in data formats and data sites can compromise the reliability and validity of analysis.

3. Complexity: heart disease is multifactorial involving various risk factors, comorbidities and disease pathways making it challenging to identify precise predictors & develop effective treatment strategies.

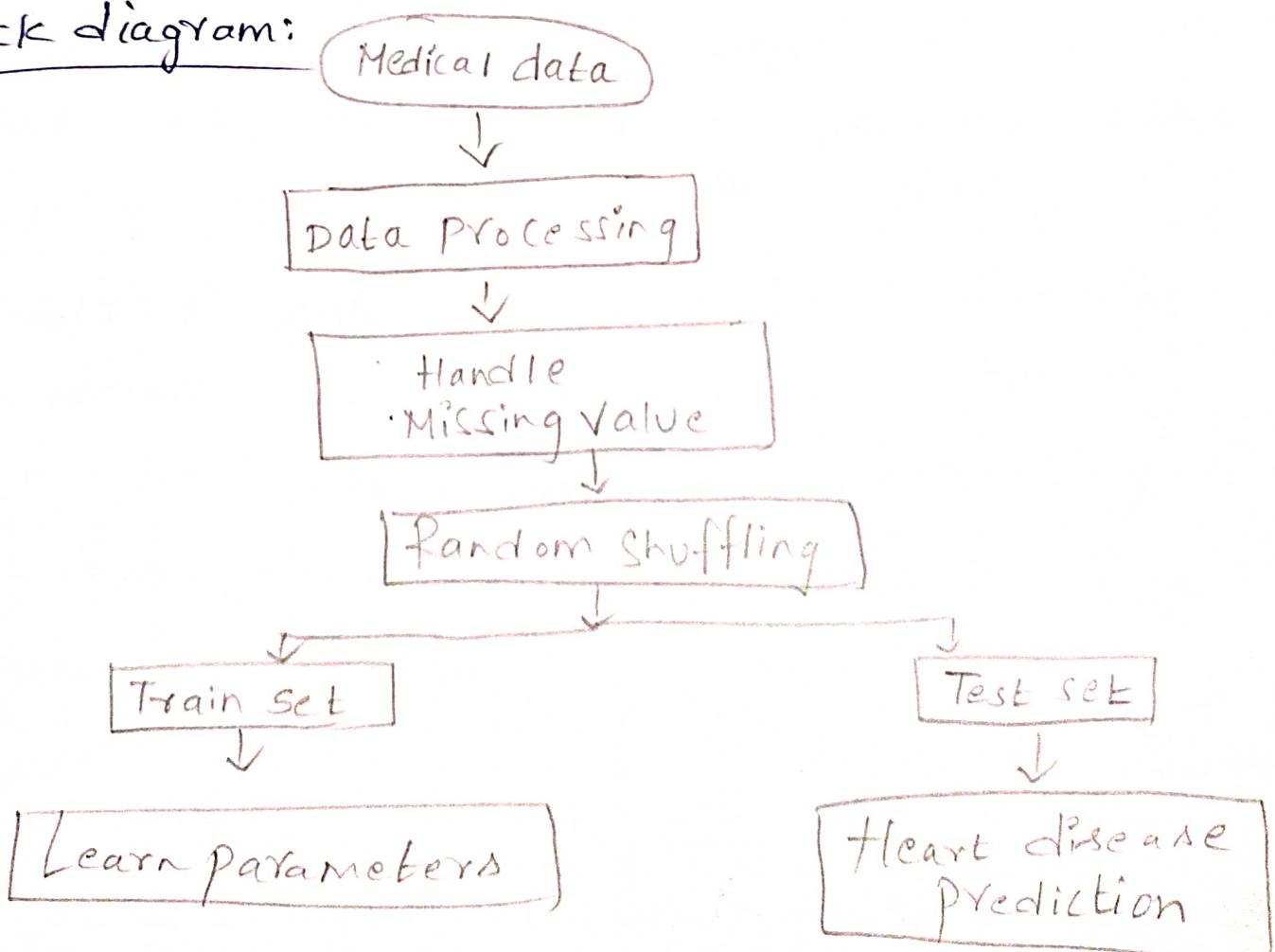
## b. Proposed Solution:

For heart disease analysis, a common method is to use machine learning algorithms to analyze medical data such as patient demographics, medical history, and diagnostic test results.

Popular techniques include Logistic regression, decision trees, random forests, Support Vector machines and neural networks.

## 3. Theoretical Analysis

### a. Block diagram:



## b. Hardware/Software Designing

### Hardware/Software requirements of the heart disease analysis.

The hardware & software requirements for heart disease analysis typically depend on the complexity of the analysis and the specific algorithms being used.

Generally, you'd need a computer with sufficient processing power & memory to handle the data, along with software for data processing, statistical analysis and machine learning algorithms. Popular tools include Python libraries like

Numpy, Pandas along with statistical software like R. Additionally, specialized hardware such as GPUs might be beneficial for accelerating computations, especially for deep learning algorithms.

## 5. Advantages & Dis-advantages of heart Disease

1. Early detection: heart analysis techniques can detect heart diseases in their early stages, allowing for timely intervention and treatment.
2. Risk Assessment: By analyzing various parameters such as cholesterol levels, blood pressure, and heart rate variability, heart analysis can assess an individual's risk of developing heart diseases, enabling preventative measures to be taken.

### Disadvantages

1. Cost and Accessibility: Some advanced heart analysis methods, such as genetic testing or specialized imaging techniques can be expensive and may not be readily accessible to all individuals. Especially those in rural areas.
2. Privacy and Security concerns:  
→ heart analysis often involves the collection & analysis of the sensitive health data.

## 6. Applications

Heart analysis has various applications across health care where solutions can be applied effectively.

1. Diagnosis of heart disease: heart analysis techniques such as Electrocardiography (ECG), echocardiography, cardiac MRI, & coronary angiography aid in the

- Early Detection & diagnosis
- Risk assessment & satisfaction.
- Population growth & health management.
- Monitoring and disease management.
- Treatment optimization.
- Clinical design support.
- Research and development.
- Telemedicine & Remote monitoring.

7. Conclusion: heart disease analysis is a vital component of modern health care, offering a comprehensive approach to the prevention, diagnosis and treatment of cardiovascular conditions. Leveraging advanced analytics techniques and innovative technologies, heart disease analysis enables early detection & improved outcomes for patients.

## FUTURE Scope:

### 1. Digital Health Technologies:

wearable sensors, mobile health apps & remote monitoring devices will facilitate continuous monitoring of cardiovascular health parameters.

### 2. Precision Medicine:

Advancements in genomic medicine and personalized diagnostics will enable more precise risk satisfaction & treatment selection.

### 3. Real Time Decision Support:

Real time analytics & decision support system will assist health care providers in making time & evidence based decisions.

## Web Integration :

publishing helps us to track and monitor key performance metrics & to communicate results & progress. help a publisher stay informed, make better decisions and communicate their performance to others.

publishing dashboard & reports to Tableau public.

Step 1: Go to dashboard / Story, click on the share button on the top ribbon. Give the server address of your Tableau public account & click on connect.

Step 2: Once you click on connect it will ask you for the Tableau public username & password. Once you login into your Tableau public using your credentials, the particular visualization will be published into the Tableau public.

Milestone 1: Define problem

→ Activity 1: Specify the business problem.  
refer project description.

Activity 2: Business requirements

The health care industry produces a huge amount of data. This data is not always made use to full extent & is often utilized.

using this huge amount of data, a disease can be detected or even cured.

The ultimate goal is to gain insights & improve performance through data visualization techniques.

### Activity 3 : Literature Survey

A literature survey for heart disease would involve researching & reviewing previous studies, articles on topic.

A comprehensive literature survey should include journals, scientific, conference proceedings. The survey should encompass range of clinical trials, studies, meta-analysis to provide a comprehensive overview of the current knowledge landscape in the field of heart disease.

### Activity 4 : Social or Business Impact

Social impact - Analyzing heart disease has profound social impacts, ranging from individual level health outcomes to community empowerment and public health initiatives.

Business impact : Analyzing heart disease has substantial business impacts across various sectors, including health care, medical technology, digital health, insurance, research, work place wellness, & consumer products.

## Data Visualization :

Data visualization is the process of creating graphical representations of data to help people understand & explore the information.

The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret.

### Activity 1: No. of unique visualizations

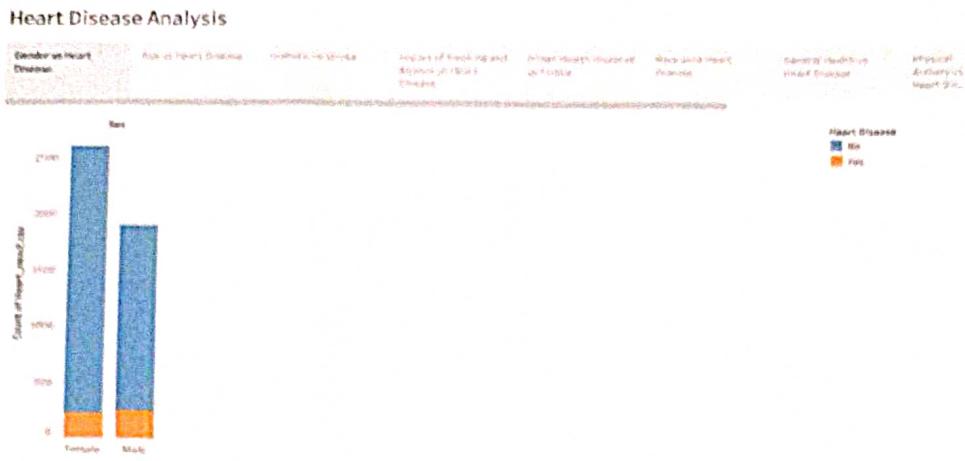
The number of unique visualizations that can be created with a given dataset.

Some common types of visualizations that can be used to analyze the performance and efficiency of banks include maps, charts etc.



## Age vs Heart disease

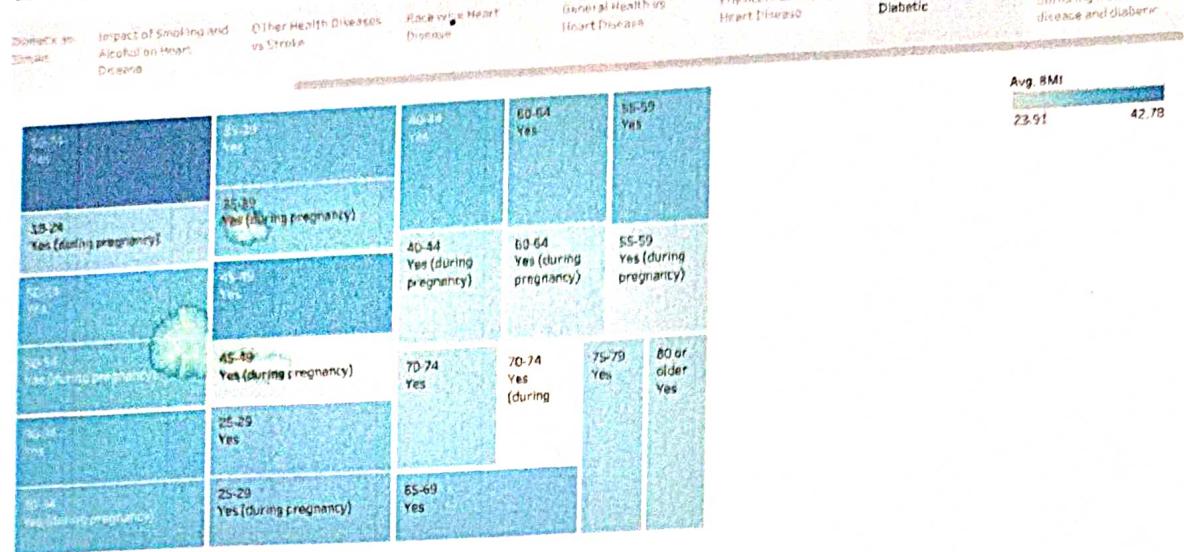
The relationship between age and heart disease is significant. As people age, the risk of developing heart disease increases. This is due to various factors, including the accumulation of plaque in the arteries, changes in blood pressure and decreased elasticity of blood vessels. Older age is a major risk factor for conditions like coronary artery disease, heart attacks, and heart failure.



## Gender Vs Heart diseases

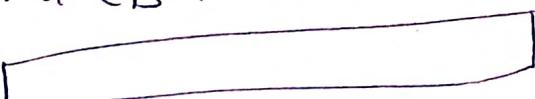
The relationship between gender and heart disease is an important area of study in cardiovascular health. Generally, men have a higher risk of heart disease compared to premenopausal women. However, this difference tends to decrease after menopause, suggesting that hormonal factors like estrogen may have a protective effect. It's also important to consider life style factors such as diet, exercise and stress which can impact heart health differently in men and women.

## Heart Disease Analysis



## Age & BMI vs Diabetic

AVG (BMI)



23.91

42.78

filter: diabetic

## Heart Disease Analysis

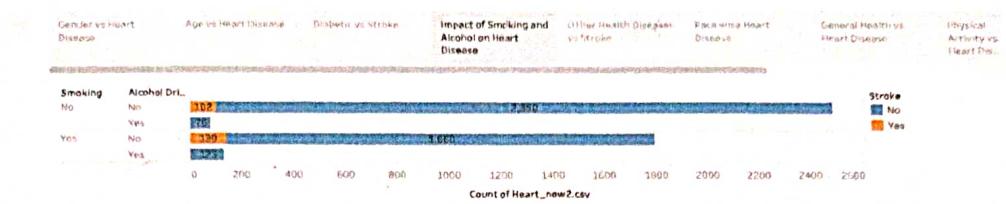


## Diabetic Vs Stroke

The relationship between diabetes & stroke is important to understand because diabetes is a major risk factor for stroke.

People with diabetes are at a higher risk of developing cardiovascular complications, including stroke, due to the effects of high blood sugar levels on blood vessels and the heart.

### Heart Disease Analysis

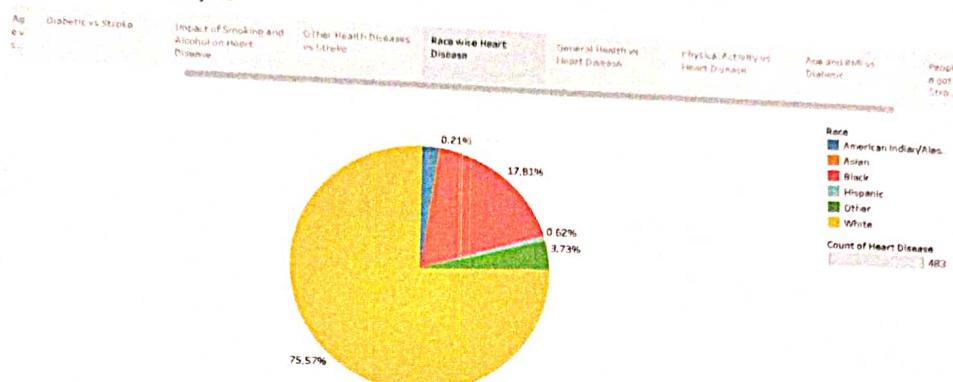


## Impact of Smoking and Alcohol on heart Disease :

Alcohol consumed to excess over several years can produce an alcoholic cardiomyopathy, in which alcohol acts as a toxin to weaken the heart muscle directly and hence may improve with abstention.

Cigarette Smoking also is a strong risk factor for congestive heart failure in the general population.

### Heart Disease Analysis



### Race wise heart disease

Black adults experience higher burden of CV risk factors such as hypertension & obesity, and are more than twice as likely to die of CVD, relative to white adults.

American Indian — 0.21%

Asian — .

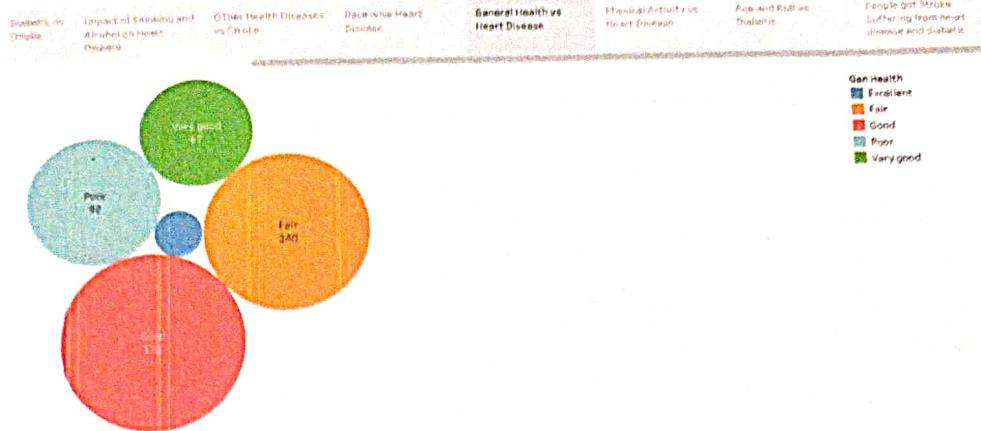
Black — 17.81%

Hispanic — 0.62%

Others — 3.73%

White — 75.57%

### Heart Disease Analysis



## General health vs heart disease

Regular, daily physical activity can lower the risk of heart disease.

Excellent -

Fair - 140

Good - 172

Poor - 92

Very good - 67

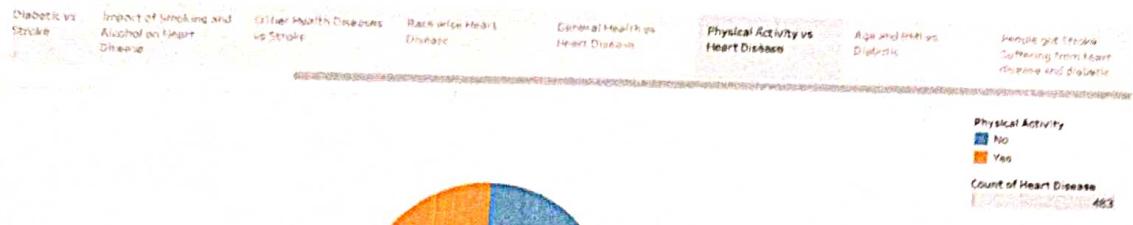
## Heart Disease Analysis



## Other health diseases vs Stroke

heart attacks and strokes have quite a bit in common: they are both medical emergencies caused by a sudden cut-off in blood flow. In a heart attack, the blood flow to your heart is suddenly blocked.

## Heart Disease Analysis



## Physical Activity Vs heart disease

physical activity reduces coronary heart disease risk factors .

Physical activity

yes - 279

no - 204

CNT (heartDisease) - 483 .

## Heart Disease Analysis



People got stroke suffering from heart disease  
and diabetic

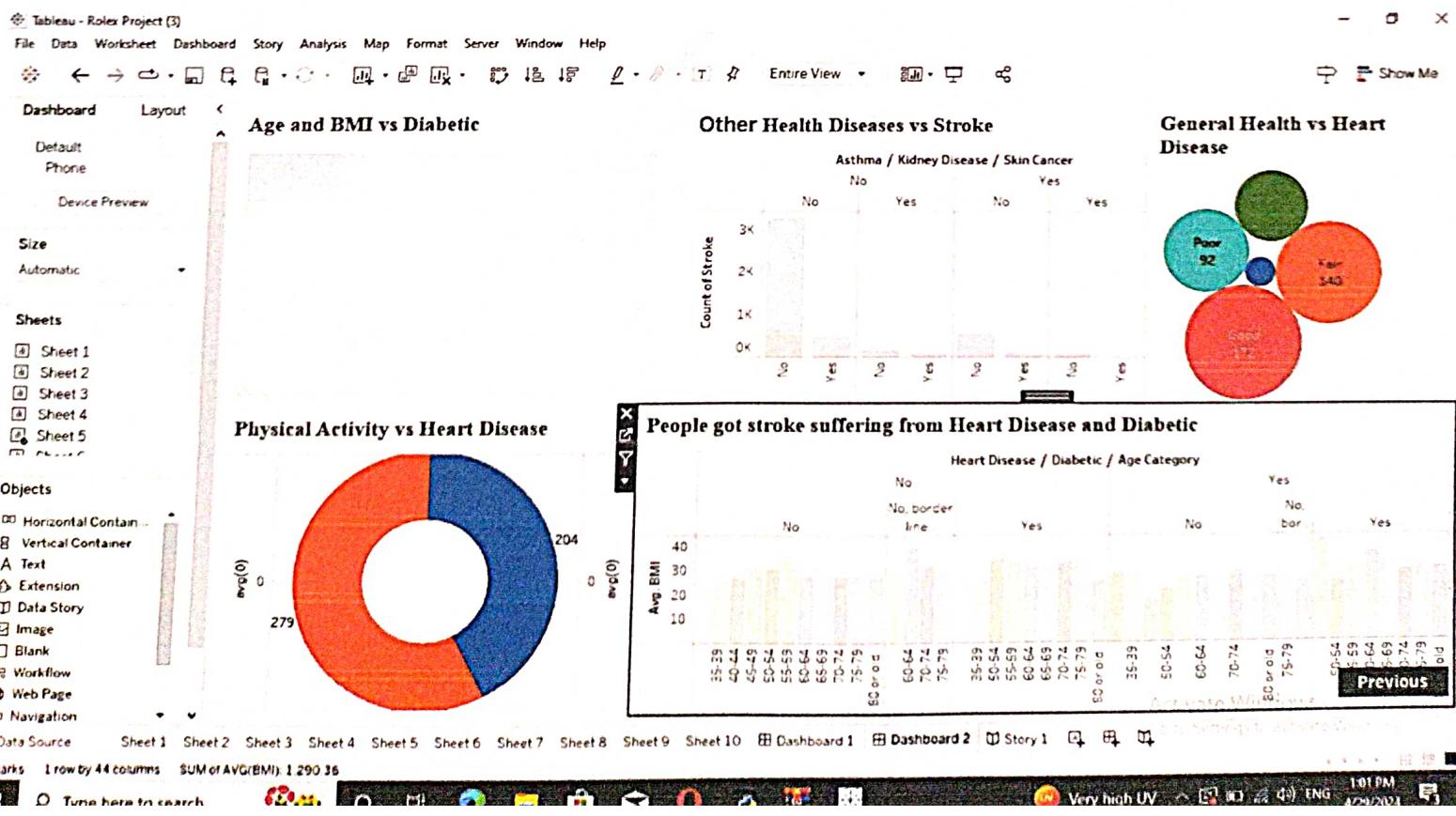
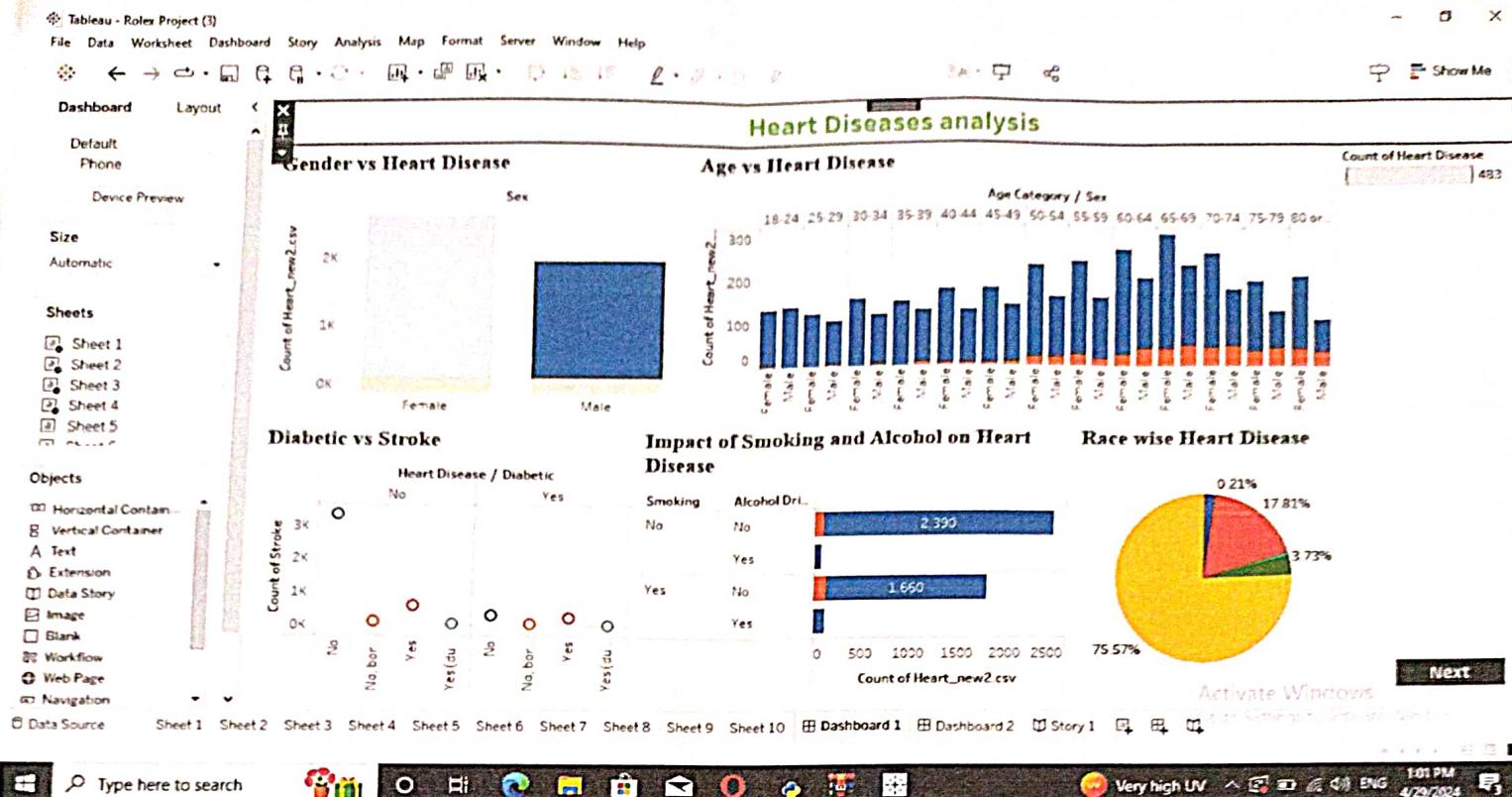
## Dashboard :

A dashboard is a graphical user interface that displays information and data in an organized, easy to read format - Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for creating a beautiful dashboard.

## Story :

A data story is a way of presenting data and analysis in a narrative format, intending to make the information more engaging and easier to understand. A data story typically includes a clear introduction that sets the stage & explains the context for the data, a body that presents the data & analysis logically & systematically. Data stories can be told using a variety of mediums such as reports, presentations, interactive visualizations and videos.

Activity: No: of Scenes of Story  
The no. of scenes in a storyboard for a data visualization analysis of the heart disease will depend on the specific insights that are trying to be conveyed.



## \* Performance:

Activity 1: Amount of data rendered to DB

- The amount of data that is rendered to a database depends on the size of the dataset & the capacity of the database to store & retrieve data.

- Open MySQL, go to database & click to expand tables, select table and click on button to get information related to table such as column, count, table rows etc.

Activity 2: Utilization of Data filters.

Filters are cards on the worksheet that display a range of data.

Activity 3: No. of Calculation.

In this analysis we have not created any new column using calculation field as data found in dataset was clean & sufficient for analysis.

Activity 4: No. of visualization / Graphs.

1. Gender wise heart disease.
2. Age wise heart disease.
3. People suffering from diabetes & stroke.
4. Impact of smoking & alcohol drinking on heart disease.
5. Other diseases vs stroke.

6. Race wise heart disease .
7. General health vs heart disease
8. physical activity Vs heart disease
9. Age and BMI vs heart disease
10. people got stroke suffering from diabetes and heart disease.

## ACTIVITY LOG FOR THE FIRST WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	<p>Introduction to Business intelligence</p> <ul style="list-style-type: none"> <li>• Data integration</li> <li>• Data processing</li> <li>• Data presentation</li> <li>• ETL Architecture</li> </ul>	<ul style="list-style-type: none"> <li>• understand the fundamentals and significance of business intelligence and data analytics.</li> </ul>	
Day - 2	<p>Introduction to tableau</p> <ul style="list-style-type: none"> <li>• overview and features</li> <li>• Connecting tableau to data sources.</li> <li>• Connecting spreadsheets.</li> </ul>	<ul style="list-style-type: none"> <li>• Gain an overview of tableau and its features</li> <li>• learn to connect tableau to various data source(s).</li> </ul>	
Day - 3	<p>Data Extraction</p> <ul style="list-style-type: none"> <li>• Introduction to database.</li> <li>• Creating database and table.</li> <li>• CRUD operation on database tables.</li> </ul>	<ul style="list-style-type: none"> <li>• Gain an introduction to database and their importance in data management.</li> </ul>	
Day - 4	<p>Basic SQL Operation</p> <p>Covered fundamental concepts of SQL and its importance in database management.</p>	<ul style="list-style-type: none"> <li>• understand the fundamentals of structured query language and its role in database management.</li> </ul>	
Day - 5	<p>Basic SQL operation</p> <p>SQL operations including querying, filtering, sorting and aggregating data.</p>	<ul style="list-style-type: none"> <li>• learn basic SQL operations including querying data from tables using SELECT statements.</li> </ul>	
Day - 6			

## WEEKLY REPORT

WEEK - 1 (From Dt..... to Dt.....)

Objective of the Activity Done: Week 1 was to provide an intensive introduction to Business I

Detailed Report: Introduction to Business Intelligence = Covered various aspect of BI including data integration, processing, presentation and ETL architecture.

Introduction to tableau on day 2:

- Introduced participants to tableau's features and capabilities.
- Demonstrated how to connect tableau to different data sources and work with flat files and spreadsheets.

Data Extraction on Day 3:

- Provided an overview of databases and their role in data management.
- Conducted sessions on creating databases and performing CRUD operations on tableau database table.

Basic SQL operations on days 4 and 5:

- Covered fundamental concepts of structured query language (SQL) and its importance in database management.
- Taught basic SQL operations including querying, filtering, sorting and aggregating data.
- Participants practiced data manipulation tasks such as inserting, updating and deleting records in database tables using SQL commands.

## ACTIVITY LOG FOR THE SECOND WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day -1	Architecture of Tableau • Interface of tableau. • Tableau field types. • Saving and publishing a data source.	• understand tableau's architecture and components. • Familiarize with tableau interface elements.	
Day -2	Charts: • Histograms, Box Plot, motion, pie, Bar, Line and bubble	Gain an understanding of Histograms, Box plots, Motion charts, pie charts, Bar charts, line charts and Bubble Charts.	
Day -3	• Bullet • Scatter • Tree • Heat maps • Text table	learn how to effectively use each chart type for visualizing different types of data and patterns.	
Day -4	• Custom charts.	Acquire skills in creating, customizing and interpreting custom charts to effectively communicate complex data insights.	
Day -5	Working with metadata and Data Blending: • Connecting w/ to data source. • Tableau data types. • cubes and PDFS.	Understand tableau data types and their implications in data visualization and analysis	
Day -6			

## WEEKLY REPORT

WEEK - 9 (From Dt..... to Dt.....)

**Objective of the Activity Done:** Advanced data visualization techniques.

**Detailed Report:** Day 1 = Architecture of tableau:

- Explored the architecture of tableau, including its components and interface elements.
- Discussed tableau field types, saving and publishing data sources and connection methods.

Day 2: Charts

- Explored various chart types including histograms, Box plots, Motion charts, Pie charts, Bar charts, line charts and bubble charts.

Day 3 = Advanced chart types

- Dived in to advanced chart types such as Bullet charts, scatter plots, Tree maps, Heat maps, maps, <sup>text</sup>tables and highlighted tables.

Day 4 : custom charts:

- Explored the concepts and importance of custom charts in data visualization.
- participants acquired skills in creating, customizing and interpreting custom charts to effectively communicate complex data insights.

Day 5: Working with meta data and Data Blending:

- Developed expertise in connecting tableau to diverse data sources including Excel, cubes and PDF's for comprehensive analysis.
- Understood tableau data types and their implications in data visualization and analysis.
- Acquired proficiency in data preparation phases within tableau to ensure data accuracy and relevance for analysis.

## ACTIVITY LOG FOR THE THIRD WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	<ul style="list-style-type: none"> <li>• Joins (left, Right, inner, and outer) and union</li> <li>• cross-database joining.</li> <li>• Data blending</li> </ul>	<p>Gain comprehensive understanding and practical skills in various types of joins including left, right, inner and outer joins.</p>	
Day - 2	<ul style="list-style-type: none"> <li>Advanced Data Manipulations</li> <li>• Preview, mark and highlight, groups, constant sets, compound sets and combined sets.</li> </ul>	<p>Mastered advanced data manipulation techniques including previewing, marking and highlighting to enhance data exploration and analysis.</p>	
Day - 3	<ul style="list-style-type: none"> <li>• Bins, hierarchies, sorting and types, using the formatting pane to work with the menu, fonts, settings etc.</li> <li>• Editing axes and annotations.</li> </ul>	<p>Learn how to utilize bins for grouping continuous data into discrete intervals.</p>	
Day - 4	<ul style="list-style-type: none"> <li>Working with filters, organizing data</li> <li>• Filters, working with filters.</li> <li>• Filtering continuous dates, dimensions and measures.</li> </ul>	<p>Mastered the addition and removal of filters to refine and focus datasets according to specific criteria.</p>	
Day - 5	<ul style="list-style-type: none"> <li>• filtering in tableau.</li> <li>• Types of filters</li> <li>• filtering the order of operations</li> </ul>	<p>Mastered Tableau's filtering tools for precise data manipulations.</p>	
Day - 6			

## WEEKLY REPORT

WEEK - 3 (From Dt..... to Dt.....)

**Objective of the Activity Done:** Advanced tableau functionalities including data.

**Detailed Report:** Day 1 : Joins ,union and Data Blending.

- gained comprehensive understanding and practical skills in various types of joins including left, right, inner and outer joins.

Day 2 : Advanced Data manipulations

mastered advanced data manipulation techniques including previewing, marking and highlighting to enhance data exploration and analysis.

Day 3 : Bins, Hierarchies, sorting and formatting

participants learned to use bins for grouping continuous data into discrete intervals and creating hierarchies for data organization.

Day 4 : Working with filters and data organization

mastered the addition and removal of filters to refine and focus datasets based on specific criteria.

• learned to effectively filter continuous dates, dimensions and measures to extract relevant insights from datasets.

Day 5 : Advanced filtering in tableau:

• explored advanced filtering tools in tableau for precise data manipulating and analysis.

• participants learned about different type of filters and their application, including categorical, range, and top N filters.

• understood the importance of tableau's order of operations for seamless visualization workflows.

## ACTIVITY LOG FOR THE FORTH WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day -1	<p>Calculated field, Quick Table calculations and LOD Expressions:</p> <ul style="list-style-type: none"> <li>Calculated fields in tableau</li> </ul>	<ul style="list-style-type: none"> <li>Learn how to Create Calculated fields in tableau for Custom data analysis and visualization.</li> </ul>	
Day -2	<ul style="list-style-type: none"> <li>Quick table calculations</li> </ul>	<ul style="list-style-type: none"> <li>Utilize tableau's quick table calculations for instant data analysis and visualization enhancements.</li> </ul>	
Day -3	<ul style="list-style-type: none"> <li>LOD Expressions in tableau</li> </ul>	<ul style="list-style-type: none"> <li>Utilize tableau's quick table calculations for instant data analysis and visualization enhancement.</li> </ul>	
Day -4	<p>Working with mapping, calculations and Expressions.</p> <ul style="list-style-type: none"> <li>Working on coordinate points.</li> <li>Plotting longitude and latitude.</li> <li>Editing unrecognized locations.</li> <li>Customizing geocoding, polygon maps, WMS : web mapping services .</li> </ul>	<ul style="list-style-type: none"> <li>Mastered mapping skills including coordinate point manipulation and longitude/latitude plotting for spatial data analysis.</li> </ul>	
Day -5	<ul style="list-style-type: none"> <li>Working on the background image, including add image.</li> <li>Plotting points on images and generating coordinates from them.</li> <li>Map visualization, custom territory.</li> </ul>	<ul style="list-style-type: none"> <li>Learn how to incorporate background images and add images in tableau for enhanced visualization.</li> </ul>	
Day -6			

## WEEKLY REPORT

WEEK - 4 (From Dt..... to Dt.....)

**Objective of the Activity Done:** Tableau function-tivities focusing on mapping and parameters

**Detailed Report:** Day 1 = calculated fields, quick table calculations and LOD EXPRESSIONS.

- Participants learned how to create calculated fields in tableau for custom data analysis and visualization.

Day 2 = quick table calculations:

- utilized tableaus quick table calculations for instant data analysis and visualization.

Day 3: LOD EXPRESSIONS in tableau:

- participants delved deeper in to the use of lod expressions for advanced analytics and precise control over aggregations in tableau.

Day 4 : Mapping, calculations and Expressions

- participants mastered mapping skills including coordinate point manipulation and longitude / latitude plotting for spatial data analysis.
- explored advanced map customization techniques such as editing unrecognized locations and utilizing geocoding options.

Day 5 : Advanced mapping techniques :

- participants learned to incorporate background image and add images in tableau for enhanced visualizations.
- Explored techniques for placing plotting points on images and generating coordinates for customized map visualization.
- Gained proficiency in map visualization and creating custom territories for effective spatial data analysis.

## ACTIVITY LOG FOR THE FIFTH WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day -1	Working with Parameters • Creating parameters. • Parameters in calculations. • Using parameters with filters. • Column selection parameters.	Master the creation of parameters in Tableau to enhance dynamic analysis and visualization capabilities.	
Day -2	Visual analytic pane • K-means cluster analysis. • Trend and reference lines. • Visual analytics in Tableau. • Forecasting, confidence interval, regression lines and bands.	Explore the visual analytic pane in Tableau for advanced data exploration and visualization techniques.	
Day -3	Dashboards and stories • Building and formatting a dashboard using size, objects, views, filters and legends. • Best practices for making creative dashboards.  • Creating multiple dashboards.	Acquire skills in building and formatting dashboards in Tableau using various elements such as size, objects, views, filters, and legends for effectiveness.	
Day -4		Gain proficiency in creating multiple data presentation Tableau for comprehensive and analysis.	
Day -5	• Creating stories. • Including the intro of story points. • Creating as well as updating the story points. • Adding catchy visuals in stories.	Master the creation of stories in Tableau, incorporating engaging introductory story points to provide context and narrative structure.	
Day -6			

## WEEKLY REPORT

WEEK - 5 (From Dt..... to Dt.....)

**Objective of the Activity Done:** Tableau functions like including parameters and dashboard.

**Detailed Report:** Day 1 = working with parameters:

- Participants mastered the creation of parameters in Tableau to enable dynamic analysis and visualization capabilities.

Day 2 = visual Analytics pane:

- Explored the visual analytics pane in Tableau for advanced data exploration and visualization techniques.

Day 3 = Dashboards and Stories:

- Acquired skills in building and formatting dashboards in Tableau using various elements such as size, objects, views, filters and legends for effective visualization.

Day 4 = creating multiple dashboard:

- Gained proficiency in creating multiple dashboards within Tableau for comprehensive data presentation and analysis.
- Learned to efficiently organize and manage multiple dashboards to provide different perspectives and insights on the same dataset.

Day 5 = creating stories:

- Mastered the creation and updating of stories in Tableau, including the introduction of story points and adding catchy visuals to enhance storytelling effectiveness.
- Learned to dynamically present insights and findings within the narrative flow using story points and compelling data visualization.

## ACTIVITY LOG FOR THE SIXTH WEEK

Day & Date	Brief description of the daily activity	Learning Outcome	Person In-Charge Signature
Day - 1	<ul style="list-style-type: none"> <li>• Adding annotations with descriptions dashboards and stories.</li> <li>• Highlight actions, URL actions and filter actions.</li> <li>• selecting and clearing values.</li> </ul>	<ul style="list-style-type: none"> <li>• master the skill of adding annotations with descriptions to provide contextual information within dashboards and stories, enhancing.</li> </ul>	
Day - 2	<p>Build tableau web application</p> <ul style="list-style-type: none"> <li>• Introduction to flask.</li> <li>• working with flask framework.</li> <li>• introduction to Bootstrap</li> </ul>	<ul style="list-style-type: none"> <li>• Acquire an introduction to flask, a python web framework, for building web applications, including its core concepts and functionalities.</li> </ul>	
Day - 3	<ul style="list-style-type: none"> <li>• Working with Bootstrap</li> </ul>	<ul style="list-style-type: none"> <li>• master the use of Bootstrap, a front-end framework, for creating responsive and visually appealing web interfaces .</li> </ul>	
Day - 4	<ul style="list-style-type: none"> <li>• Building application with flask framework.</li> </ul>	<ul style="list-style-type: none"> <li>• Acquire the skills necessary to build web application using the flask framework, a lightweight and flexible python web framework.</li> </ul>	
Day - 5	<ul style="list-style-type: none"> <li>• Embedding Dashboard and story with web application</li> </ul>	<ul style="list-style-type: none"> <li>• Learn how to embed tableau dashboard and stories in to web application using tableau's embedding functionalities.</li> </ul>	
Day -6			

## WEEKLY REPORT

WEEK - 6 (From Dt..... to Dt.....)

**Objective of the Activity Done:** Annotation, dashboard interactions and web application.

**Detailed Report:** Day 1 = Adding annotations and dashboard interactions:

- Participants mastered the skill of adding annotations with descriptions to provide contextual information within Tableau dashboards and stories.

Day 2 = Building Tableau web application with flask and bootstrap:

- Acquire an introduction of flask, a Python web framework, for building web applications, including its core concepts and functionalities.

Day 3 = Working with Bootstrap:

- Participants mastered the use of Bootstrap, a front-end framework, for creating responsive and visually appealing web interfaces.

Day 4 = Building applications with flask framework:

- Acquire the skills necessary to build web applications using the flask framework, a lightweight and flexible Python web framework.

- Learned the fundamental of flask, including routing, request handling, templates and deployment, to create dynamic and interactive.

Day 5 = Embedding Dashboards and Stories in to web applications:

- Participants learned how to embed Tableau dashboard and stories in to web applications using Tableau's embedding functionalities.

- Explored methods for integrating Tableau visualizations seamlessly into web pages, enhancing user experience and interactivity.

- Gained proficiency in leveraging Tableau's JavaScript API to embed and interact with dashboard and stories with custom web applications.