Lab Exercise Demonstration 2 (Exercises 3.1 to 4.1) (Week 5)

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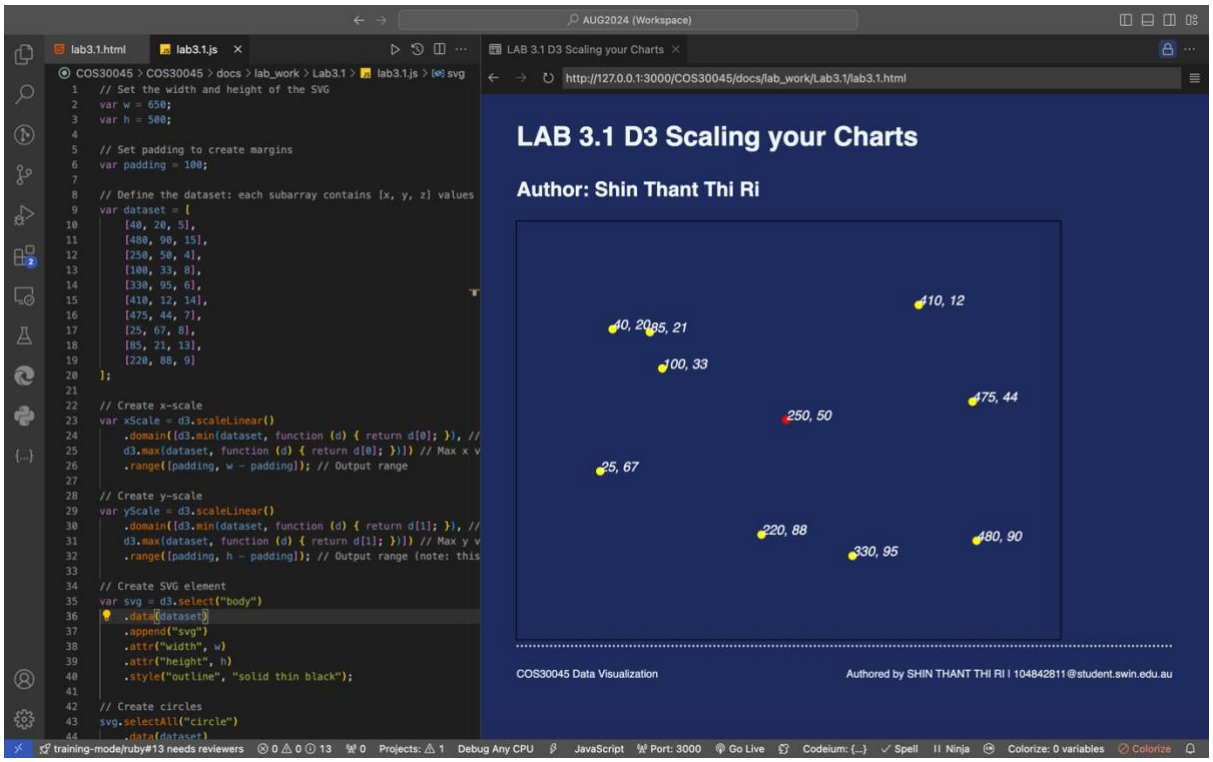
GitHub Link: https://github.com/sharin-io/COS30045

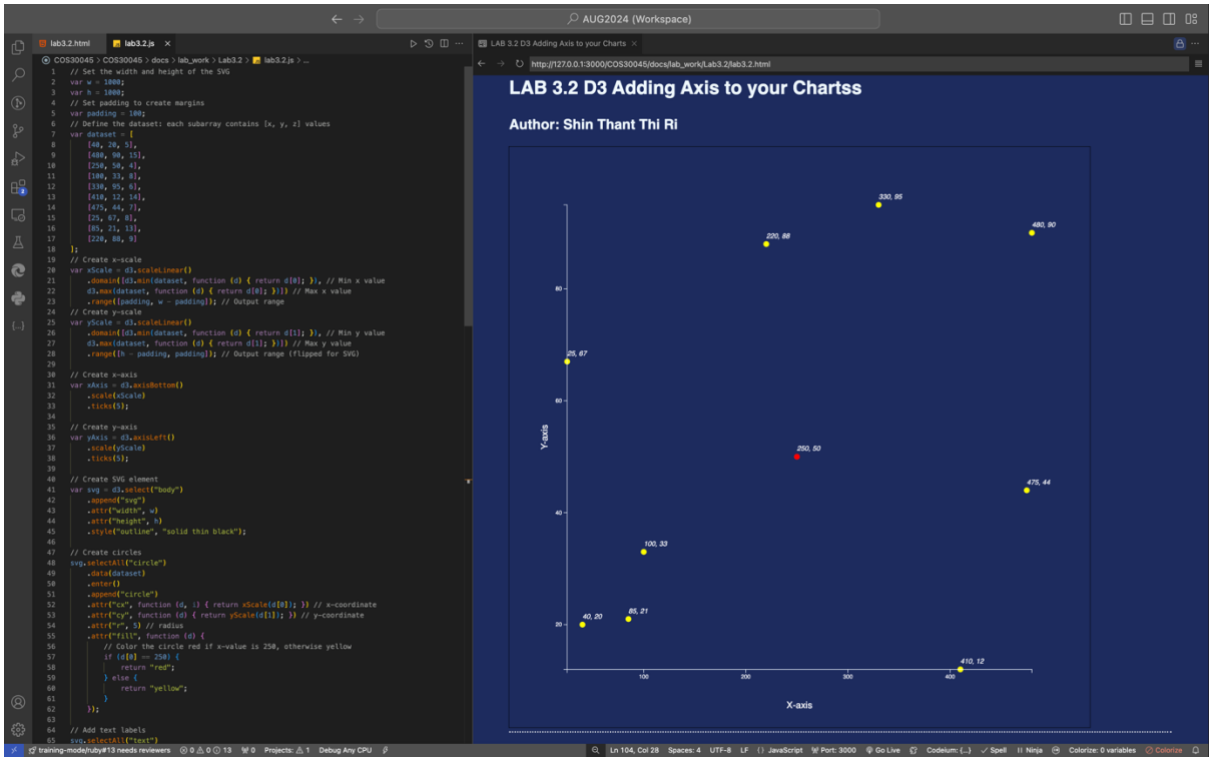
Screenshots of webpages for Lab Task 3.1 to 4.1

Lab 3

Lab 3.1



Lab 3.2



Lab 4.1 Design Studio

1. **How does crash frequency vary across different regions of Australia throughout the year?**

   Crash Frequency Across Australian Regions

   Visualization Type: Line Chart

   Data Attributes Needed:

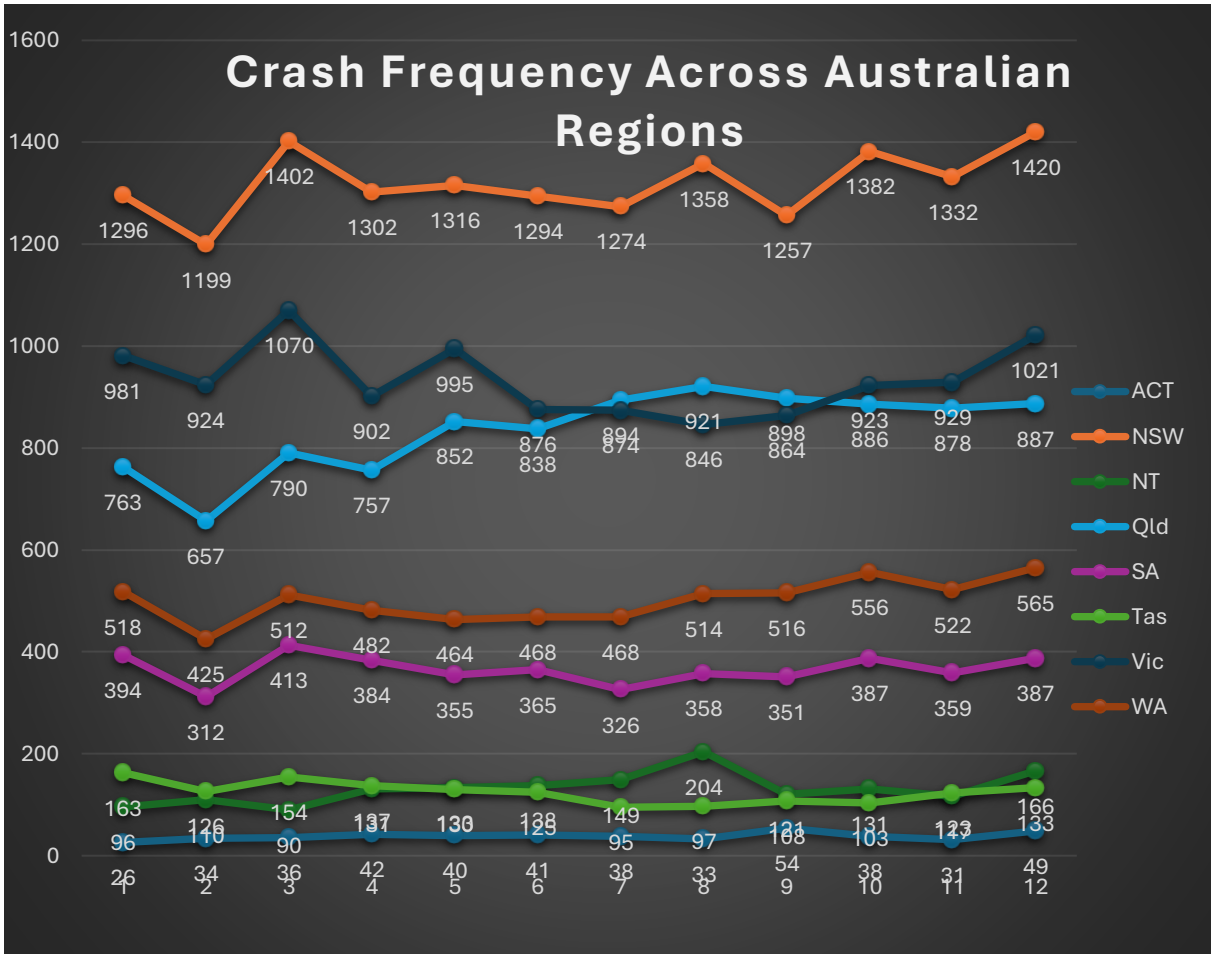
   - State: Represents the region or state in Australia where the crashes occurred (e.g., NSW, Qld, SA).
   - Month: Represents the month of the year in which the crashes occurred, used to analyze trends across the year.
   - Crash Count: Represents the total number of crashes that occurred in each state per month.

   Data Transformation Needed:

- Grouping and Summing: The data needs to be grouped by both State and Month. For each state and month, you will sum the total number of crashes to match the line graph format.
- Pivoting Data: The data needs to be pivoted so that each state becomes a separate line in the graph, with months on the x-axis and crash counts on the y-axis.

Data Type Changes Due to Transformation:

- Crash Count: After grouping, individual crash records are aggregated into totals for each month and state, so they remain as numerical data.
- State and Month: These remain categorical (nominal) data types before and after the transformation. No changes are needed.
- The line graph shows crash frequency trends across Australian states over 12 months.



Visualization Insight:

- **NSW** has the highest crash rates, peaking in February (1402) and December (1420).
- **ACT** shows a steady rise, with a sharp increase in December (1021).
- **Qld** remains stable with slight peaks in March and December.
- **WA** gradually increases, ending with the second-highest count in December (565).
- **Tas** and **NT** have low and stable crash rates.
- **Vic** and **SA** show moderate fluctuations.
- **Seasonal Trends**: Several states see a rise in crashes toward the year's end, possibly due to holidays or increased travel.

2. **How does the distribution of crash types vary across different times of day?**

Distribution of Crash Types Across Different Times of Day

Visualization Type: Bar Chart

Data Attributes Needed:

- Time of day (categorized as Day/Night)
- Crash Type (Single, Multiple, Pedestrian)
- Crash ID (to count occurrences)

Data Transformation Needed:

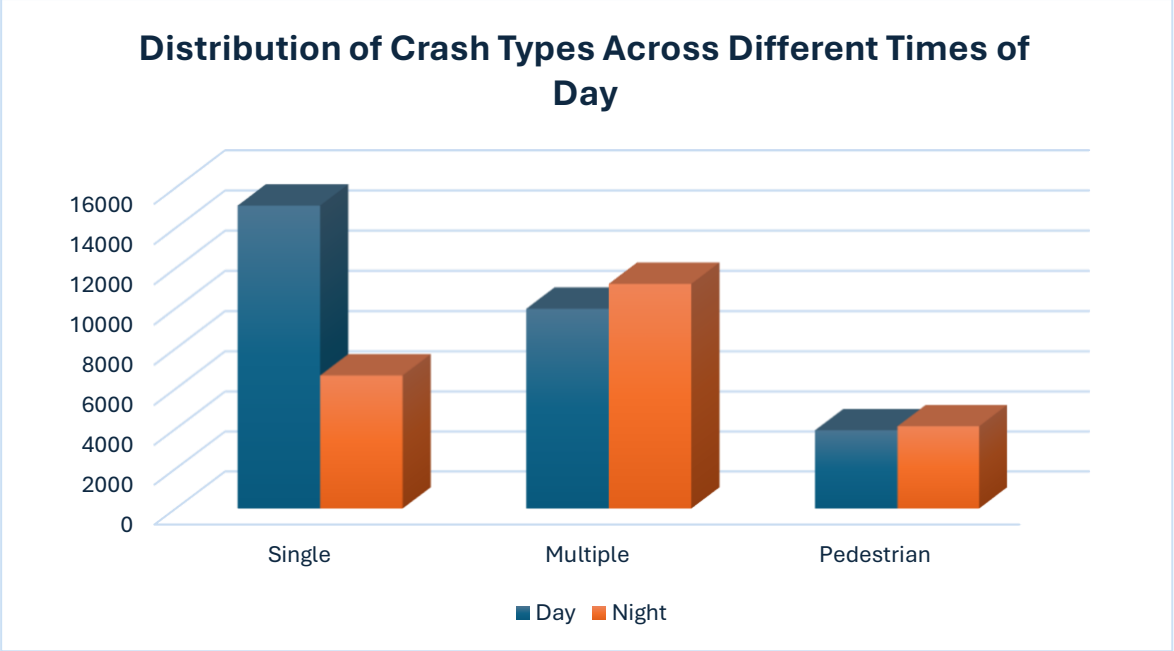
- Categorize Time into "Day" (06:00-17:59) and "Night" (18:00-05:59).
- Count the number of occurrences for each Crash Type (Single, Multiple, Pedestrian) within these time categories.

Original Data Type:

- Time is quantitative (interval) in HH format.
- Crash Type is categorical (nominal).
- Crash ID is categorical (nominal), serving as a unique identifier.

Transformed Data Type:

- Time becomes a categorical variable (nominal) with values "Day" and "Night".
- Crash Type remains categorical (nominal).
- Crash Count is a new numeric variable (quantitative) representing the number of crashes for each type in the given time categories.



Visualization Insight:

- The bar chart shows that **Single** crash types occur significantly more during the **Day** compared to the **Night**.
- For **Multiple** crash types, the occurrences are almost equal for both **Day** and **Night**.
- **Pedestrian** crashes show similar frequencies during both **Day** and **Night**, but with lower overall numbers compared to Single and Multiple crashes.

3. **What is the gender distribution of road users involved in crashes?**

Gender Distribution in Road User Crashes

Visualization Type: Pie Chart

Data Attributes Needed:

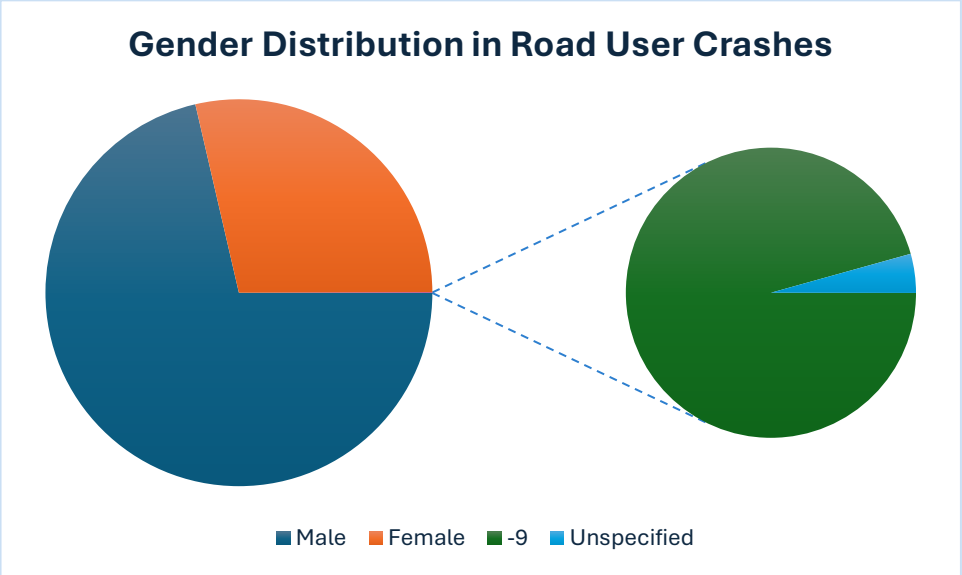
- **Gender:** Represents the gender of the road users involved in crashes.
- **Road User:** Represents the type of road user (e.g., driver, passenger, pedestrian).

Data Transformation Needed:

- No transformation is needed because the data in the Gender and Road User columns is already in a suitable format for analysis.

Data Type Changes Due to Transformation:

- There are no changes in data type as no transformation is required.
- Both Gender and Road User remain categorical (nominal) data types before and after the analysis.



Visualization Insight:

- The pie chart visually illustrates the distribution of road user crashes by gender.
- It helps identify which gender group is more frequently involved in road user crashes.
- It reveals the proportion of crashes where gender data is missing or unspecified.
- Provides a clear overview of gender-based patterns in road user incidents.