# Report: Automobile Sales Data Analysis

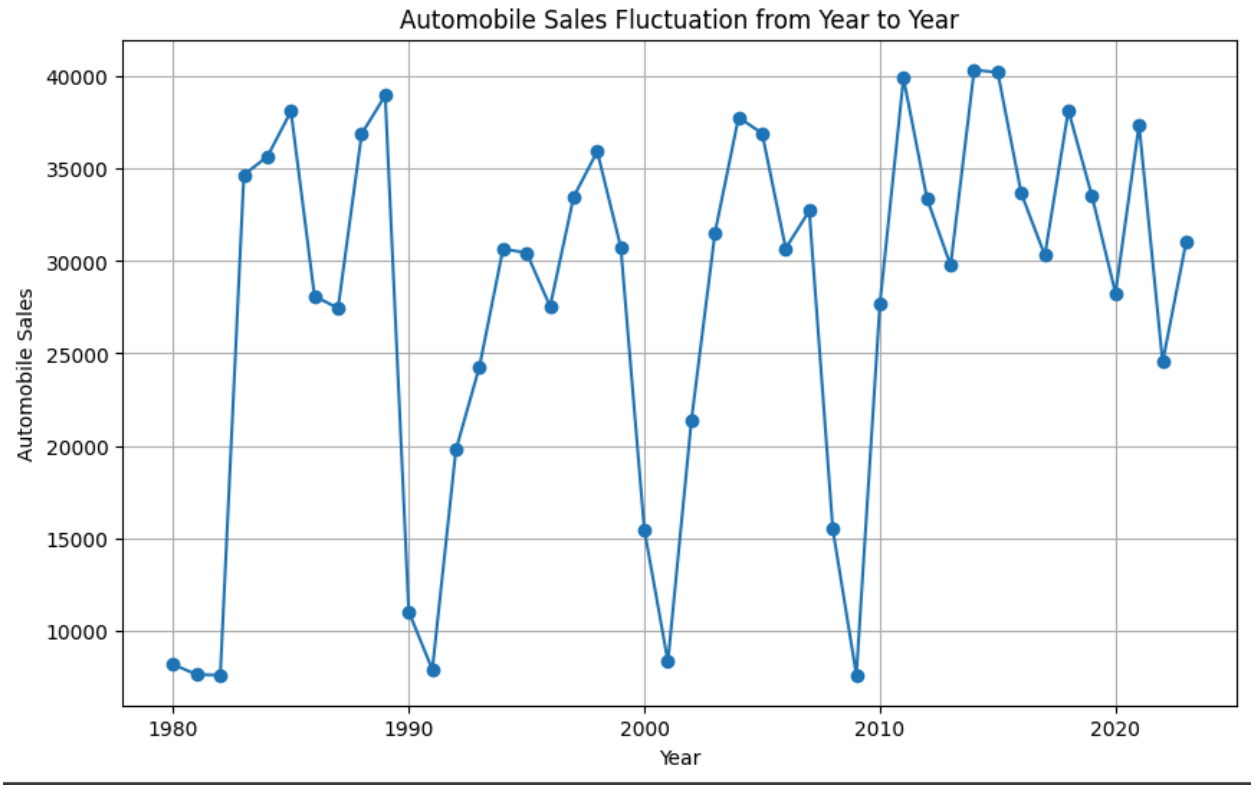
## Task 1.1: Line Chart for Automobile Sales Fluctuation

Objective: Visualize how automobile sales fluctuate from year to year.

Approach:

1. Load the dataset and remove outliers using the Interquartile Range (IQR) method.
2. Group the data by year and calculate the total automobile sales for each year.
3. Plot a line chart to depict the yearly sales trend.

Findings: The line chart reveals the yearly fluctuations in automobile sales, highlighting significant periods of growth and decline. This visualization identifies long-term trends and patterns.



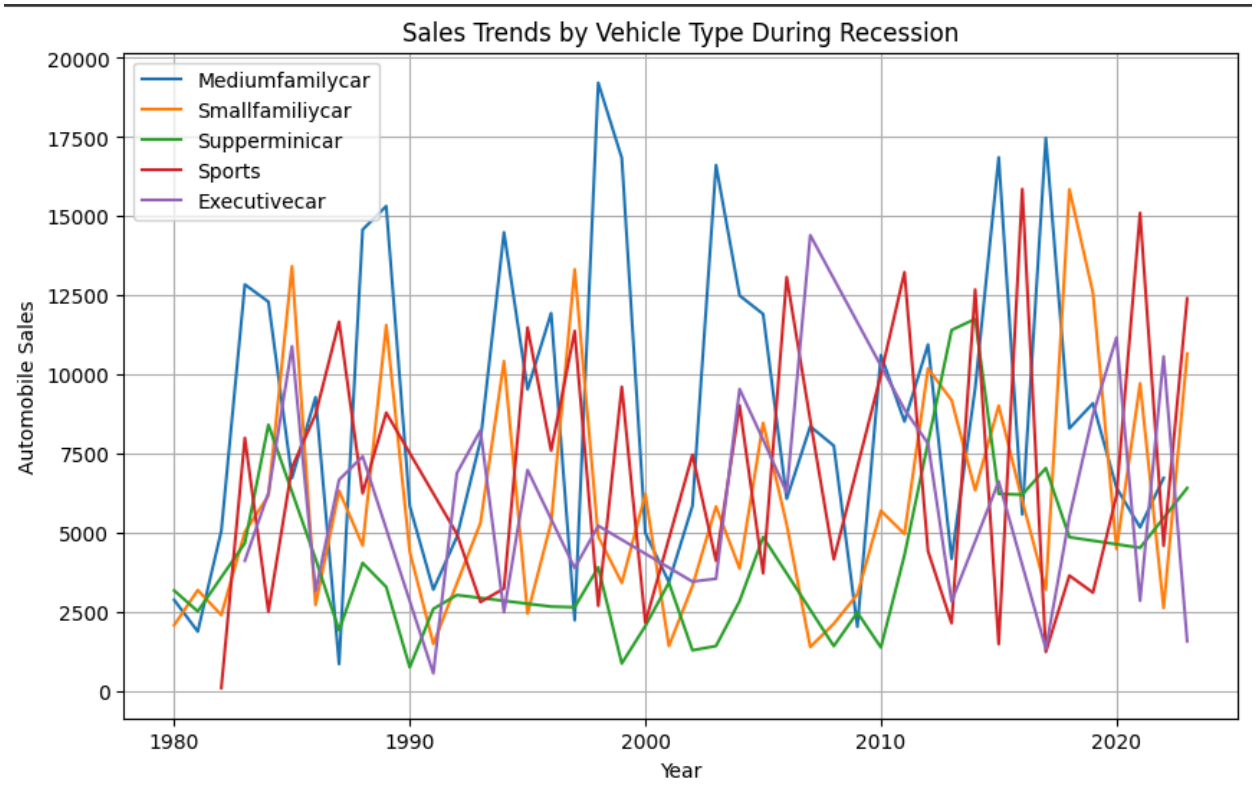
## Task 1.2: Line Chart for Vehicle Type Sales Trends During Recession

Objective: Analyze the sales trends of different vehicle types during recession periods.

Approach:

1. Filter data for recession periods.
2. Group the data by year and vehicle type, then sum the automobile sales.
3. Plot a line chart with separate lines for each vehicle type to compare trends.

Findings: The line chart shows distinct sales patterns for different vehicle types during recession periods, identifying which vehicle types are more resilient or vulnerable during economic downturns.



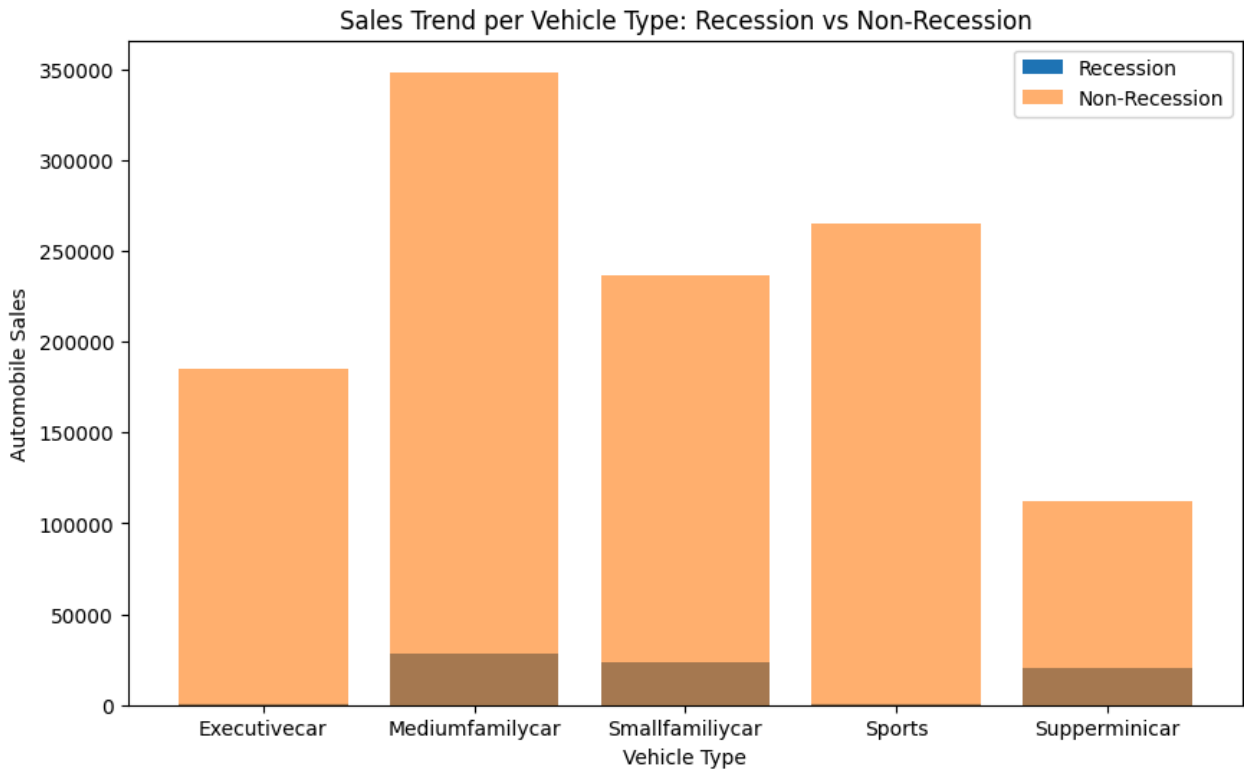
## Task 1.3: Comparison of Sales Trend per Vehicle Type

Objective: Compare sales trends per vehicle type during recession and non-recession periods.

Approach:

1. Split the data into recession and non-recession periods.
2. Group the data by vehicle type and calculate total sales for each period.
3. Plot a bar chart comparing sales trends for each vehicle type.

Findings: The bar chart highlights the differences in sales trends across vehicle types during recession and non-recession periods. This comparison identifies vehicle types that are more sensitive to economic conditions.



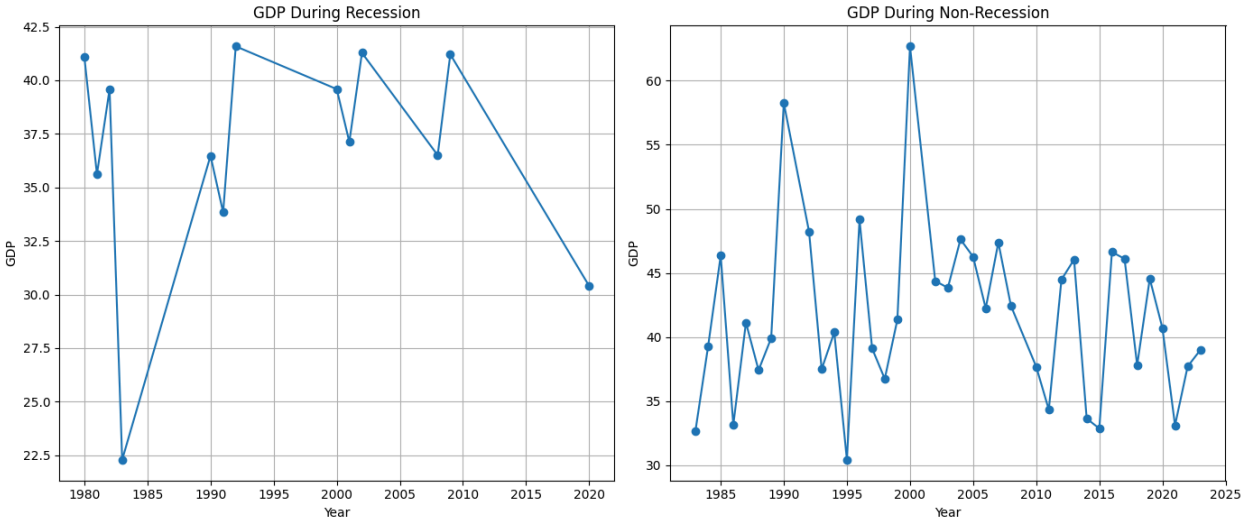
## Task 1.4: Subplotting for GDP Variations

Objective: Compare GDP variations during recession and non-recession periods.

Approach:

1. Group the data by year and calculate the mean GDP for recession and non-recession periods.
2. Use subplotting to create side-by-side line plots for GDP trends in each period.

Findings: The subplots reveal distinct GDP patterns during recession and non-recession periods, demonstrating the economic impact of recessions on GDP.



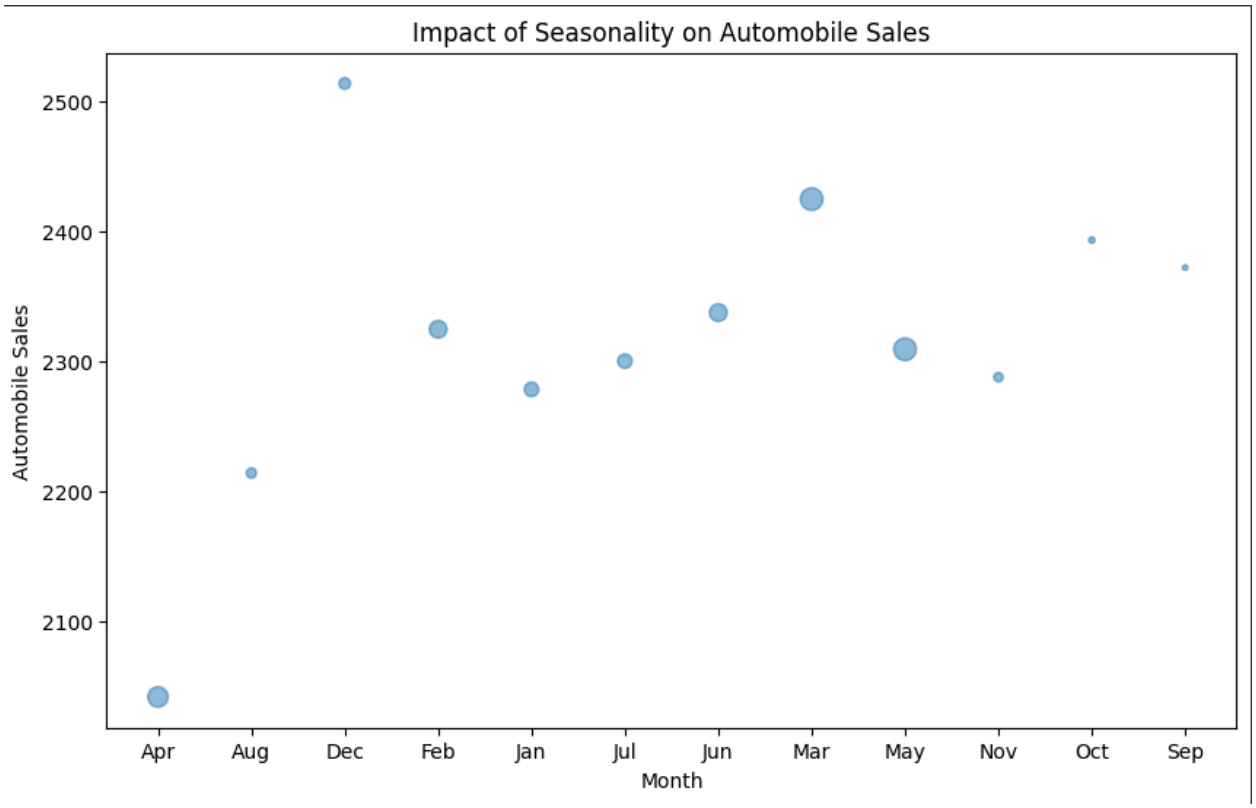

## Task 1.5: Bubble Plot for Seasonality Impact

Objective: Display the impact of seasonality on automobile sales.

Approach:

1. Group the data by month and calculate the mean seasonality weight and automobile sales.
2. Plot a bubble plot where bubble sizes represent seasonality weights.

Findings: The bubble plot highlights the influence of seasonality on sales, with larger bubbles indicating months with significant seasonal impacts. This visualization identifies peak and low sales periods.



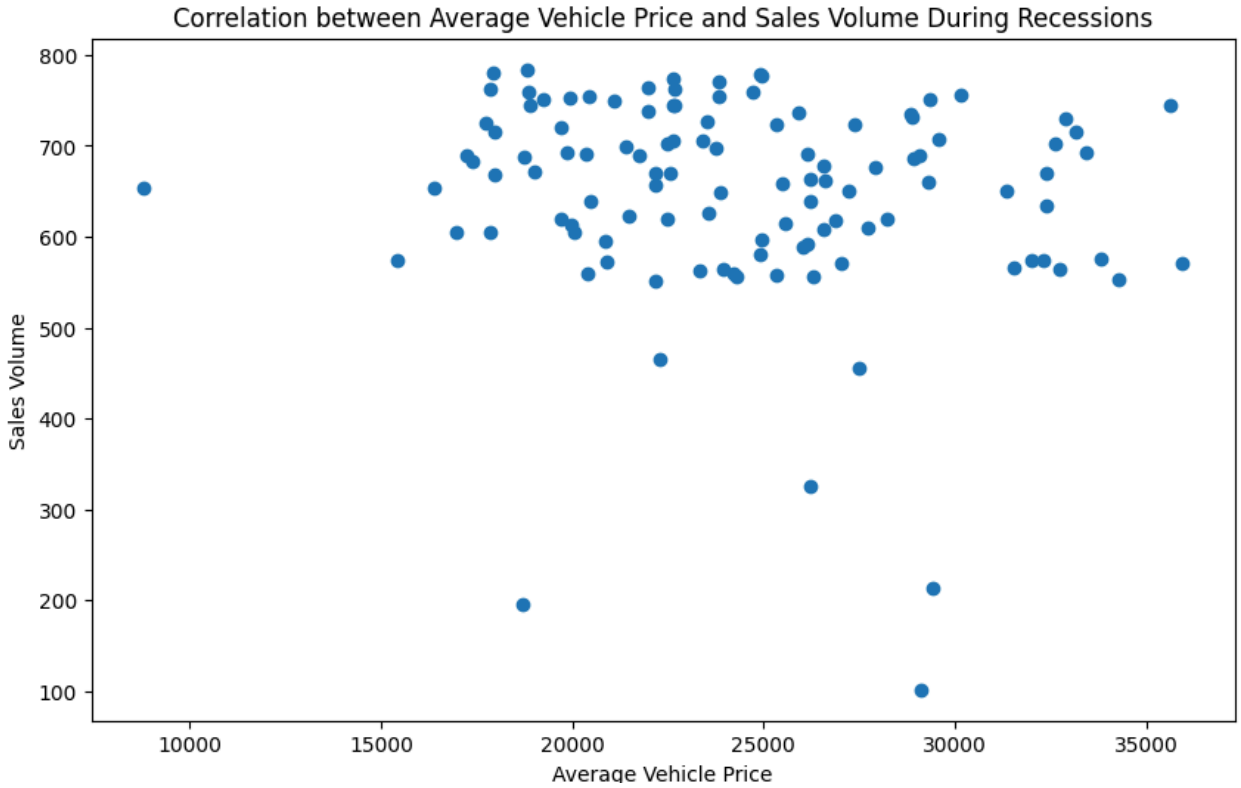

## Task 1.6: Scatter Plot for Price vs Sales Volume During Recessions

Objective: Identify the correlation between average vehicle price and sales volume during recessions.

Approach:

1. Filter data for recession periods.
2. Plot a scatter plot with average vehicle price on the x-axis and sales volume on the y-axis.

Findings: The scatter plot demonstrates the relationship between vehicle price and sales volume during recessions. This analysis shows how pricing strategies influence sales in economic downturns.



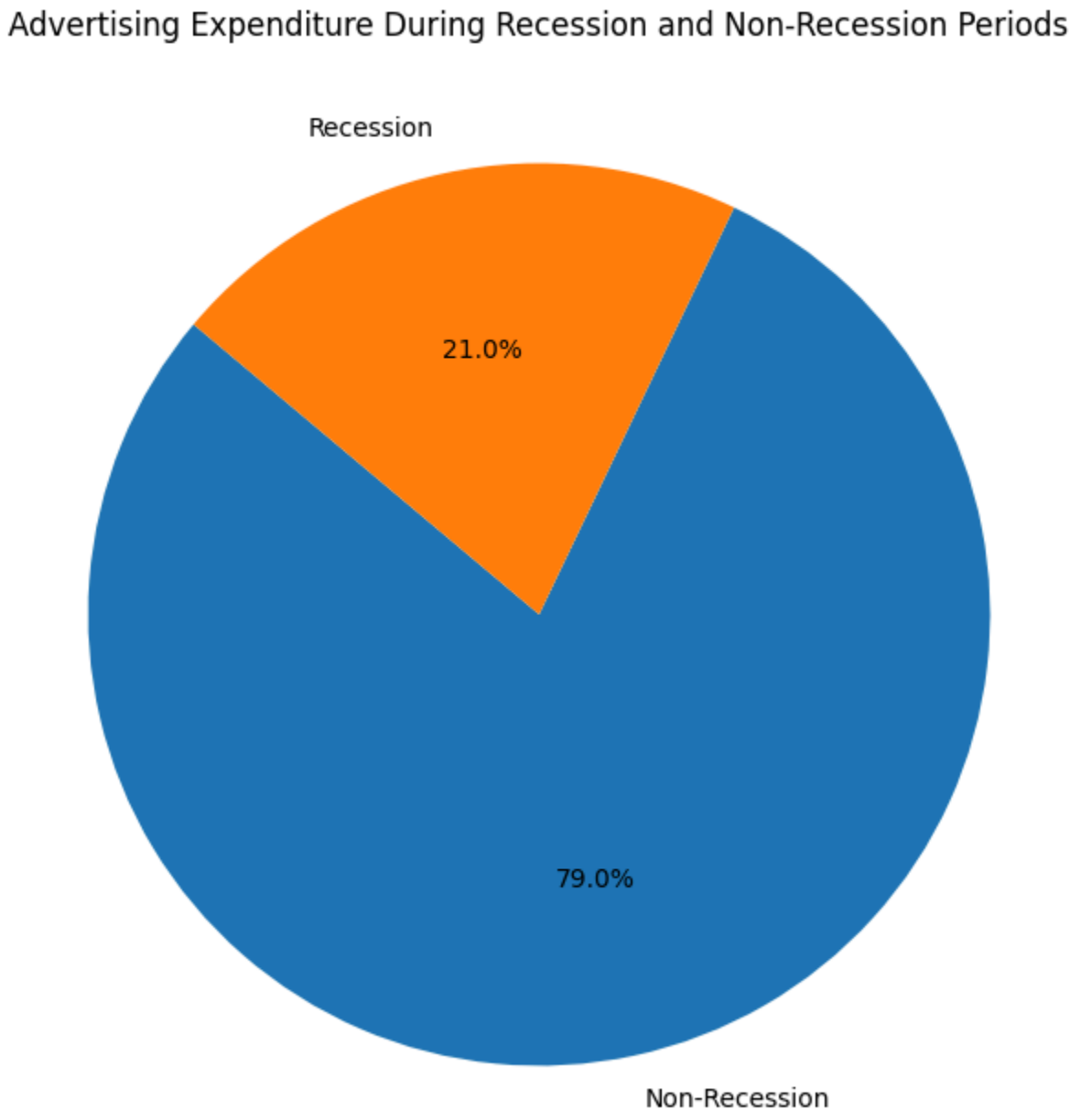

## Task 1.7: Pie Chart for Advertising Expenditure

Objective: Visualize the portion of advertising expenditure during recession and non-recession periods.

Approach:

1. Group the data by recession and calculate the total advertising expenditure for each period.
2. Plot a pie chart showing the proportions of expenditure.

Findings: The pie chart provides a clear visualization of advertising expenditure allocation between recession and non-recession periods, indicating how marketing budgets are adjusted during economic fluctuations.



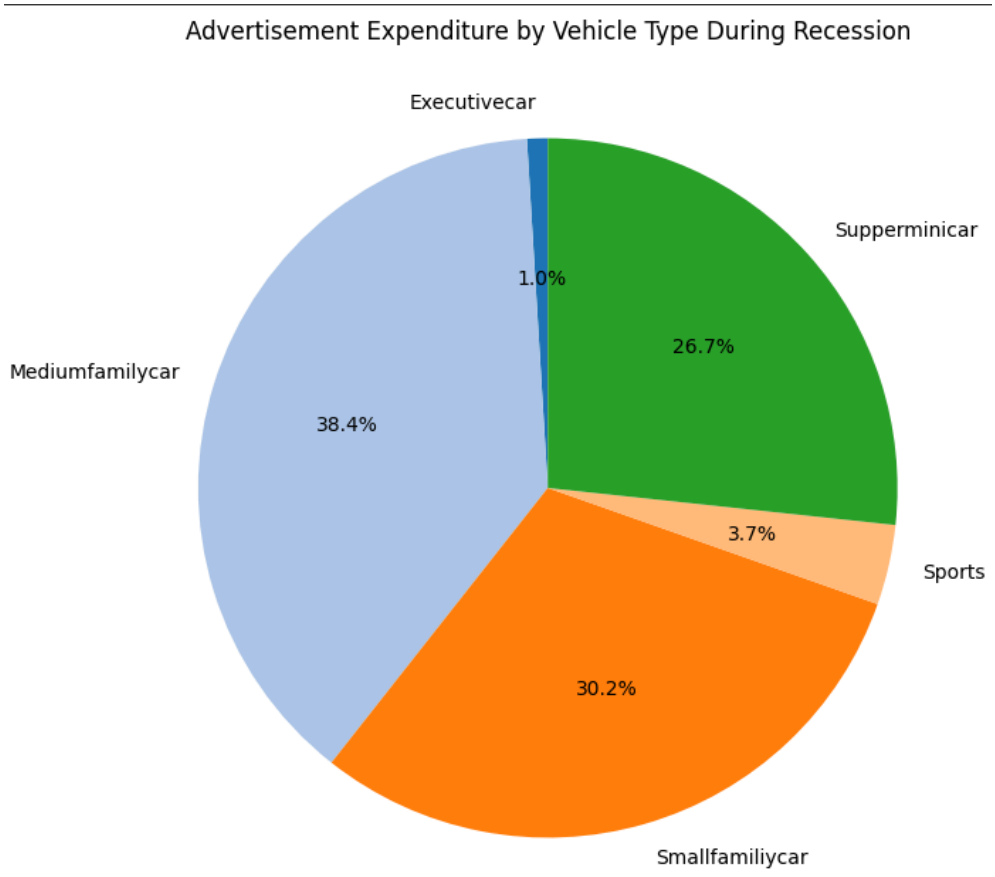
## Task 1.8: Pie Chart for Advertising Expenditure by Vehicle Type During Recession

Objective: Display the total advertising expenditure for each vehicle type during recession periods.

Approach:

1. Filter data for recession periods.
2. Group the data by vehicle type and calculate total advertising expenditure.
3. Plot a pie chart to show the expenditure distribution.

Findings: The pie chart illustrates the focus of advertising efforts on specific vehicle types during recessions, offering insights into marketing priorities during economic downturns.



## Task 1.9: Line Plot for Unemployment Rate Impact

Objective: Analyze the impact of the unemployment rate on vehicle type sales during recessions.

Approach:

1. Filter data for recession periods.
2. Group the data by year and vehicle type, calculating the mean unemployment rate and automobile sales.
3. Plot a line chart showing unemployment rate effects on sales for each vehicle type.

Findings: The line chart highlights how unemployment rates affect sales of different vehicle types during recessions. This analysis provides insights into consumer behavior under economic stress.


Conclusion

This comprehensive analysis uses various visualization techniques to uncover trends and patterns in automobile sales data. The insights derived can guide strategic decision-making for pricing, marketing, and production planning in response to economic conditions and seasonal impacts.

# Report: Dash Application for Automobile Sales Analysis

## Objective

The goal is to create an interactive Dash application to analyze automobile sales data, using the `historical_automobile_sales.csv` dataset. The application provides insights through dynamic graphs for Recession and Yearly Report statistics.

Features Implemented

1. **Meaningful Title:**
    - The application is titled **"Automobile Sales Analysis Dashboard"** for clarity and purpose.
2. **Dropdowns for Filters:**
    - Two dropdowns allow users to select:
        - **Report Type:** Recession or Yearly Report.
        - **Year:** Choose a specific year for filtering the data.
3. **Output Display:**
    - A division with an `id` (`output-container`) and `className` property displays the selected options and updates dynamically.
4. **Callbacks:**
    - A callback function updates the output container and generates graphs based on the dropdown inputs.
    - Interactivity allows real-time updates based on user selections.
5. **Graphs:**
    - **Recession Report Statistics:**
        - Bar charts show monthly automobile sales during recession years.
    - **Yearly Report Statistics:**
        - Line charts display monthly sales trends for the selected year.

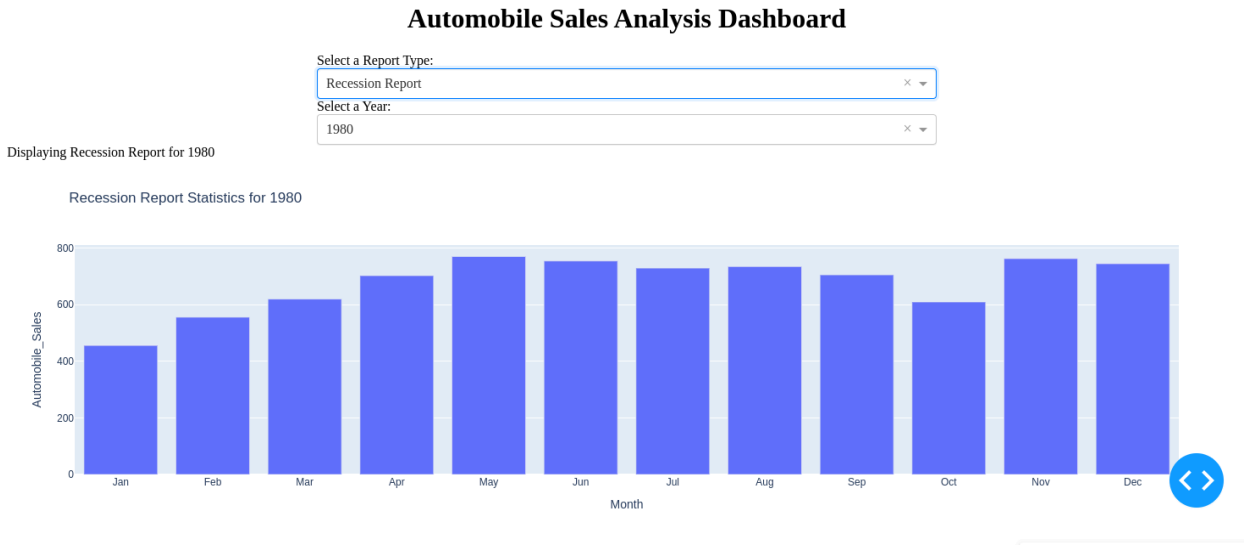
## Usage

1. Select the desired **Report Type** (Recession or Yearly) from the first dropdown.
2. Choose the **Year** for analysis from the second dropdown.
3. The output container displays a summary of the selected options.
4. The graph dynamically updates to reflect the selected report and year.

## Benefits

- **Interactive Analysis:** Users can explore recession impacts and yearly trends dynamically.
- **Visual Insights:** Graphs provide a clear representation of the sales data for actionable insights.

This application is ready for deployment and serves as a robust tool for analyzing historical automobile sales. Let me know if enhancements are needed!



# Automobile Sales Analysis Dashboard

Select a Report Type:

Yearly Report

Select a Year:

1980

Displaying Yearly Report for 1980