PES Institute of Technology and Management

Department of Computer Science & Engineering (Data Science)

Laboratory Manual

Semester: V

Subject: DATA VISUALIZATION LAB

Subject Code: BAIL504

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PROGRAM OUTCOMES

PO's	PO Description
PO1	**Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO2	**Problem analysis:** Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO3	**Design/development of solutions**: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO4	**Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO5	**Modern tool usage:** Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO6	**The engineer and society:** Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO7	**Environment and sustainability:** Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO8	**Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO9	**Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO10	**Communication:** Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO11	**Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO12	**Life-long learning:** Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

PSO's	PSO Description
PSO1	An ability to design and analyze algorithms by applying theoretical concepts to build complex and computer- based systems in the domain of System Software, Computer Networks & Security, Web technologies, Data Science and Analytics.
PSO2	Be able to develop various software solutions by applying the techniques of Data Base Management, Complex Mathematical Models, Software Engineering practices and Machine Learning with Artificial Intelligence.

DATA VISUALIZATION LAB		Semester	V
Course Code	**BAIL504**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	100
Examination type (SEE)	Practical		

Course objectives:

- Understand the Importance of data Visualization for business intelligence and decision making.
- Learn different approaches to understand the importance of visual perception.
- Learn different data visualization techniques and tools.
- Gain knowledge of effective data visuals to solve workplace problems.

Sl.NO	Experiments
1	**Getting Started -** Tableau Workspace, Tableau terminologies, basic functionalities.
2	**Connecting to Data Source –** Connecting to Database, Different types of Tableau Joins.
3	**Creating a View -** formatting charts, adding filters, creating calculated fields and defining parameters.
4	**Dashboard Design and Storytelling –** Components of Dashboard, Understanding how to place worksheets in Containers, Action filters and its types.
5	**Introducing Power BI –**Components and the flow of work. Power BI Desktop Interface-The Report has five main areas.
6	**Querying Data from CSV -** Query Editor, Connecting the data from the Excel Source, Clean, Transform the data.
7	**Creating Reports & Visualizations -** Different types of charts, Formatting charts with Title, Colors.
8	**Dashboards -** Filters in Power BI, Formatting dashboards.
9	Analysis of revenue in sales dataset: i) Create a choropleth map (fill the map) to spot the special trends to show the state which has the highest revenue. ii) Create a line chart to show the revenue based on the month of the year. iii) Create a bin of size 10 for the age measure to create a new dimension to show the revenue. iv) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field. v) Create a butterfly chart by reversing the bar chart to compare female & male revenue based on product category. vi) Create a calculated field to show the average revenue per state & display profitable & non-profitable state. vii) Build a dashboard.
10	Analysis of GDP dataset: i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps. ii) Create a bar graph to compare GDP of Belgium between 2006 – 2026. iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010. iv) Visualize the countries Bhutan & Costa Rica competing in terms of GDP.

	v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006. vi) Build an interactive dashboard.
11	Analysis of HR Dataset: i) Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age. ii) Create a Lollipop Chart to show the attrition rate based on gender category. iii) Create a pie chart to show the attrition percentage based on Department Category- Drag department into colours and change automatic to pie. Entire view, Drag attrition count to angle. Label attrition count, change to percent, add total also, edit label. iv) Create a bar chart to display the number of employees by Age group, v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count. vi) Create a horizontal bar chart to show the attrition count for each Education field Education field wise attrition – drag education field to rows, sum attrition count to col, vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group.
12	Analysis of Amazon Prime Dataset: i) Create a Donut chart to show the percentage of movie and tv shows ii) Create a area chart to shows by release year and type iii) Create a horizontal bar chart to show Top 10 genre iv) Create a map to display total shows by country v) Create a text sheet to show the description of any movie/movies. vi) Build an interactive Dashboard.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Design the experiment to create basic charts and graphs using Tableau and Power BI.
2. Develop the solution for the given real world problem.
3. Analyze the results and produce substantial written documentation.

1) **Getting Started-** Tableau Workspace, Tableau terminologies, basic functionalities.

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1. **Open Tableau Public**

- Launch the Tableau Public application.

2. **Familiarize with the Tableau Workspace**

- **Menu Bar**: Located at the top; contains options for file management and editing.
- **Toolbar**: Quick access to common functions like saving, undoing, and visualizing.
- **Data Pane**: On the left; shows your connected data sources and fields.
- **Shelves**: Rows, Columns, Filters, and Pages; where you place fields to create visualizations.
- **Canvas**: The central area where your visualizations appear.

3. **Learn Key Tableau Terminologies**

- **Workbook**: The file containing your visualizations, similar to an Excel file.
- **Worksheet**: A single view where you create a specific visualization.
- **Dashboard**: A collection of multiple worksheets and visual elements.
- **Story**: A sequence of visualizations that convey a narrative or analysis.
- **Field**: A column from your data source; can be a dimension (categorical) or measure (quantitative).

4. **Explore Basic Functionalities**

- **Connecting to Data**: Click on "Connect" to load your data from various sources (Excel, text files, etc.).
- **Creating Visualizations**: Drag and drop fields onto the Rows and Columns shelves to create charts.
- **Filters**: Drag fields to the Filters shelf to limit data displayed in your visualizations.
- **Sorting**: Click on a field header in the view to sort data in ascending or descending order.
- **Saving Work**: Use File > Save to save your workbook to Tableau Public.

2) **Connecting to Data Source –** Connecting to Database, Different types of Tableau Joins.

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❖ Connecting to Data Source in Tableau Public

1. **Open Tableau Public**
   - Launch the Tableau Public application.
2. **Connect to Data Source**
   - **Click on "Connect"**: Choose a data source type (e.g., Excel, Text file, Google Sheets).
   - **Select Your File**: Locate and select the file you want to connect to.

3. **Load Data**
    - **Preview Data**: Review the data in the Data Source tab.
    - **Drag Table to Canvas**: If using a database or multiple sheets, drag the desired table/sheet onto the canvas.

❖ Understanding Joins in Tableau Public

4. **Add Second Table for Joining**
    - **Drag Second Table**: If applicable, drag a second table onto the data canvas next to the first.
5. **Create a Join**
    - **Join Conditions**: Set the join conditions by selecting matching fields from both tables.
    - **Choose Join Type**: Click the join icon (Inner, Left, Right, Full Outer) to select the desired join type.
6. **Preview and Review Data**
    - **Check the Data**: Ensure the joined data appears correctly in the preview.
7. **Save Your Work**
    - **Save to Tableau Public**: Go to File > Save to Tableau Public to save your workbook.

3) Creating a view- formatting charts, adding filters, creating calculated fields and defining parameters.

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1. **Open Worksheet**

- File > New Worksheet

2. **Create Basic Chart**

- Drag fields to Rows and Columns (e.g., Sales to Columns, Order Date to Rows)

3. **Format Chart**

- Change Chart Type: Show Me panel > select type
- Adjust Axes: Right-click axis > Edit Axis
- Change Colors: Color shelf > select or customize
- Edit Labels: Label shelf > drag fields and format
- Add Title: Worksheet menu > Show Title > edit
- Adjust Sizes: Size shelf > modify element sizes

4. **Add Filters**

- Select Field: Drag field to Filters shelf
- Configure Filter: Choose filter type > apply settings
- Show Filter Control: Right-click filter > Show Filter
- Customize Control: Click filter control > adjust appearance

5. **Create Calculated Fields**

- Open Data Pane: Right-click > Create Calculated Field
- Define Calculation: Name field > enter formula
- Validate: Click OK to save

6. **Define Parameters**

- Create Parameter: Right-click > Create Parameter
- Configure: Name, Data Type, Allowable Values, Current Value
- Use Parameter: Integrate into calculations or filters
- Show Parameter Control: Right-click > Show Parameter Control

4) Dashboard Design and Storytelling – Components of Dashboard, Understanding how to place worksheets in Containers, Action filters and its types.

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1. **Open Dashboard**

- File > New Dashboard

2. **Understand Dashboard Components**

- **Title**: Add a title for context (Text box > drag to the top).
- **Worksheets**: Include individual visualizations created earlier.
- **Filters**: Add interactive filters to help users explore data.
- **Legends**: Include color or size legends for clarity.

3. **Place Worksheets in Containers**

- **Add a Container**: Drag a Vertical or Horizontal container from the Objects pane to the dashboard area.
- **Insert Worksheets**: Drag your worksheets into the container.
- **Adjust Sizing**: Resize the container and worksheets as needed for a balanced layout.
- **Align Elements**: Use the layout pane to ensure everything is properly aligned.

4. **Add Action Filters**

- **Create Action Filter**: Dashboard menu > Actions > Add Action > Filter.
- **Set Source Sheets**: Select the worksheet that triggers the action.
- **Select Target Sheets**: Choose which worksheets will respond to the filter.
- **Configure Actions**: Decide how users will interact (e.g., select or hover).
- **Click OK**: Save your action filter settings.

5. **Types of Action Filters**

- **Filter Action**: Displays data based on selection from another worksheet.

- **Highlight Action**: Highlights related data across worksheets when one is selected.
- **URL Action**: Links to external content (websites, documents) based on selection.

6. **Final Adjustments**

- **Review Layout**: Ensure the dashboard is visually appealing and easy to navigate.
- **Test Interactivity**: Click through action filters to verify they work as intended.
- **Save Dashboard**: File > Save As to keep your work.

5) Introducing Power BI –Components and the flow of work. Power BI Desktop Interface-The Report has five main areas.

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❖ Introducing Power BI Desktop

1. **Open Power BI Desktop**
   - Launch the Power BI Desktop application on your computer.
2. **Understand Key Components of Power BI**
   - **Datasets**: Collections of data imported from various sources.
   - **Reports**: Visualizations created from datasets, displaying data insights.
   - **Dashboards**: Summarized views of multiple reports (note: dashboards are typically accessed in the online service).
3. **Basic Workflow in Power BI**
   - **Get Data**: Import data from files (Excel, CSV) or databases (Home > Get Data).
   - **Transform Data**: Clean and shape your data using Power Query (Transform Data).
   - **Create Visualizations**: Use fields to create charts and graphs on the report canvas.
   - **Save Reports**: Save your work as a Power BI file (.pbix) for future use.

❖ Power BI Desktop Interface Overview

4. **Main Areas of the Report View**
   - **Report Canvas**: The central area where you design your visualizations.
   - **Visualizations Pane**: On the right; contains options for different chart types (e.g., bar, line).
   - **Fields Pane**: Also on the right; shows the data fields you can use in your report.
   - **Filters Pane**: Located on the right; allows you to filter your data for specific insights.
   - **Ribbon Menu**: At the top; contains tabs for Home, View, and Modeling, offering various tools and options.
5. **Create Your First Report**
   - **Import Data**: Click on Home > Get Data and select your data source (e.g., Excel).
   - **Load Data**: Follow prompts to load your data into Power BI.

- **Drag Fields**: Use the Fields Pane to drag data fields onto the Report Canvas to create visualizations.
- **Customize Visuals**: Select a visualization and use the Visualizations Pane to adjust its appearance.
- **Save Your Work**: Click File > Save to store your report as a .pbix file.

6) Querying Data from CSV - Query Editor, Connecting the data from the Excel Source, Clean, Transform the data.

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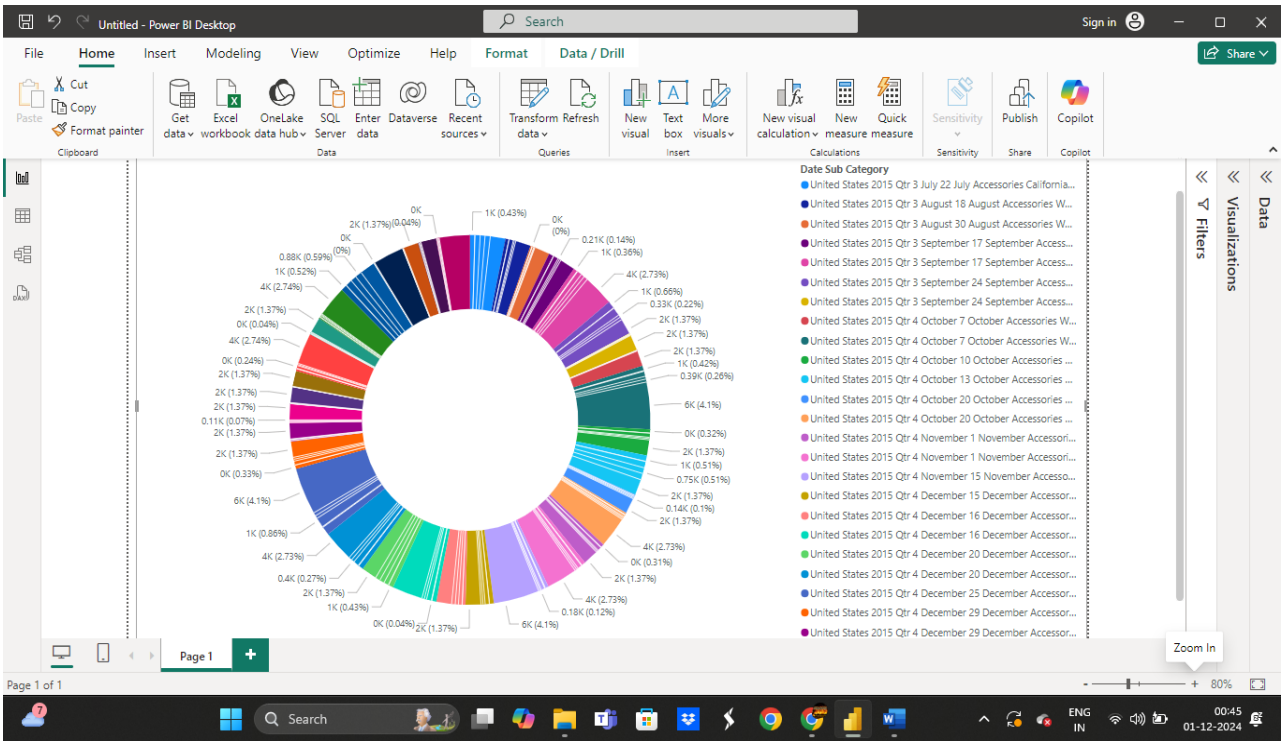
❖ Querying Data from CSV in Power BI

1. **Open Power BI Desktop**
   - Launch the Power BI Desktop application.
2. **Import Data from CSV**
   - **Get Data**: Click on Home > Get Data > Text/CSV.
   - **Select File**: Browse to find your CSV file and click "Open."
3. **Load Data into Query Editor**
   - **Preview Data**: A preview window will appear showing the data from the CSV file.
   - **Load to Query Editor**: Click on "Transform Data" to open the Query Editor.
4. **Using the Query Editor**
   - **Data Preview**: Review the data layout and ensure it appears correctly.
   - **Clean Data**:
     - **Remove Unnecessary Columns**: Right-click on any column you don"t need and select "Remove."
     - **Rename Columns**: Double-click on the column header to rename it for clarity.
   - **Transform Data**:
     - **Change Data Types**: Select a column, go to the "Transform" tab, and choose the appropriate data type (e.g., text, number, date).
     - **Filter Rows**: Click the dropdown arrow on a column header to filter out unwanted data.
     - **Sort Data**: Click on the column header to sort your data in ascending or descending order.
5. **Apply Changes**
   - **Close and Apply**: After making all necessary changes, click "Close & Apply" in the top-left corner to load the cleaned data into Power BI.
6. **Create Visualizations**
   - **Start Visualizing**: Once your data is loaded, use the Fields Pane to drag fields onto the Report Canvas and create your visualizations.
7. **Save Your Work**
   - **Save File**: Click File > Save to store your Power BI file.

OUTPUT:



7) Creating Reports & Visualizations - Different types of charts, Formatting charts with Title, Colors.

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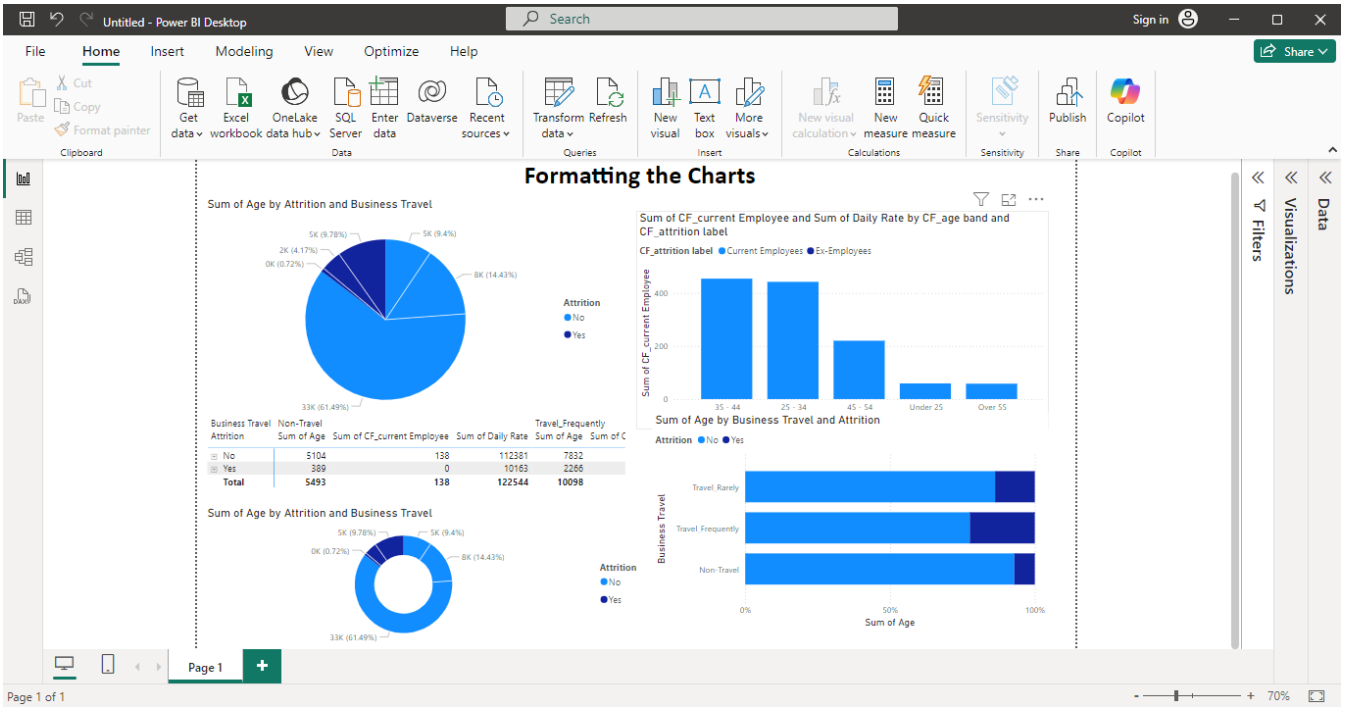
❖ **Creating Reports & Visualizations in Power BI**

1. **Open Power BI Desktop**
   - Launch the Power BI Desktop application and open your existing report or create a new one.
2. **Load Your Data**
   - Ensure your dataset is loaded in the Fields Pane on the right side.
3. **Create a Visualization**
   - **Select a Chart Type**: Click on the Report Canvas to activate it.
   - **Choose Visualization**: In the Visualizations Pane on the right, select the type of chart you want to create (e.g., Bar Chart, Line Chart, Pie Chart).
   - **Drag Fields**: Drag the relevant fields from the Fields Pane onto the selected chart. For example:
     - For a bar chart, drag a categorical field (like "Category") to the Axis and a numerical field (like "Sales") to the Values.
4. **Different Types of Charts**
   - **Bar Chart**: Ideal for comparing values across categories.
   - **Line Chart**: Best for showing trends over time.
   - **Pie Chart**: Useful for displaying proportions of a whole.
   - **Column Chart**: Similar to bar charts but oriented vertically.
   - **Table**: Great for displaying detailed data.
5. **Format the Chart**
   - **Add a Title**:
     - Click on the chart to select it.
     - In the Visualizations Pane, go to the "Format" section (paint roller

icon).
    - Expand the "Title" option, turn it on, and enter your desired title.
  - **Change Colors**:
    - In the same Format section, look for the "Data colors" option.
    - Click to choose different colors for the chart elements, ensuring they are visually appealing and distinct.
6. **Customize Further**
  - **Adjust Labels**: Turn on data labels to show values on the chart.
  - **Modify Legends**: If applicable, adjust the legend‟s position or font size for better visibility.
  - **Change Background**: Set a background color for the chart to make it stand out.
7. **Save Your Report**
  - **Save File**: Click File > Save to keep your report updated with your new visualizations.

OUTPUT:



8) Dashboards - Filters in Power BI, Formatting dashboards.

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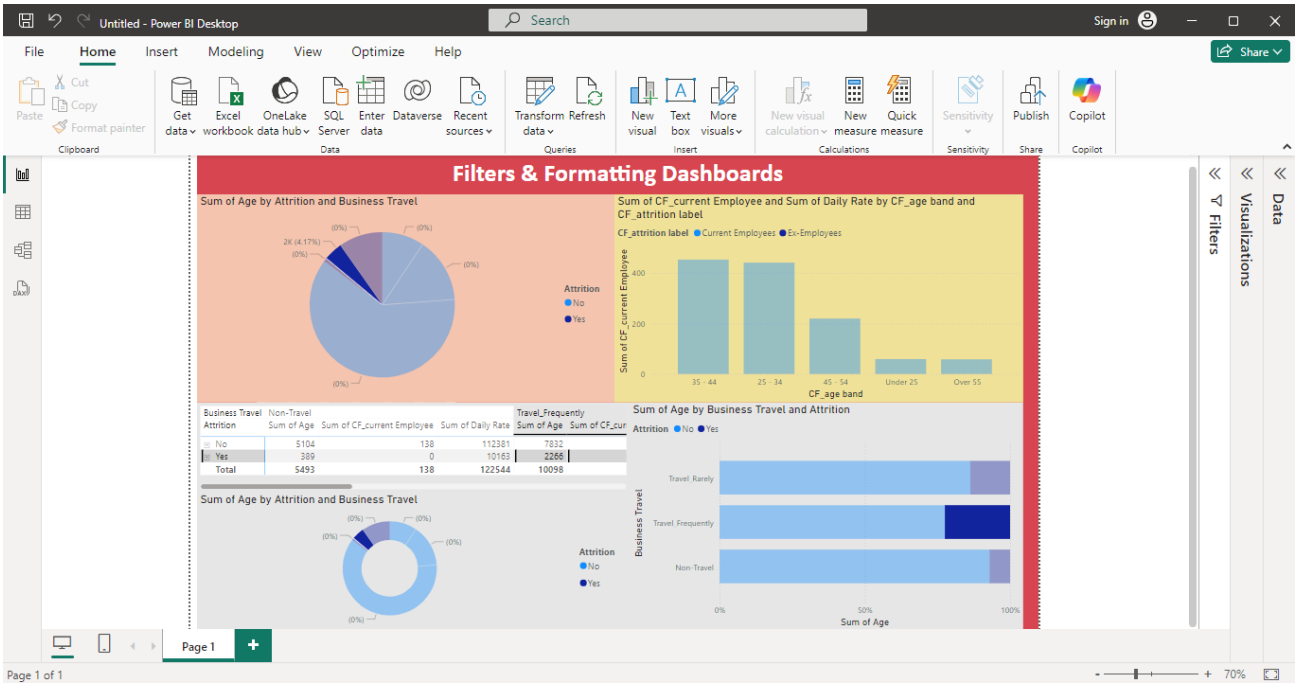
❖ Creating Dashboards in Power BI

1. **Open Power BI Desktop**
  - Launch Power BI Desktop and open your existing report containing visualizations.
2. **Create a Dashboard View**
  - **Switch to Report View**: Ensure you are in the Report view where you can see all your visualizations.
3. **Add Visualizations to the Dashboard**

- **Arrange Visuals**: Drag and drop visualizations onto the report canvas to arrange them as desired.
- **Resize Visuals**: Click on the edges of each visual to resize them for better layout.

4. **Add Filters to the Dashboard**
   - **Insert a Filter**:
     - From the Visualizations Pane, select the filter visual (e.g., Slicer).
     - Drag the desired field (e.g., "Category" or "Date") to the filter visual.
   - **Configure Filter Options**:
     - Use the filter visual to select specific values or date ranges that will affect the other visuals on the dashboard.
5. **Sync Filters Across Visuals**
   - **Select the Filter**: Click on the filter visual you just added.
   - **Sync Filters**: In the Format pane, look for the "Edit Interactions" option. Choose how the filter interacts with other visuals on the dashboard (e.g., affecting all visuals or specific ones).
6. **Format the Dashboard**
   - **Add a Title**:
     - Click on the blank area of the report canvas.
     - Go to the Format pane, and find the "Title" option to add a title for your dashboard.
   - **Adjust Background Color**:
     - In the Format pane, find the "Page background" option to change the dashboard's background color.
   - **Customize Visual Borders**:
     - Click on individual visuals and use the Format pane to add or change borders for clarity and emphasis.
7. **Save Your Dashboard**
   - **Save File**: Click File > Save to keep your dashboard layout and settings.



9) Analysis of revenue in sales dataset:
i) Create a choropleth map (fill the map) to spot the special trends to show the state which has the highest revenue.
ii) Create a line chart to show the revenue based on the month of the year.
iii) Create a bin of size 10 for the age measure to create a new dimension to show the revenue.
iv) Create a donut chart view to show the percentage of revenue per region by creating zero access in the calculated field.
v) Create a butterfly chart by reversing the bar chart to compare female & male revenue based on product category.
vi) Create a calculated field to show the average revenue per state & display profitable & non-profitable state.
vii) Build a dashboard.

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i) Choropleth Map:

***Connect to Your Data Source:**
- Open Tableau.
- Connect to your dataset (e.g., Excel or CSV) that includes fields for State and Revenue.

***Assign Geographic Role to State:**
- In Tableau‟s Data Pane, right-click on the State field.
- Choose Geographic Role > State to ensure Tableau recognizes the field as geographic data.

***Create the Basic Map:**
- Drag the State field to the Rows shelf.
- Tableau will automatically generate a map if the field has a geographic role.

***Add the Revenue Data:**
- Drag the Revenue field to the Color shelf under Marks.
- The map regions will be filled based on the revenue data for each state.

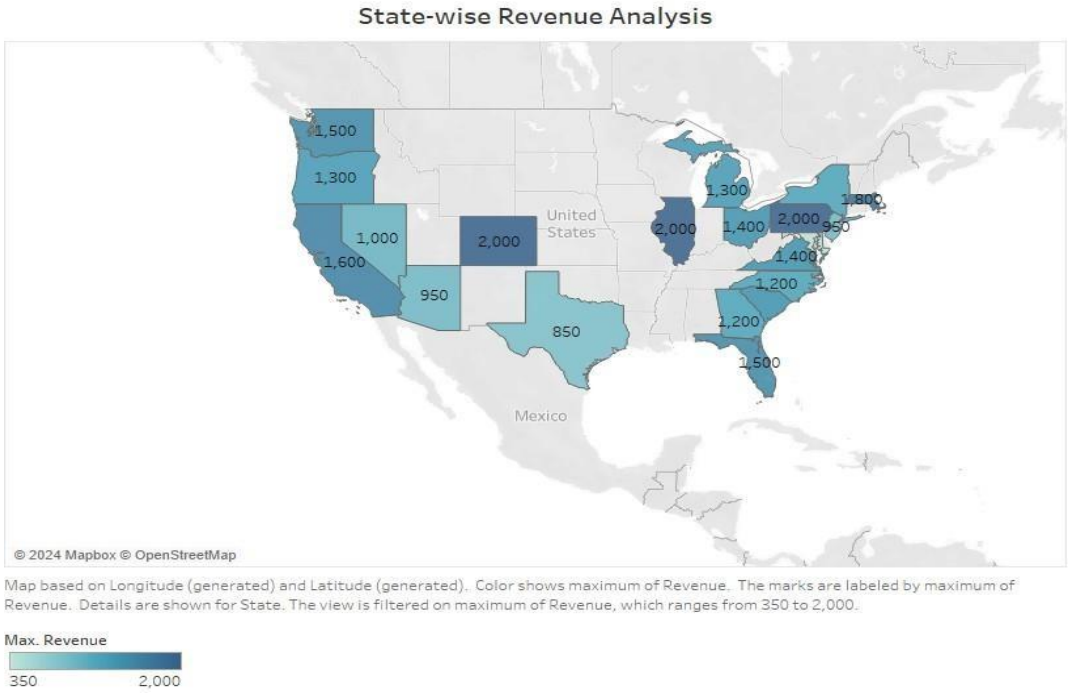
***Adjust the Map Type to Filled (Choropleth Map):**
- On the Marks card, change the map type to Filled Map.
- States will be filled with color based on revenue.

***Edit the Color Scheme:**
- Click on the Color shelf and choose Edit Colors.
- Use a diverging color palette (e.g., light-to-dark gradient) to highlight highest and lowest revenue states.

***Finalize the Map:**
- Adjust map size and zoom as needed using zoom controls or dragging the map.
- Add a Title by double-clicking on the worksheet title and entering a descriptive title like ”State-wise Revenue Analysis”.

***Publish or Export:**
- When the map is ready, export it or publish it to Tableau Server/Tableau Public.

*** Choropleth Map (Output):**



ii) Line Chart:

***Connect to Your Data Source:**

- Open Tableau.
- Connect to your dataset that includes Date (or a field for month) and Revenue.

***Drag the Date Field to the Columns Shelf:**

- Drag the Date field from the Data Pane to the Columns shelf.
- By default, Tableau will display the Year from the date field.

***Change Date Aggregation to Months:**

- Click the drop-down arrow on the Date pill in the Columns shelf.
- Select Month from the Date Parts options to split your data by months.

***Drag the Revenue Field to the Rows Shelf:**

- Drag the Revenue field from the Data Pane to the Rows shelf.
- This will plot the Revenue against each month of the year.

***Adjust the Line Chart Type:**

- Tableau will automatically generate a line chart.
- If not, go to the Marks card and select the Line chart type.

***Ensure Continuous Time Axis:**

- On the Columns shelf, right-click the Month(Date) field.
- Choose Exact Date to treat the axis as a continuous timeline.
- Tableau will now display the months in a continuous line from January to December.

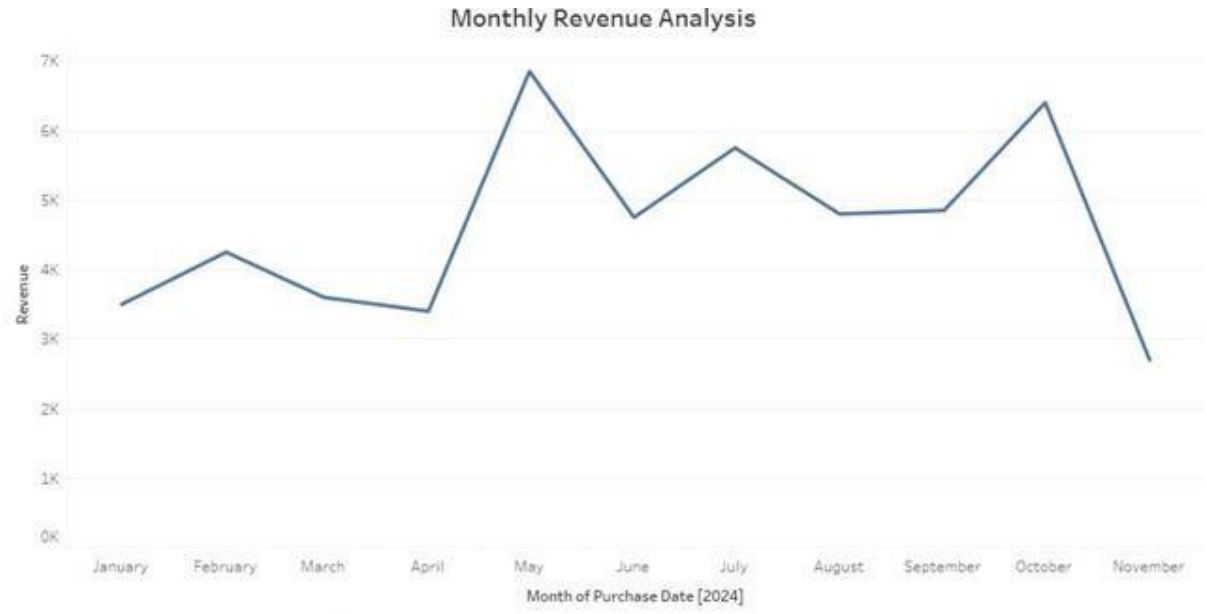
***Add a Title:**

- Double-click on the Title at the top of the worksheet.
- Give a descriptive title like “Monthly Revenue Analysis”.

***Finalize and Publish:**

- Once your chart is ready, export it or publish it to Tableau Server/Tableau Public.

*** Line Chart (Output):**



iii) Bar With Age Bins:

***Connect to Your Data Source:**

- Open Tableau and connect to the dataset that includes the fields Age and Revenue.

***Create an Age Bin:**

- In the Data Pane, locate the Age field.
- Right-click on the Age field and select Create > Bins.

***Define the Bin Size:**

- In the Create Bins dialog box, specify the bin size.
- Set the bin size to 10 (grouping ages into bins of 10, e.g., 0-9, 10-19, 20-29, etc.).
- Click OK.

***New Age Bin Dimension:**

- Tableau will create a new dimension called Age (bin), which will appear in the Data Pane under the Dimensions section.

***Drag the Age Bin to Rows or Columns:**

- Drag the newly created Age (bin) field to the Rows or Columns shelf, depending on your display preference.

***Drag the Revenue Field to the Other Shelf:**

- Drag the Revenue field from the Data Pane to either the Rows or Columns shelf (opposite of the Age (bin) dimension placement).
- This will create a chart showing total revenue for each age bin.

***Choose the Chart Type:**

- By default, Tableau may create a bar chart.
- If not, go to the Marks card and select Bar Chart or any other chart type (e.g., histogram).

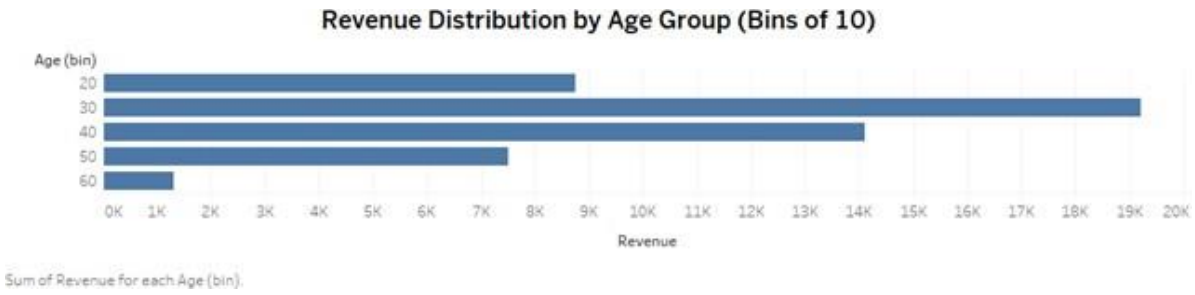
***Add a Title:**

- Double-click the title area at the top of the worksheet.
- Give a descriptive title like "Revenue Distribution by Age Group (Bins of 10)".

***Publish and Share:**

- Once satisfied with the visualization, export or publish it to Tableau Server or Tableau Public.

*** Bar With Age Bins (Output):**



iv) Donut Chart:

***Connect to Your Data Source:**

- Open Tableau and connect to the dataset that includes the fields Revenue and Region.

***Create a Calculated Field for the Zero Axis:**

- Go to the Data Pane, right-click, and select Create Calculated Field.
- Name the field "Zero Axis" and enter the formula „0„.
- Click OK.

***Create the Pie Charts:**

- Inner Pie Chart:
- Drag the Zero field to the Columns shelf.
- Click the Show Me panel and select the Pie Chart option.
- Outer Pie Chart:
- Drag the Zero field again to the Columns shelf, next to the first pie chart.
- Right-click on the second Zero field and choose Dual Axis.

***Format the Donut Chart:**

- Adjust the size of both pie charts:
- Click on the Size shelf for both pie charts and increase the size of the outer pie chart.
- Set the inner pie chart color to white to create the donut effect.

***Format the Labels:**

- Drag Region to the color shelf in the first pie chart to show revenue by region.
- Drag Revenue to the Label shelf in the first pie chart to show percentage of total revenue.
- Right-click the Revenue field on the Label shelf, select Quick Table Cal- culation > Percent of Total.

***Remove Unnecessary Axis Headers:**

- Right-click on the axes headers and deselect Show Header to hide them.

***Add a Title and Format the Chart:**

- Add a chart title by double-clicking the title area.
- Use a descriptive title such as ”Percentage of Revenue by Region”.
- Customize the colors of the different regions using the Color shelf on the Marks card.

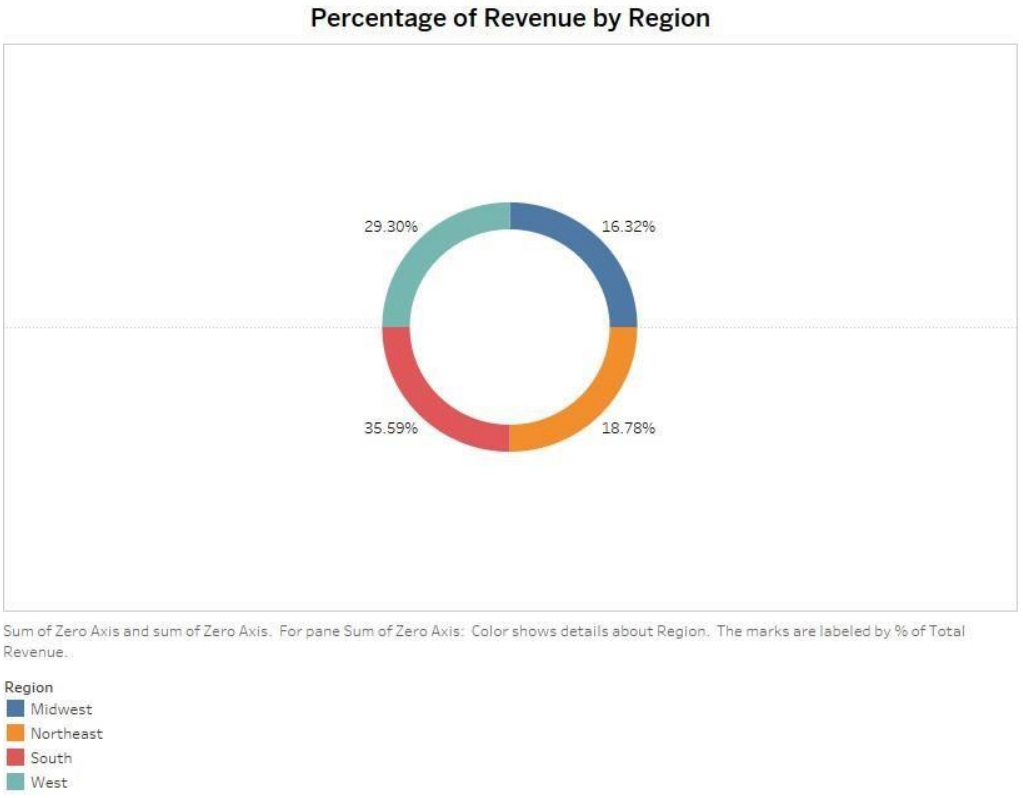
***Final Formatting and Customization:**

- Adjust the size of the pie slices or hole, format the labels, and refine the color scheme.
- Optionally, add tooltips for additional information when hovering over slices.

***Publish and Share:**

- Once satisfied with your donut chart, export or publish it to Tableau Server or Tableau Public.

*** Donut Chart (Output):**



v) Butterfly Chart:

***Connect to Your Data Source:**

- Open Tableau and connect to your data source (Excel, CSV, etc.) con- taining your revenue data.

***Create Calculated Fields for Male and Female Revenue:**

- Male Revenue:
- Click on the Analysis menu and select Create Calculated Field.
- Name it ”Male Revenue” and enter the formula:

```
IF [Customer Gender] = 'M' THEN [Revenue] END
```

- Female Revenue:
- Repeat the process to create another calculated field named ”Female Revenue” with the formula:

```
IF [Customer Gender] = 'F' THEN [Revenue] END
```

***Create the Butterfly Chart:**

- Drag the Male Revenue calculated field to the Columns shelf.
- Drag the Female Revenue calculated field next to the first measure on the Columns shelf.
- Reverse the Male Revenue axis:
- Right-click the axis for Male Revenue, select Edit Axis, and check ”Re- versed”.
- Add the Product Category dimension by dragging it to the Rows shelf.
- Sort the Product Category:
- Right-click the Product Category field and choose Sort.
- Sort by either Male Revenue or Female Revenue in descending order.
- Add labels:
- Drag Male Revenue and Female Revenue measures onto the Label shelf and format as needed.
- Format the chart:
- Drag the Gender dimension to the Color shelf for differentiation.
- Remove grid lines by right-clicking on them and selecting Format.
- Adjust tick marks by right-clicking the axis and choosing Edit Axis.
- Optional: Create a Zero Line:
- Create a calculated field for a zero line with a fixed value of 0 and name it ”Zero Line”.
- Final formatting:
- Adjust the size of the bars for visibility.
- Remove unnecessary headers or axes for clarity.

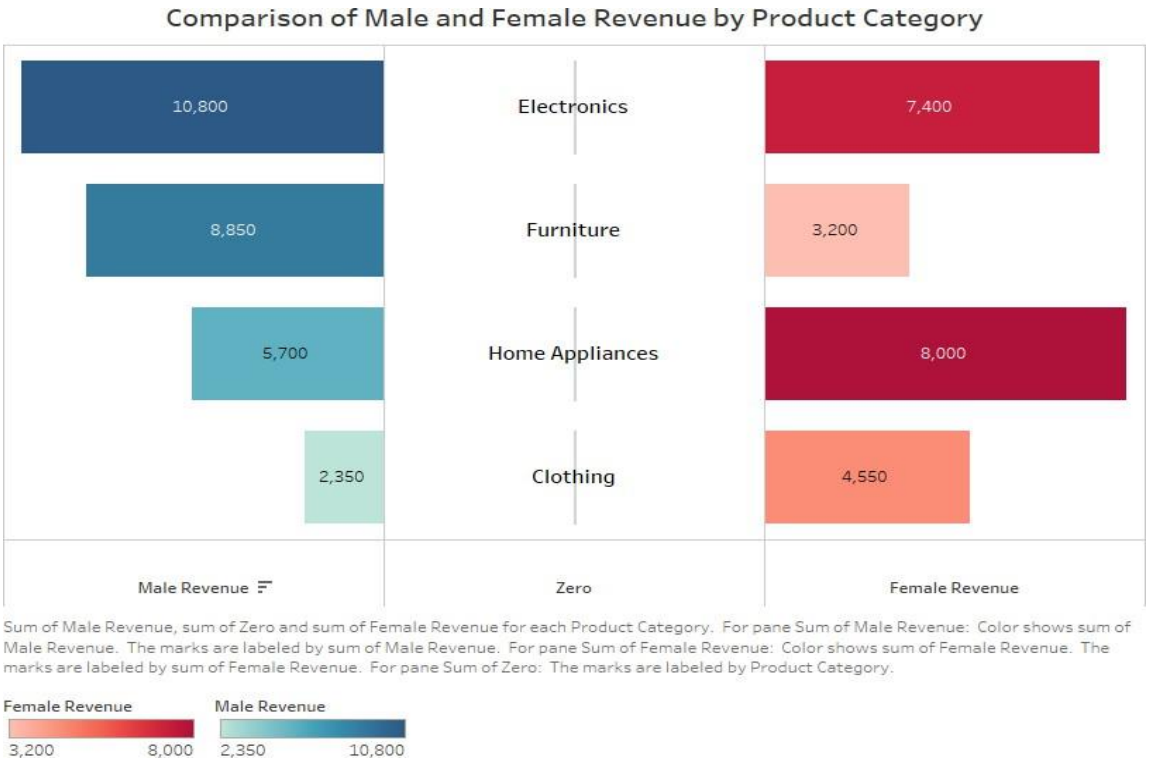
***Add a Title:**

- Double-click on the title area to edit the title.
- Enter a relevant title, such as ”Comparison of Male and Female Revenue by Product Category”.

***Review and Save:**

- Review the visualization for adjustments and save your Tableau work- book.

*** Butterfly Chart (Output):**



vi) Calculated Field:

***Connect to Your Data Source:**

- Open Tableau and connect to your dataset that includes fields like State, Revenue, and Profit.

***Create a Calculated Field for Average Revenue:**

- Right-click in the Data Pane and select Create Calculated Field.
- Name the field Average Revenue Per State.
- Enter the formula:

```
{ FIXED [State] : AVG([Revenue]) }
```

- Click OK to save the calculated field.

***Create a Calculated Field to Classify Profitable vs. Non-Profitable States:**

- Right-click in the Data Pane and select Create Calculated Field.
- Name the field State Profitability.
- Use the formula:

```
IF SUM([Cost]) > 0 THEN "Profitable"
ELSE "Non-Profitable"
END
```

- Click OK to save the calculated field.

***Create the Visualization:**

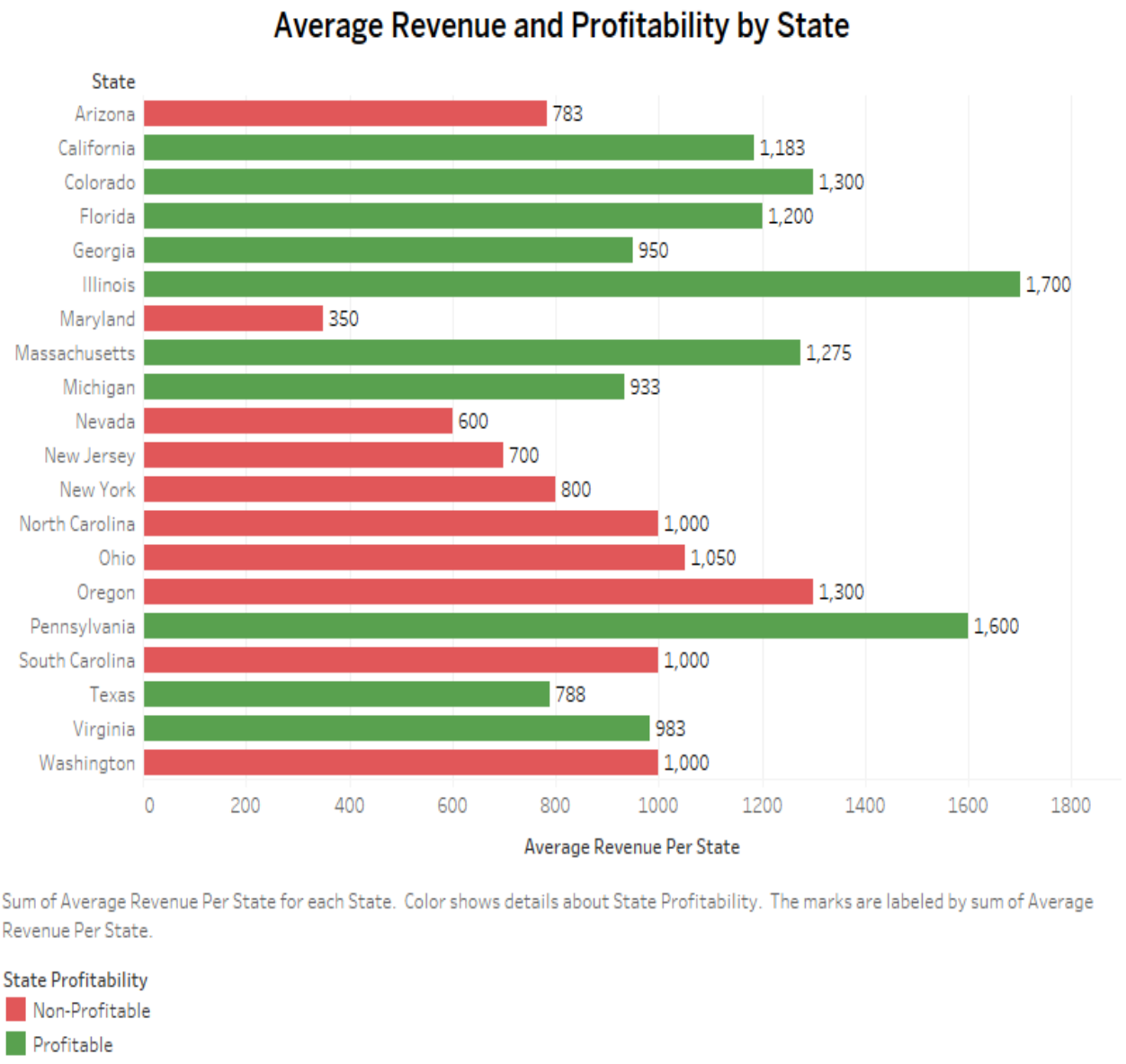
- Drag State to the Rows shelf (or Columns shelf).
- Drag Average Revenue Per State to the Columns shelf.
- Drag State Profitability to the Color shelf on the Marks card for color- coding.

***Enhance the Visualization:**

- Add labels: Drag Average Revenue Per State to the Label shelf.
- Customize colors: Use green for Profitable and red for Non-Profitable.
- Filter by state: Drag State Profitability to the Filters shelf to view spe- cific categories.

***Title and Format the Chart:**

- Add a title by double-clicking the title area and typing ”Average Revenue and Profitability by State”.
- Adjust axis, gridlines, and formatting options for better readability.



vii) Dash Board:

***Prepare Your Worksheets:**

- Create individual worksheets for specific visualizations:
- A bar chart for revenue by state.
- A line chart for revenue over time.
- A map showing revenue by region.
- A donut chart for percentage revenue by product category.

***Create a New Dashboard:**

- Click the New Dashboard icon at the bottom tabs or select Dashboard from the top menu.

***Adjust Dashboard Size:**

- In the Dashboard pane, select a size from the drop-down menu (e.g., Desktop, Tablet, Mobile).
- For publishing, use a fixed size based on your audience (e.g., 1200x800 pixels).

***Drag Worksheets to the Dashboard:**

- Drag and drop desired worksheets into the blank dashboard space.
- Adjust the layout as needed.

***Add Interactive Filters:**

- Click the drop-down arrow on any sheet and select Filters.
- Choose filters like State, Product Category, or Date Range for interac- tivity.

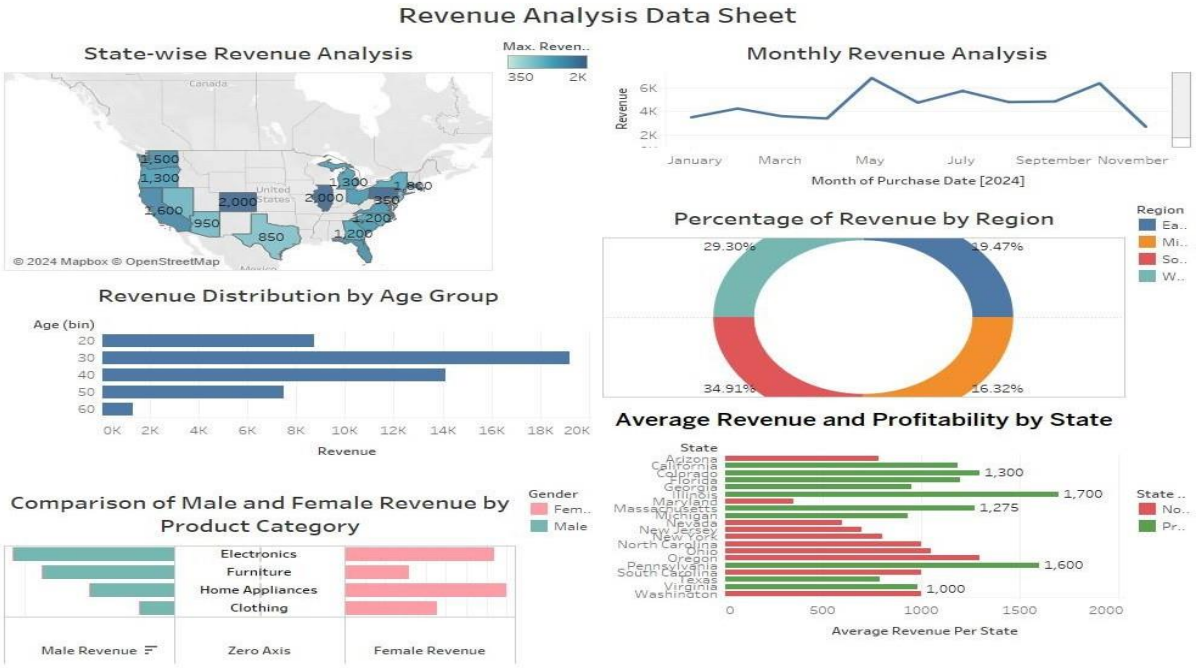
***Add Titles and Descriptions:**

- Add a title to your dashboard for context.
- Use Text Objects from the Objects section to provide descriptions or instructions.

***Publish the Dashboard:**

- Publish to Tableau Server or Tableau Public by clicking Server ¿ Publish Workbook or File > Save to Tableau Public.
- Share a link or embed the dashboard after publishing.

*** Dash Board (Output):**



10) Analysis of GDP dataset:

i) Visualize the countries data given in the dataset with respect to latitude and longitude along with country name using symbol maps.

ii) Create a bar graph to compare GDP of Belgium between 2006 – 2026.

iii) Using pie chart, visualize the GDP of India, Nepal, Romania, South Asia, Singapore by the year 2010.

iv) Visualize the countries Bhutan & Costa Rica competing in terms of GDP.

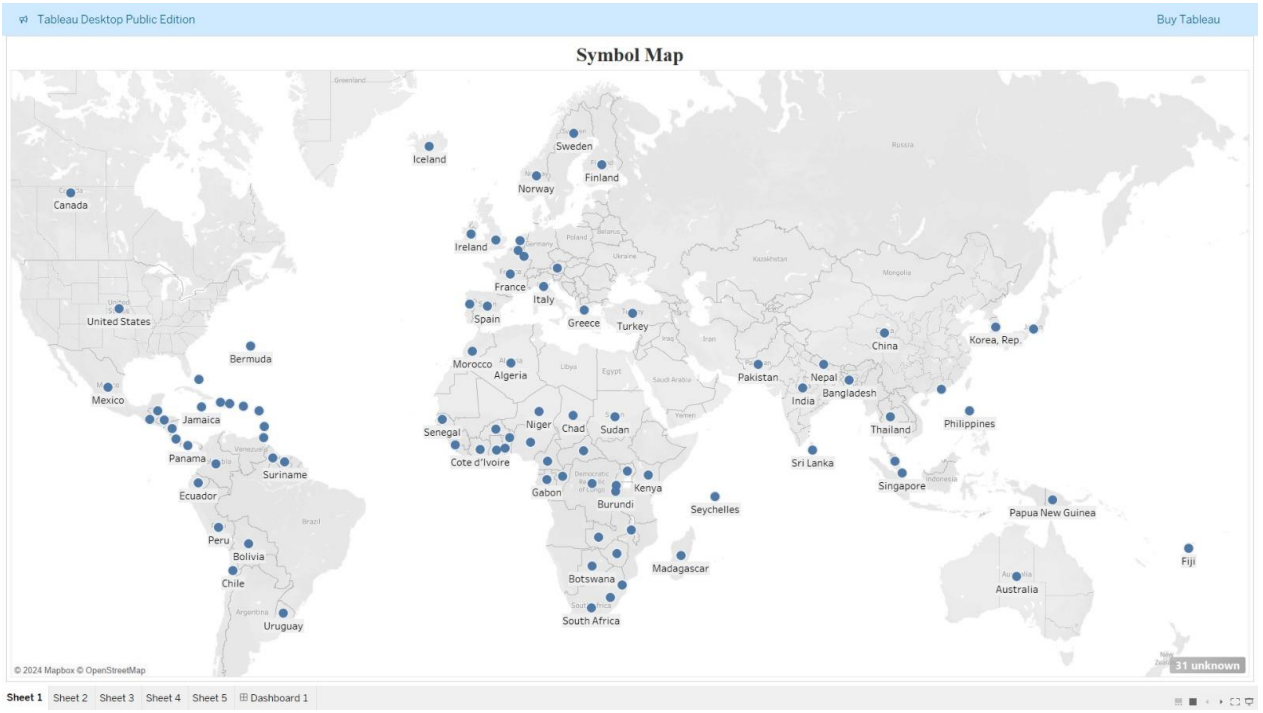
v) Create a scatter plot or circle views of GDP of Mexico, Algeria, Fiji, Estonia from 2004 to 2006.

vi) Build an interactive dashboard.

(i)

➢

- Drag Country Name to Columns.
- Select Symbol Maps from Show me.
- Drag Country Name to Marks Sections & make it label.
- Drag any year to color & size in the marks table.
- Title : "**Symbol Map**".
- **Symbol Maps(Output):**

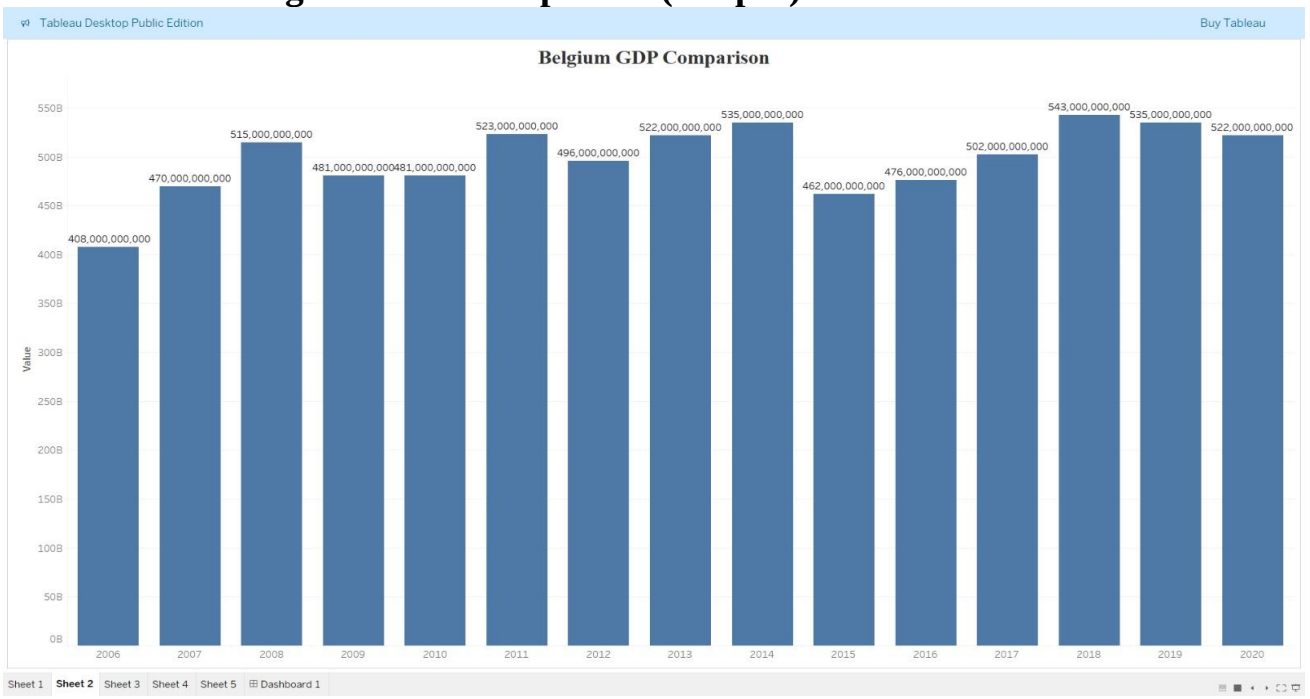


(ii)

➢

- Drag Measure Name to Columns.
- Drag Measure Value to Rows.
- Add filter to Measure Names -> 2006 to 2020.
- Add filter to country name -> Belgium change graph type to bar.
- Title: "**Belgium GDP Comparison**".

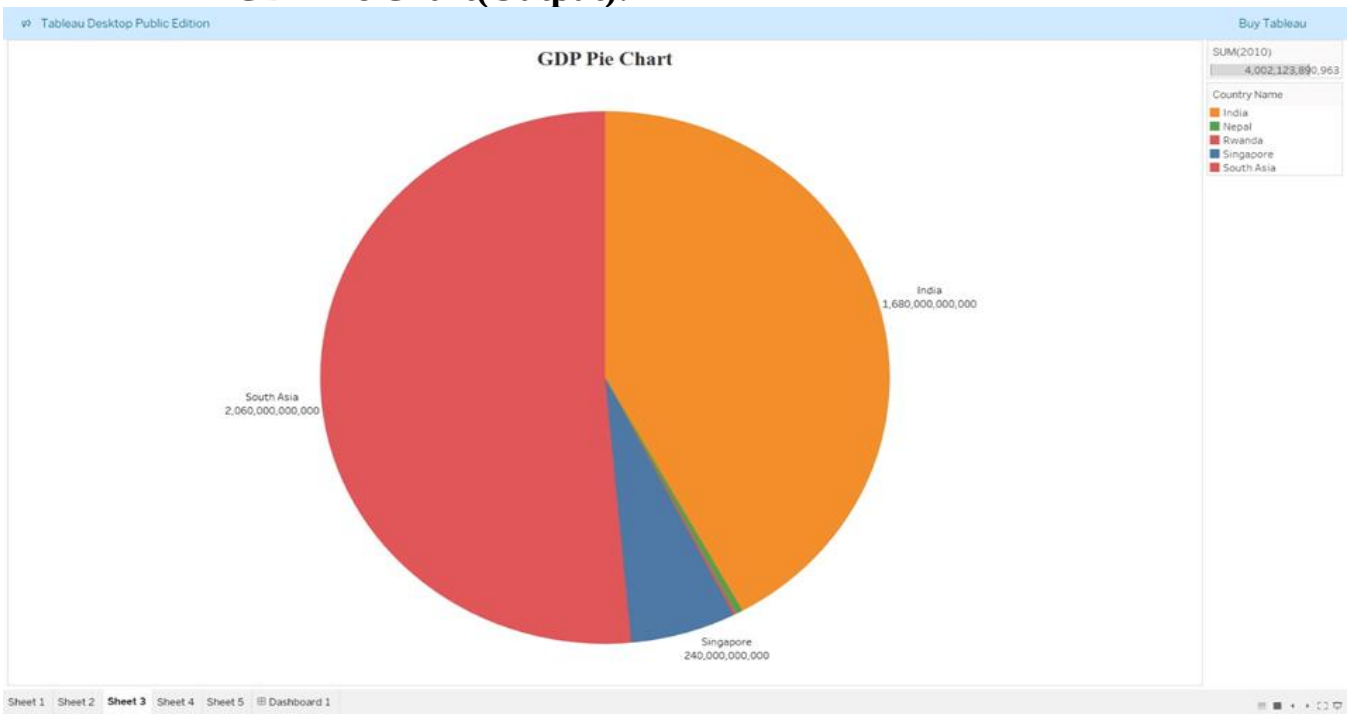
- **Belgium GDP Comparison(Output):**



(iii)

➢

- Drag 2010 to Rows.
- Drag Country Name to Columns.
- Add filter to Country Name -> India, Nepal, Romania, South Asia & Singapore.
- Change Graph type to Die.
- Put Country Name & 2010 to marks section & change type to label.
- Title: "**GDP Pie Chart**".
- **GDP Pie Chart(Output):**



(iv)

➢

- ❖ Drag Country Name to Columns.
- ❖ Drag Measure Value to Rows.
- ❖ Add filter Country name to select India & Costa Rica.
- ❖ Change Graph type to bar.
- ❖ Put Measure name to Marks & change to size.
- ❖ Title: "**India vs Costa Rica GDP**".
- ❖ **India vs Costa Rica GDP(Output):**

(V)

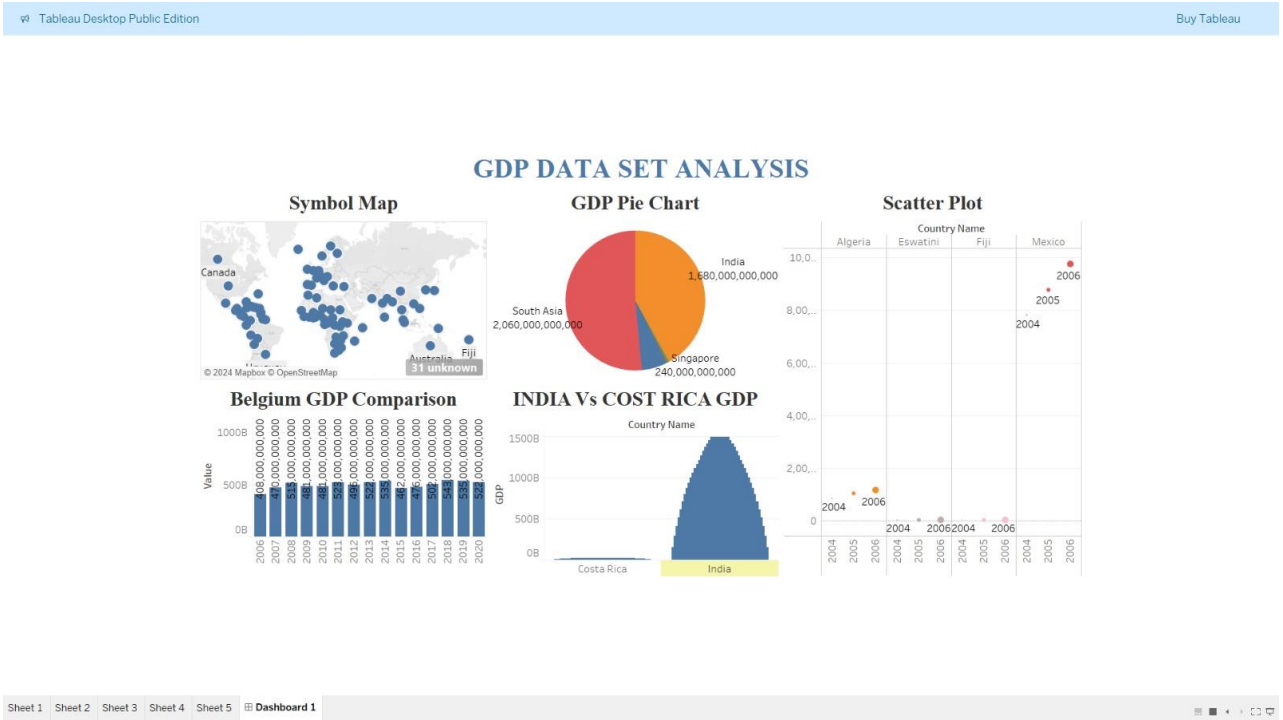
➢

- ❖ Drag Country Name, Measure Name to Columns.
- ❖ Drag Measure Value to Rows.
- ❖ Add filter Country Name to select specified Countries.
- ❖ Add filter Measures Name to select 2004,2005 & 2006.
- ❖ Change graph type to circle views.
- ❖ Put Measure Name to Marks twice & change to size & label.
- ❖ Title: "**Scatter Plot**".
- ❖ **Scatter Plot (Output):**

(vi)

➢

- From the "Sheets" pane, drag and drop the visualizations onto the dashboard canvas.
- Arrange visualizations for a clean layout, resizing as necessary.
- Title: "**GDP DATA SET ANALYSIS".**
- **GDP DATA SET ANALYSIS (OUTPUT):**



11) Analysis of HR Dataset:

i)Create KPI to show employee count, attrition count, attrition rate, attrition count, active employees, and average age.

ii) Create a Lollipop Chart to show the attrition rate based on gender category.

iii) Create a pie chart to show the attrition percentage based on Department Category- Drag department into colours and change automatic to pie. Entire view, Drag attrition count to angle. Label attrition count, change to percent, add total also, edit label.

iv) Create a bar chart to display the number of employees by Age group.

v) Create a highlight table to show the Job Satisfaction Rating for each job role based on employee count.

vi) Create a horizontal bar chart to show the attrition count for each Education field Education field wise attrition – drag education field to rows, sum attrition count to col.

vii) Create multiple donut chart to show the Attrition Rate by Gender for different Age group.

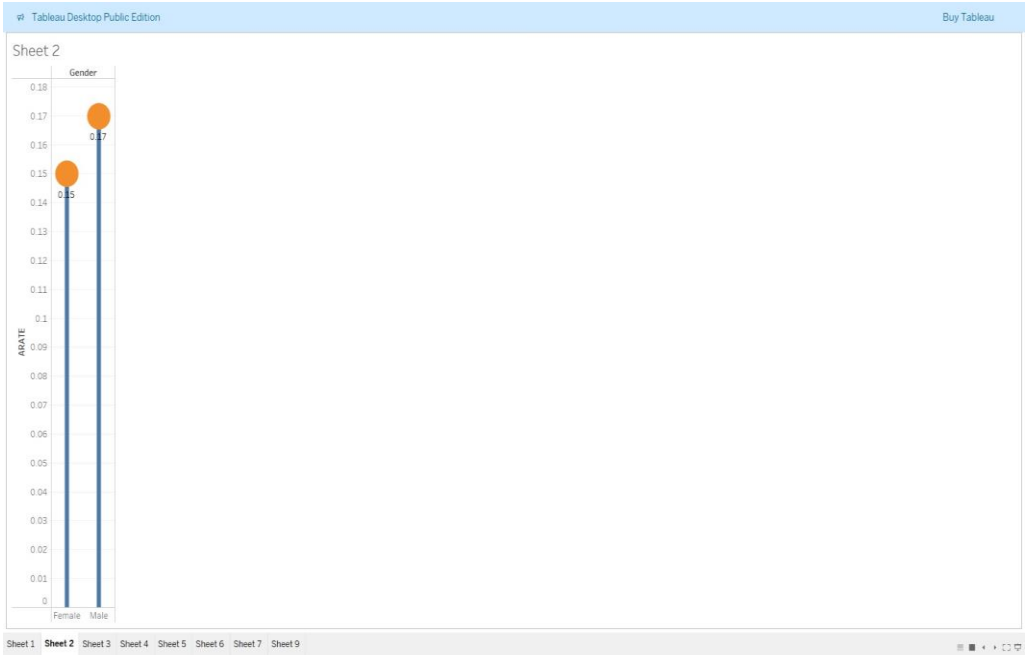
(i)

- Create calculated field EmpCount with Calculation: COUNT([EmpID]) .
- Similarly, calculated field Attrition Count SUM (IF [Attrition] = = 'Yes' THEN|ELSE O END)
- ARATE: ROUND ([Attr Count]/ Emp Count], 2)
- ACTIVEMP:SUM (IF (Job Satisfaction]>=3 THEN | ELSE O END)
- AVAGE: AVG ([Age])
- Finally, KPIS:
- Go to Label in Mark & give title as , Total Employees, Attrition Count, Attrition Rate, Active Employees, Average Age
- **Output:**

(ii)

➢

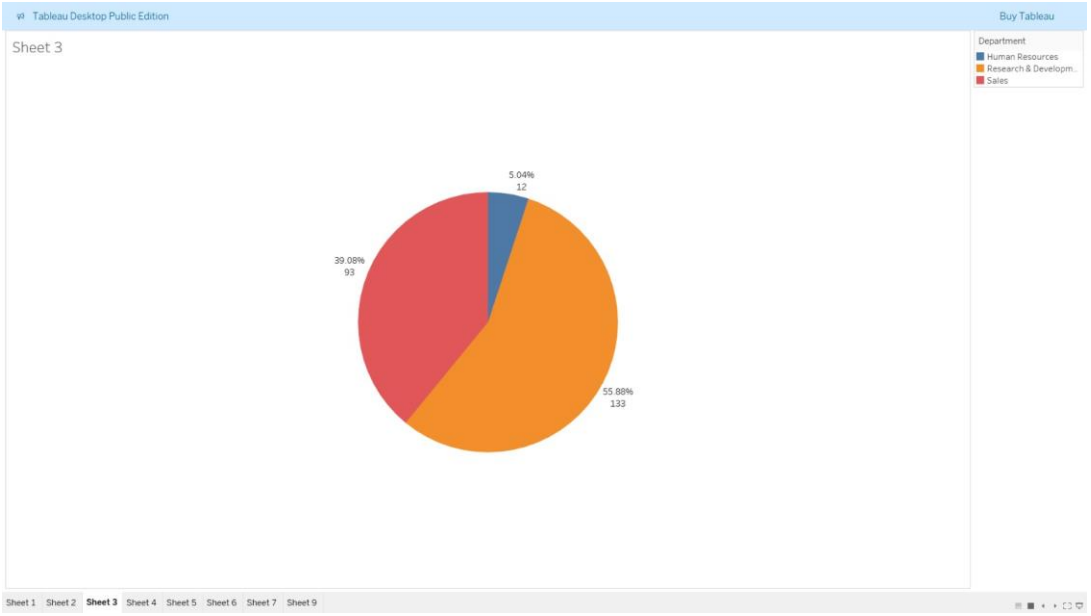
- Drag Gender to Columns
- ARATE twice to Rows shelf
- Four Second ARATE, disable Show Header & Select Dual Axis.
- In Mark rection for first ARATE, Change type to Bar.
- In Mark Section for Second ARATE change type to circle.
- Adjust Size & Color to get look of Lollipop chart.
- **Output:**



(iii)

➢

- Drag Department to colors.
- Change Automatic to Pie.
- Select Entire view.
- Drag Attrition Count to Angle.
- Label' Attrition Count & change to percent (Table calculation with percentage of total).
- Get Total using another table calculation With Running sum.
- **Output:**



(iv)

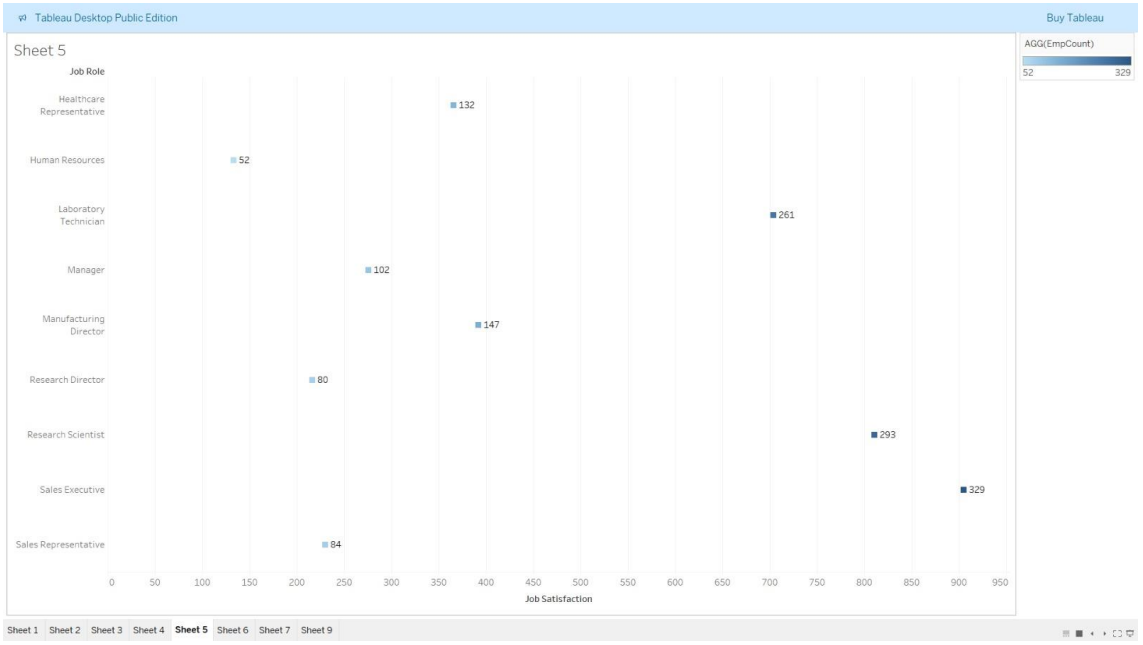
➢

- ❖ Right click Age group. Select create group.
- ❖ Drag created group to columns.
- ❖ Drag Emp Counts to Rows.
- ❖ **Output:**

(v)

➢

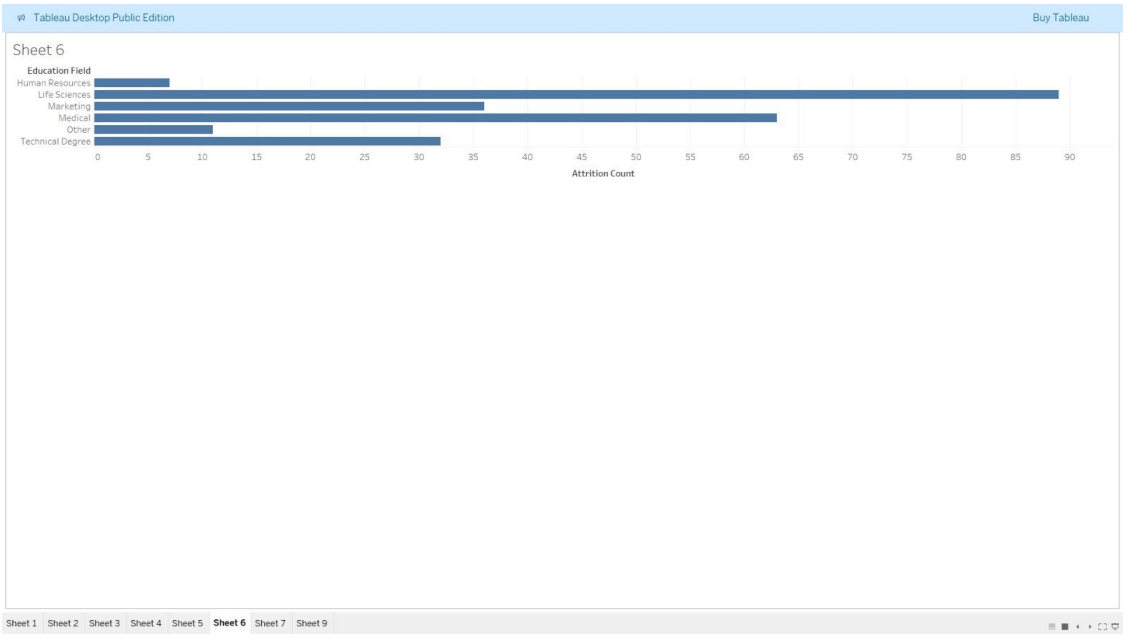
- Drag job satisfaction to columns.
- Drag job Role to Rows.
- Select Mark Type as Square.
- Pot Emp Count to Mark section as both labels & colors.
- **Output:**



(vi)

➢

- Drag Attr Count to Columns.
- Drag Educational Field to Row.
- **Output:**



(vii)

➢

- ❖ Drag Gender to columns.
- ❖ Also Drag Age Group to columns.
- ❖ Drag A RATE to Rows twice.
- ❖ Select Dual Axis for Second ARATE.
- ❖ For Firet ARATE use Pie & Second Circle.
- ❖ Change color & Size of second ARATE to create donuts.
- ❖ Use ARATE ae label for second ARATE to display.
- ❖ **Output:**

12) Analysis of Amazon Prime Dataset:

i) Create a Donut chart to show the percentage of movie and tv shows.

ii) Create a area chart to shows by release year and type.

iii) Create a horizontal bar chart to show Top 10 genre.

iv) Create a map to display total shows by country.

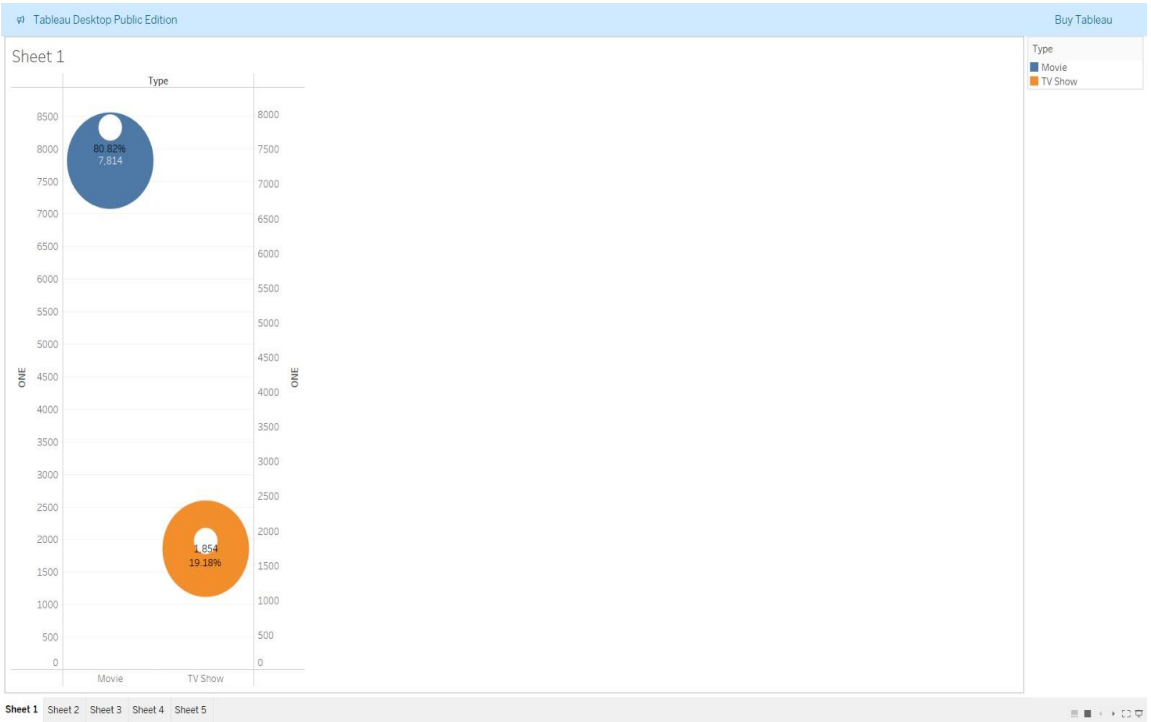
v) Create a text sheet to show the description of any movie/movies.

vi) Build an interactive Dashboard.

(i)

➢

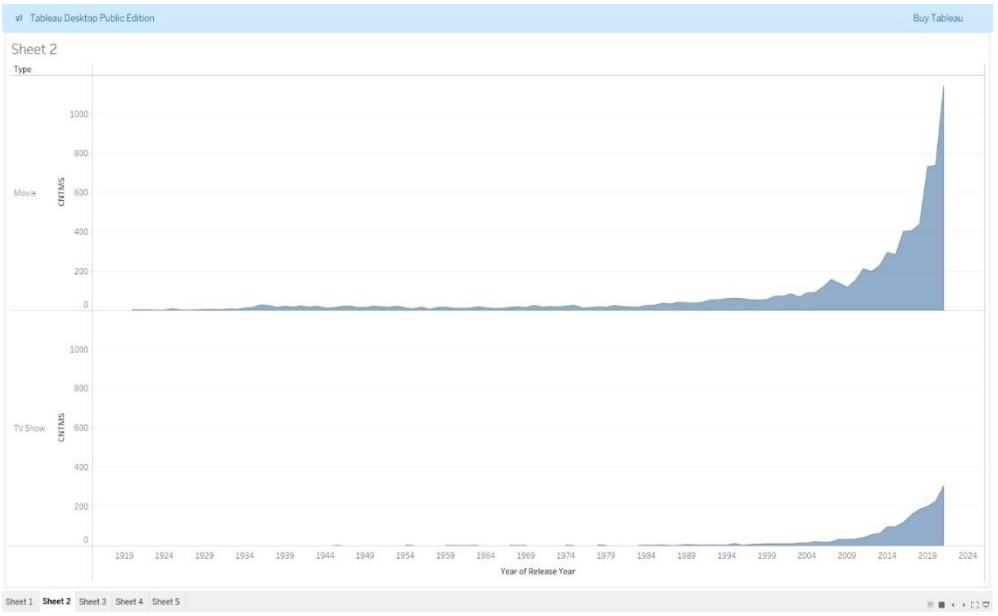
- Create a calculated field One with Calculation: 1
- Drag Type to Columns.
- Drag ONE twice to Rows.
- Seled Dual axis for Second one.
- For first ONE use Pie & Second Circle.
- Change color & Size of Second ONE to Create donuts.
- Create a Calculated Field CNTMS with Calculation: COUNT ((Show Id])
- Drag Type to Marks field of first ONE & make it color.
- Drag CNTMS to Marks field of first ONE 2 times & charge them to label & Size.
- **Output:**



(ii)

➢

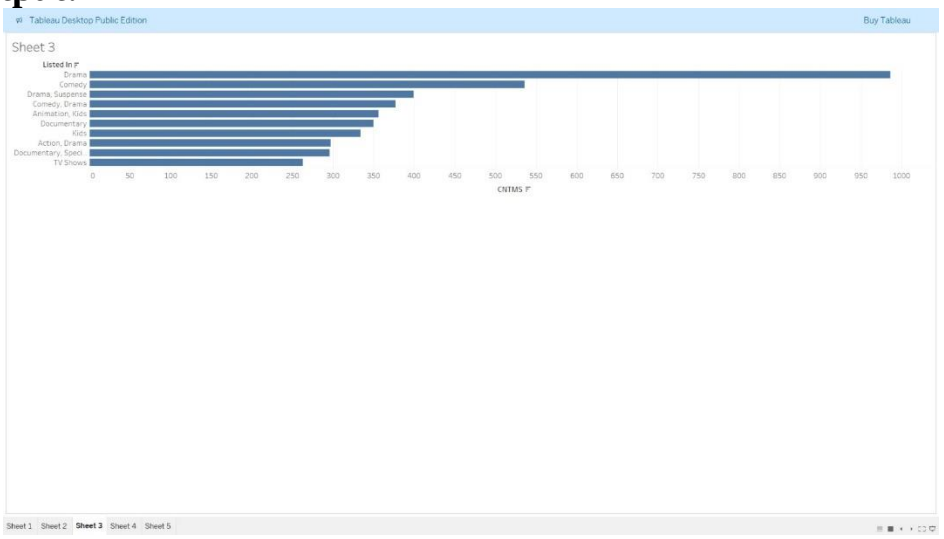
- ❖ Right click Rebars year column & convert to Date.
- ❖ Drag rebars year to columns.
- ❖ Create a Calculated field CATIMS with Calculation: COUNT ([Show Id]).
- ❖ Drag CNTMS type also to rows.
- ❖ Change Marks type to Area.
- ❖ **Output:**



(iii)

➢

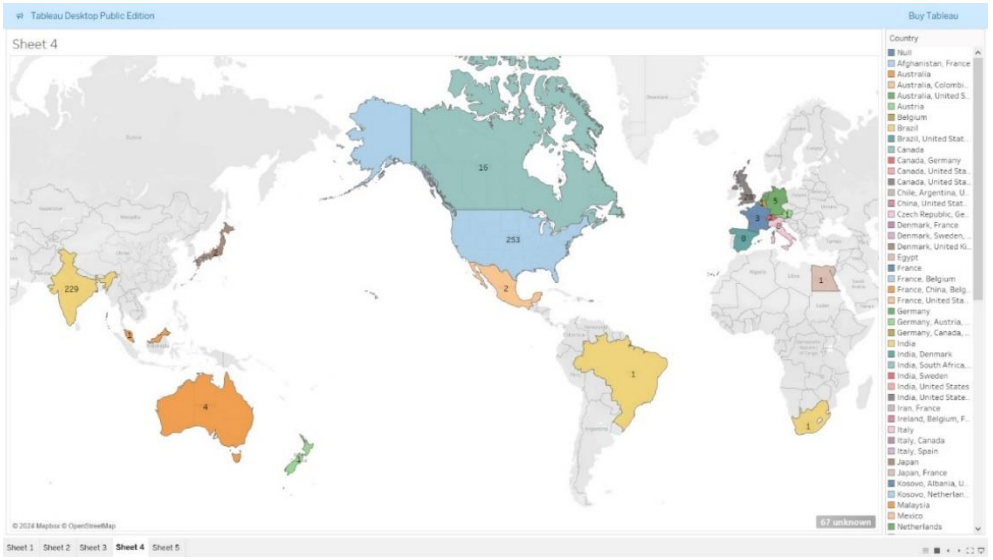
- ❖ Drag CNIMS to Columns.
- ❖ Drag Listed in to Rows.
- ❖ Also Drag Listed in to Filters.
- ❖ In filter use Top 10 filtering.
- ❖ Sort the CNTMS axis in descending order.
- ❖ **Output:**



(iv)

➢

- Drag Country to columns.
- Select Symbol maps from show Me.
- Drag CNTMS to Manke section. change to Label.
- Drag Country to Mark section. change to color.
- **Output:**



(v)

➢

- Drag Title to columns.
- Drag description to row.
- Drag title to Filter to select.
- 2-3 movies. use Entire view.
- **Output:**