Lab_2

Student Project: Analyzing Vehicle Performance with Interactive Visualizations

Project Title: *Exploring Car Performance Metrics Using Interactive Data Visualizations in R*

Project Objective

Students will analyze the **mtcars** dataset using **Plotly** in R to uncover insights about vehicle performance. They will create interactive visualizations to understand relationships between different car attributes.

Project Requirements

Data Source: Built-in **mtcars** dataset
Tools: `plotly`, `dplyr`
Deliverables:
- **R script** with data analysis and visualization
- **A short report or presentation** summarizing findings
- **A dashboard (optional) using flexdashboard or Shiny**

Tasks and Guidelines

1. Data Preparation - Load the `mtcars` dataset. - Convert categorical variables (`cyl`, `gear`) into factors.

2. Visualization Tasks
Scatter Plot:
- Create an interactive **scatter plot** of **MPG vs. Weight**, with color representing `cyl` (cylinders). - Add **horsepower (hp) as the size** of the points.

Bar Chart:
- Create a **stacked bar chart** showing the count of cars by `cyl` and `gear`.

Bubble Chart:
- Create an interactive **bubble chart** visualizing **MPG vs. Horsepower**, with **weight as the bubble size**.

Heatmap:
- Generate an interactive **heatmap** showing correlations between `mpg`, `hp`, `wt`, and `qsec`.

Density Plot:
- Create a **2D histogram density plot** to examine the distribution of `MPG` and `HP`.

3. Insights & Interpretation
- Summarize key findings from the visualizations. - Answer questions like: - Which type of car (by `cyl`) tends to have better fuel efficiency (`mpg`)? - What is the relationship between `hp` and `mpg`? - How does weight (`wt`) impact fuel efficiency?

4. (Optional) Interactive Dashboard
- If students want an extra challenge, they can integrate the plots into a **Shiny app** or **flexdashboard**.

Grading Criteria

Criteria	Points
Correct use of `plotly` for interactive visualizations	30
Clarity & accuracy of visualizations	20
Interpretation & insights from data	20
Report/Presentation quality	20
Bonus (Dashboard or additional insights)	10

Expected Outcome

By completing this project, students will develop skills in **interactive data visualization** and **data-driven storytelling**, which are highly valuable for business analytics.

Would you like a template R script for this project?