Unlocking Automotive Trends Project - Part 1 and Part2

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Introduction:

Project Overview: This project focuses on analyzing a comprehensive car dataset to identify key factors that influence the success of car models. By examining various metrics such as fuel efficiency, performance, weight distribution, safety features, and market segmentation, we aim to extract actionable insights that will guide strategic decisions for launching promising car models. The initial sprint covers data cleaning, segmentation, and core analyses to provide a foundation for deeper exploration and recommendations.

Part 1
Market Segmentation Analysis

Task 1

A car manufacturer wants to introduce a new car and requires information about the top 5 most preferred car body types. Display the results using a horizontal bar chart.

Top 5 Most Preferred Car Body Types
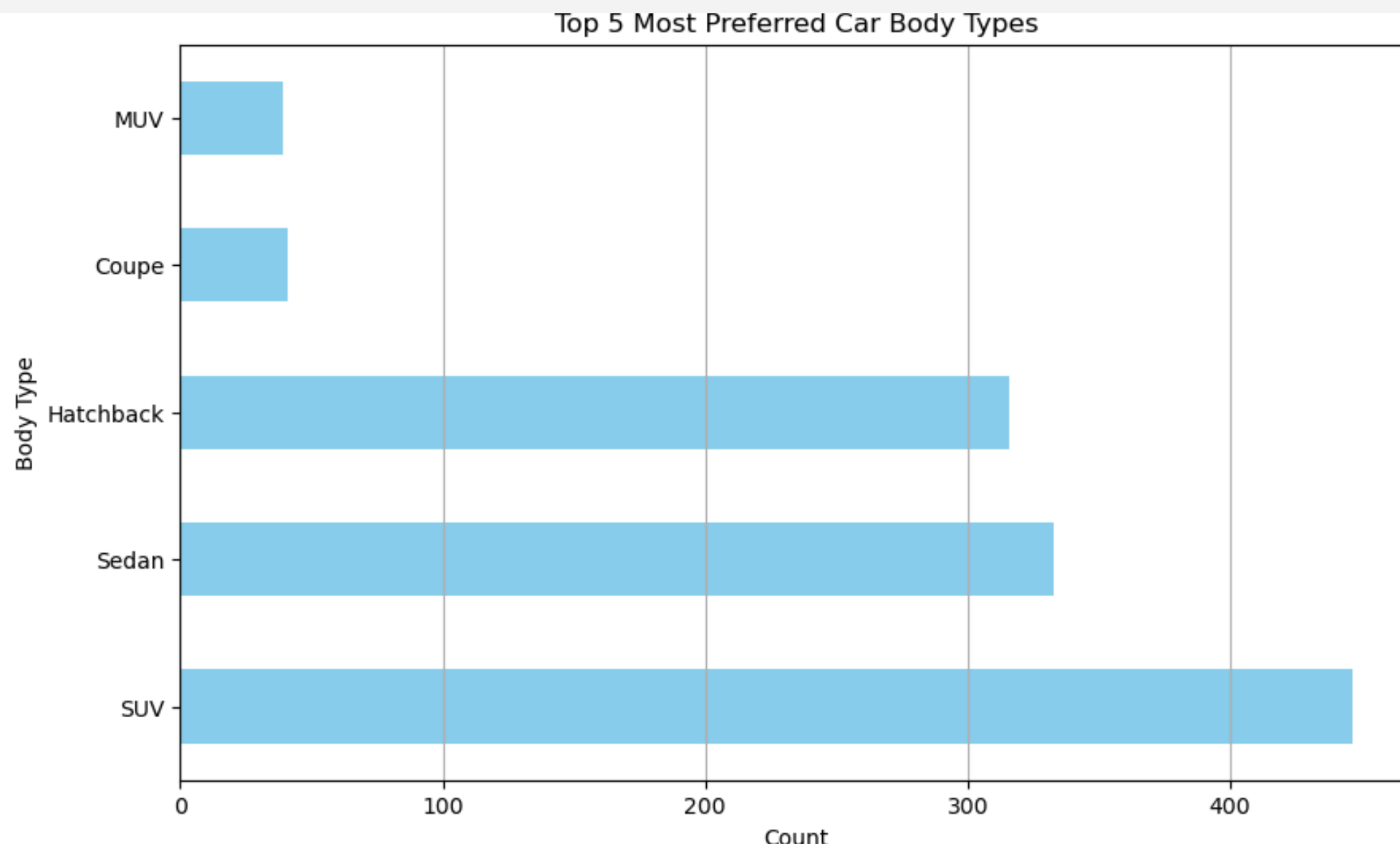
Interpretation :

- SUV: The most common body type with 447 cars.
- Sedan: The second most frequent, with 333 cars.
- Hatchback: 316 cars, making it the third most popular.
- Coupe: A much smaller category, with only 41 cars.
- MUV: The least common, with 39 cars.
- This distribution indicates that SUVs are the most dominant body type in the dataset, while Coupes and MUVs represent niche categories.

Part 1
Market Segmentation Analysis

Task 2

List all the details of cars that can adapt to various driving conditions such as normal, comfort, eco, sport, and power mode. How many cars have all the above-mentioned features?

Drive Modes Table:

| Model	Occurrences
Discovery Sport	Comfort, Eco, Sport
Kona Electric	Comfort, Eco, Sport
XC40	Comfort, Eco, Sport, Normal
A6	Comfort, Eco, Sport, Normal
Octavia	Sport
Mercedes-Benz C-Class	Sport
Tiago	Sport
X7	Sport, Normal, Comfort
Mercedes-Benz GLE	Sport, Normal, Eco
ZS EV	

Interpretation :

- **Popular Drive Modes:** The drive mode combination "Comfort, Eco, Sport" is seen in several car models like "Discovery Sport" and "Kona Electric," indicating these are popular options for versatile driving conditions.
- **Model Diversity:** Different models feature a variety of drive modes. Some models, like "Mercedes-Benz C-Class," focus heavily on one mode, such as "Sport."
- **Frequency:** The frequency count helps identify which combinations of drive modes and models are most common, potentially highlighting market preferences or trends in the car industry.

Part 1
Fuel Efficiency Analysis

Task 3

Identify the top 10 car manufacturers based on the city mileage and display the result using a horizontal bar graph with the manufacturer on the y-axis and mileage on the x-axis.

Top 10 Car Manufacturers Based on Average City Mileage
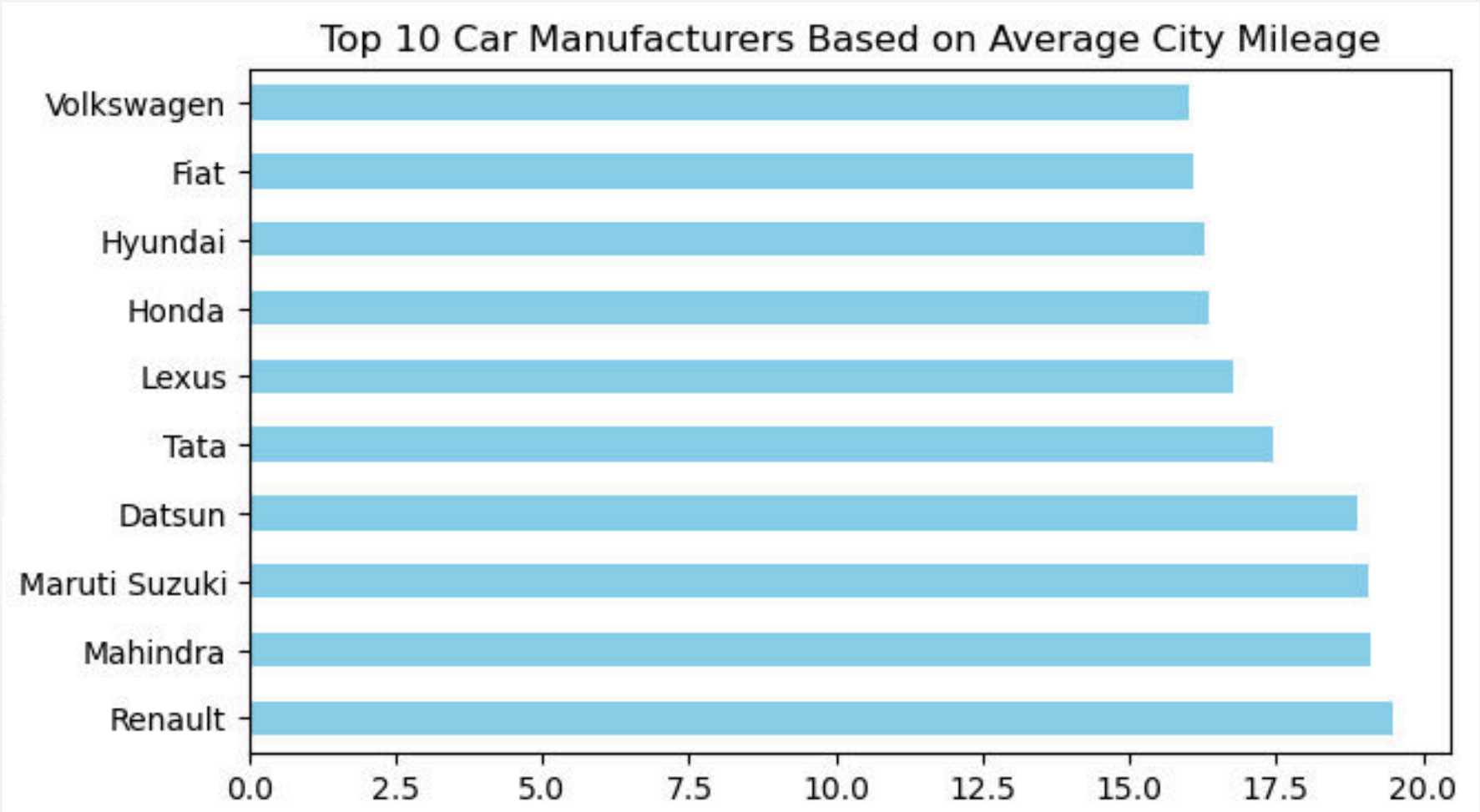
Interpretation :

Top Performer: Renault leads with an average city mileage of 19.50 km/litre, indicating strong fuel efficiency compared to the others.

Competitive Range: Mahindra and Maruti Suzuki follow closely with average mileages of 19.09 km/litre and 19.06 km/litre, respectively, showing competitive performance.

Middle Ground: Datsun and Tata exhibit average city mileages of 18.89 km/litre and 17.46 km/litre, indicating decent efficiency but lower than the top three manufacturers.

Lower Efficiency: Lexus, Honda, Hyundai, and Fiat show lower average mileages, ranging from 16.08 km/litre to 16.75 km/litre, suggesting that these brands may focus more on performance or luxury than fuel efficiency.

Part 1
Fuel Efficiency Analysis

Task 4

Identify the top 20 non-electric car manufacturers based on city mileage and display the results using a bar graph similar to that in task 1.

Interpretation :

Top 20 Non-Electric Car Manufacturers by City Mileage
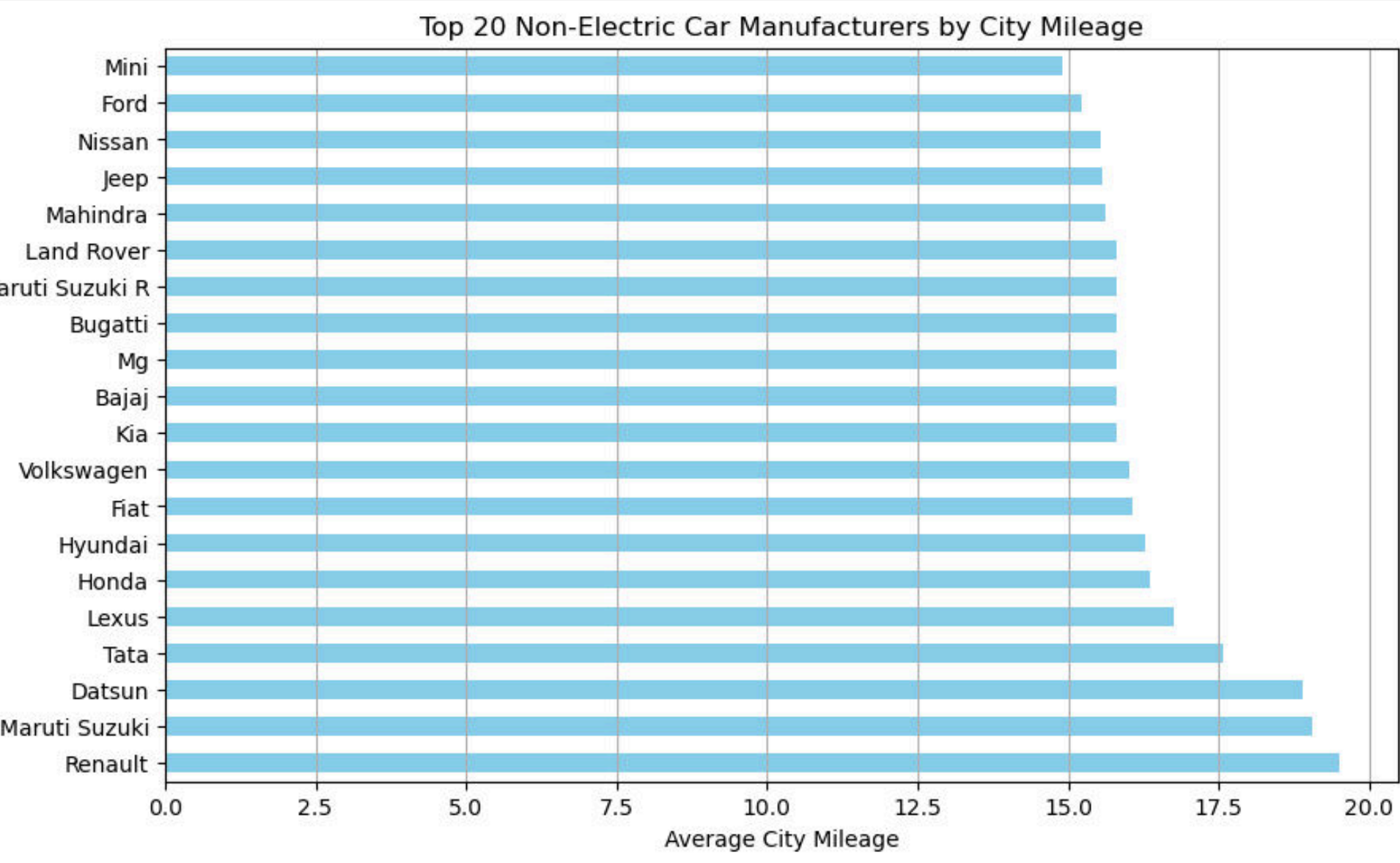
Top Performers:
- **R**enault: 19.50 km/litre
- Maruti Suzuki: 19.06 km/litre

Competitive Middle :
- **Tier:**Datsun: 18.89 km/litre
- Tata: 17.56 km/litre

Moderate Performance:
- Lexus: 16.75 km/litre
- Honda: 16.36 km/litre
- Hyundai: 16.27 km/litre

Lower Efficiency Brands:
- Kia, Bajaj, MG, Bugatti: 15.82 km/litre
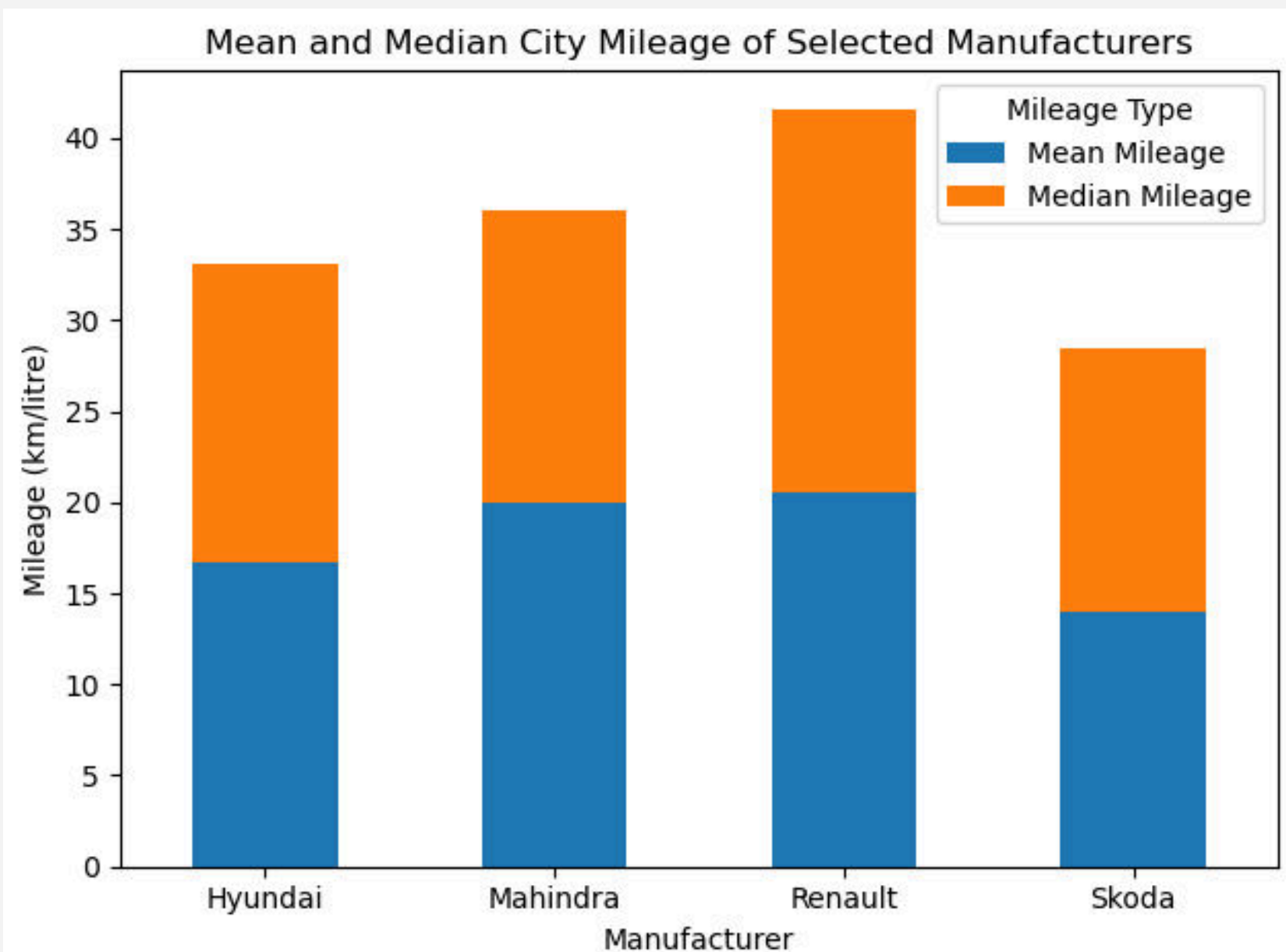- Mahindra: 15.63 km/litre
- Lowest Mileage:Mini: 14.91 km/litre

Renault and **Maruti Suzuki** lead in fuel efficiency, while Mini shows the lowest mileage.

Task 6

Display the mean and median values of city mileages of the following manufacturers, using a stacked column chart: Hyundai, Renault, Mahindra, and Skoda.

Interpretation :

Mean City Mileage:
- **Renault:** 19.50 km/litre (Mean) – Leading in fuel efficiency.
- **Mahindra**: 19.08 km/litre (Mean) – Close to Renault, offering balanced performance.
- **Hyundai:** 16.26 km/litre (Mean) – Moderate efficiency, suitable for urban driving.
- **Skoda:** 14.51 km/litre (Mean) – Lower mileage, prioritizing features.

- **Median City Mileage:**
- **Renault:** 21.04 km/litre (Median) – Consistently efficient, higher than its mean.
- **Hyunda**i: 15.81km/litre (Median) – Slightly below its mean, still moderate
- **Mahindra:** 15.81km/litre (Median) – Lower than the mean, indicating potential outliers or variability.
- **Skoda:** 15.10km/litre (Median) – Close to the mean, showing consistency.

Key Insights:
Renault leads in both mean and median mileage, highlighting its overall efficiency.
Mahindra shows a notable difference between mean and median, suggesting variability in performance.
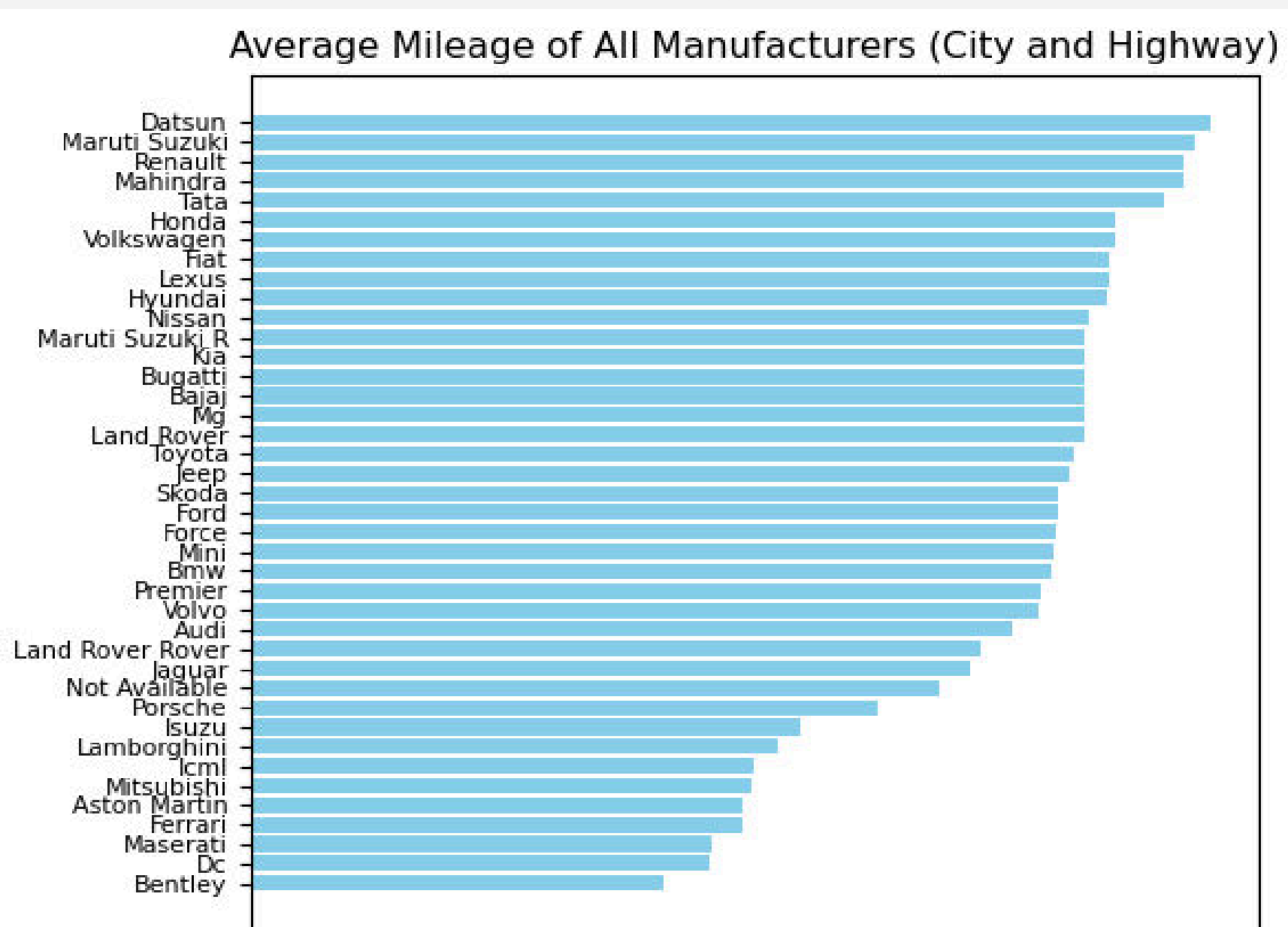Skoda and Hyundai show consistency, but with lower overall mileage compared to Renault and Mahindra.

Part 1
Fuel Efficiency Analysis

Task 7

Display the average mileage (city and highway) of all manufacturers using a horizontal bar chart, in ascending order of mileage

Average Mileage of All Manufacturers (City and Highway)

Interpretation :

Top Performers:
- Mahindra and Maruti Suzuki lead in city mileage, offering superior fuel efficiency.
- Datsun exhibits a high city mileage, approaching 19 km/litre.

Low Performers:
- Aston Martin, Bentley, and Lamborghini have the lowest average city mileages, indicating lower fuel efficiency.

General Trends:
- The data shows a noticeable range of city mileage across manufacturers, highlighting variations in efficiency based on design and engineering focus.

Part 1
Fuel Efficiency Analysis

Task 8

Plot a line chart to understand the relation between displacement and city mileage by choosing the top 10 cars with the highest city mileage.

Relationship between displacement & city mileage
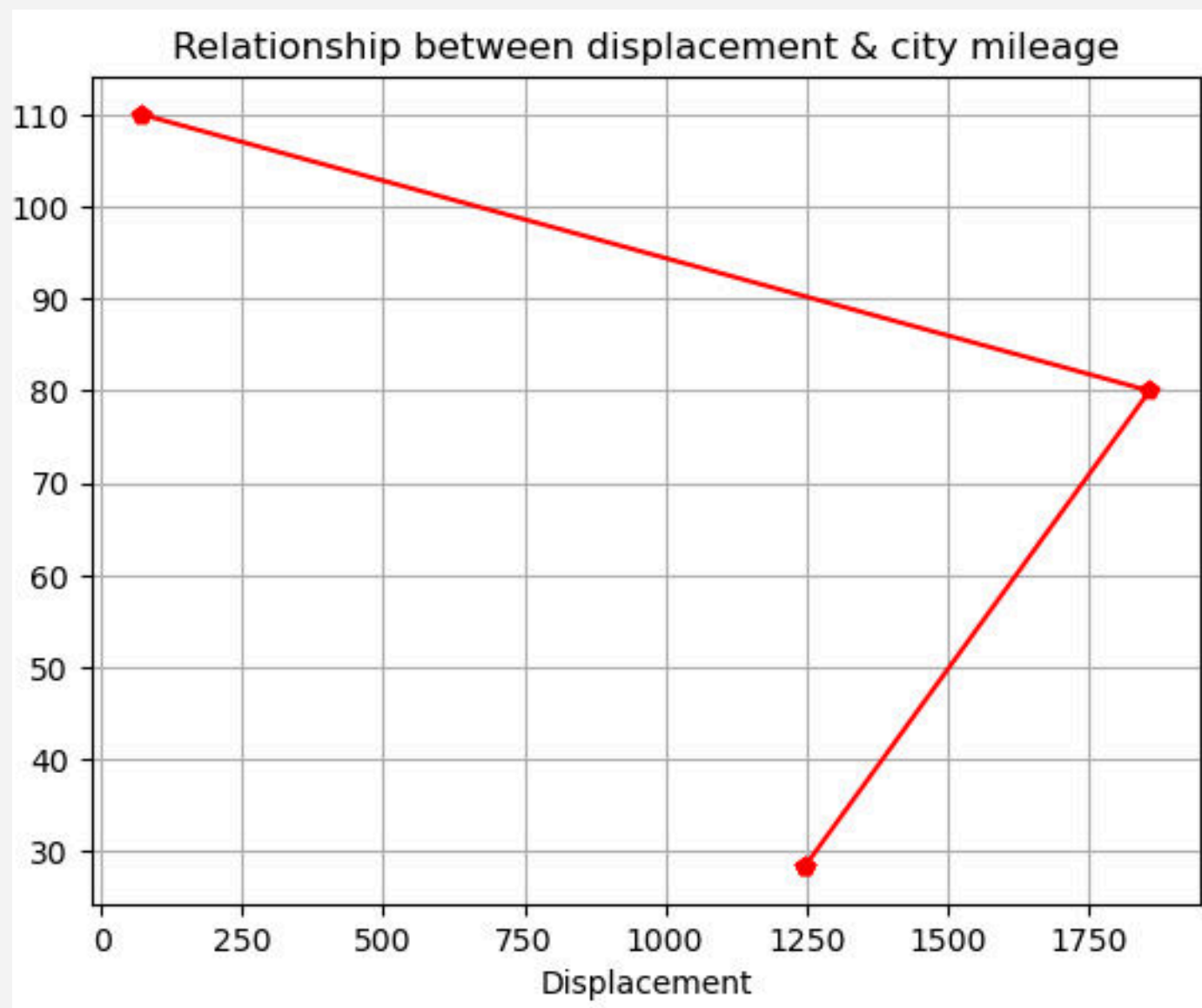
Interpretation :

EVerito:
- With such a low displacement and high city mileage, this model demonstrates excellent fuel efficiency, making it a strong option for urban driving.

E2O Plus:
- Despite its higher displacement, its city mileage is lower compared to E Verito.
- This indicates that larger engine sizes may not necessarily result in better fuel efficiency in city conditions.

Dzire:
- This model has a much larger displacement than E Verito, but its city mileage is significantly lower.
- This suggests that as displacement increases beyond a certain point, city mileage can drastically decrease.

Trends:
- The data suggests that there is negative correlation between displacement and city mileage for the analyzed models. As displacement increases, city mileage tends to decrease, which is common in many vehicles.

The E Verito stands out as an exception with its low displacement and high efficiency, indicating that not all vehicles follow the same trend regarding displacement and mileage.

Part 1
## Fuel Efficiency Analysis

Task 9

Analyze the spread of fuel economy using a histogram for all car models of the following manufacturers: Hyundai, Suzuki, Tata, and BMW
Which of these manufacturers has the most skewed mileage distribution?
Note: A separate histogram is required for each manufacturer.

Spread of fuel economy (Hyundai)

Spread of fuel economy (Suzuki)

Spread of fuel economy (Bmw)

Part 1
Fuel Efficiency Analysis

Task 9

Spread of fuel economy
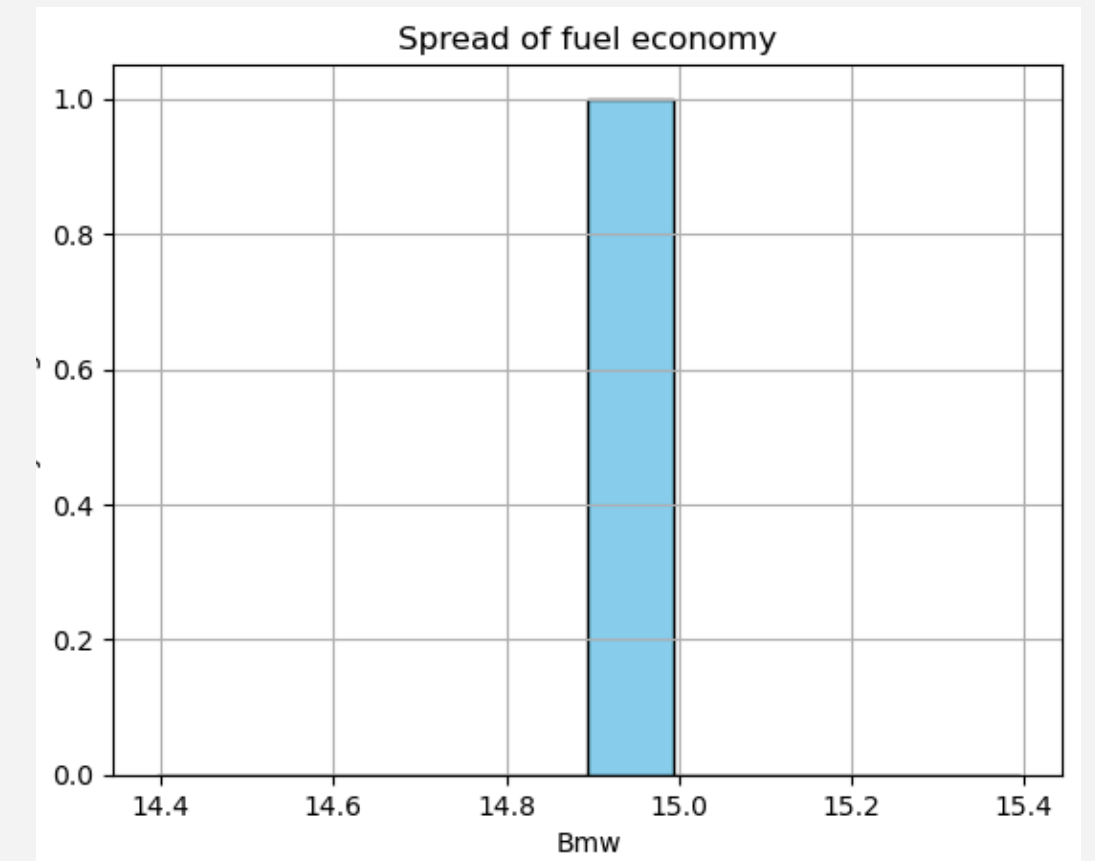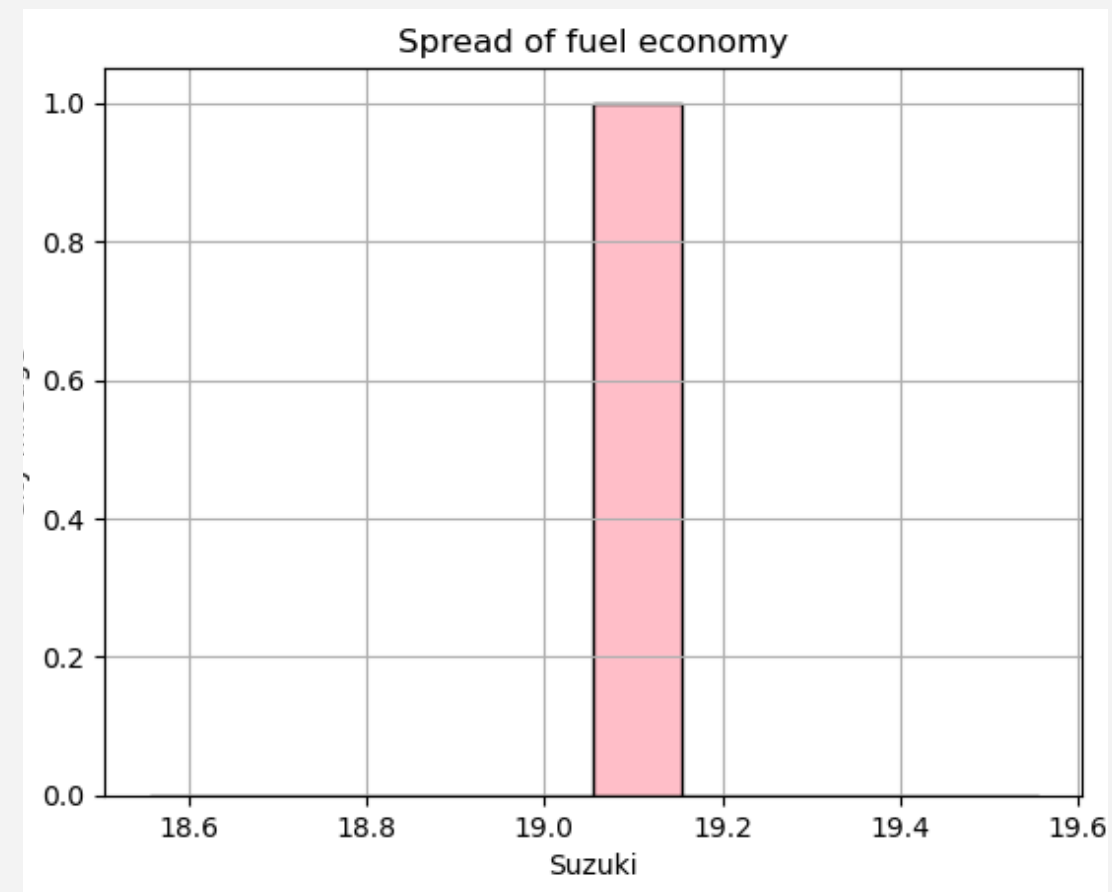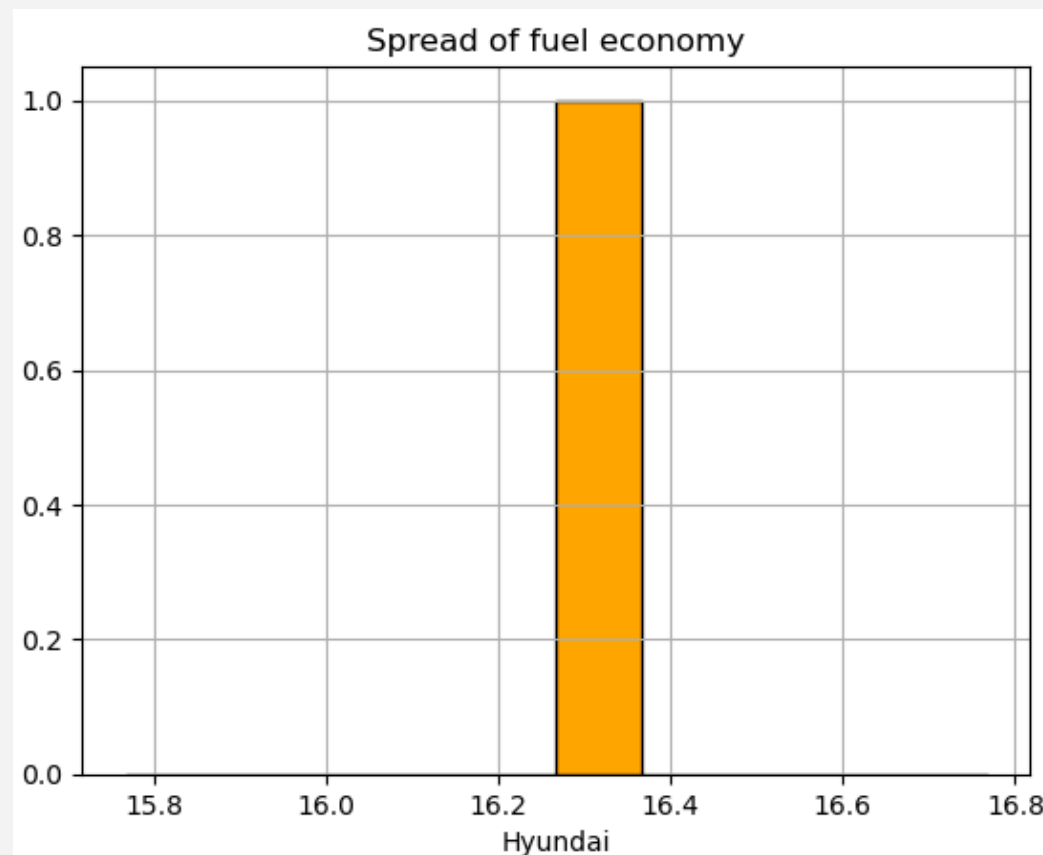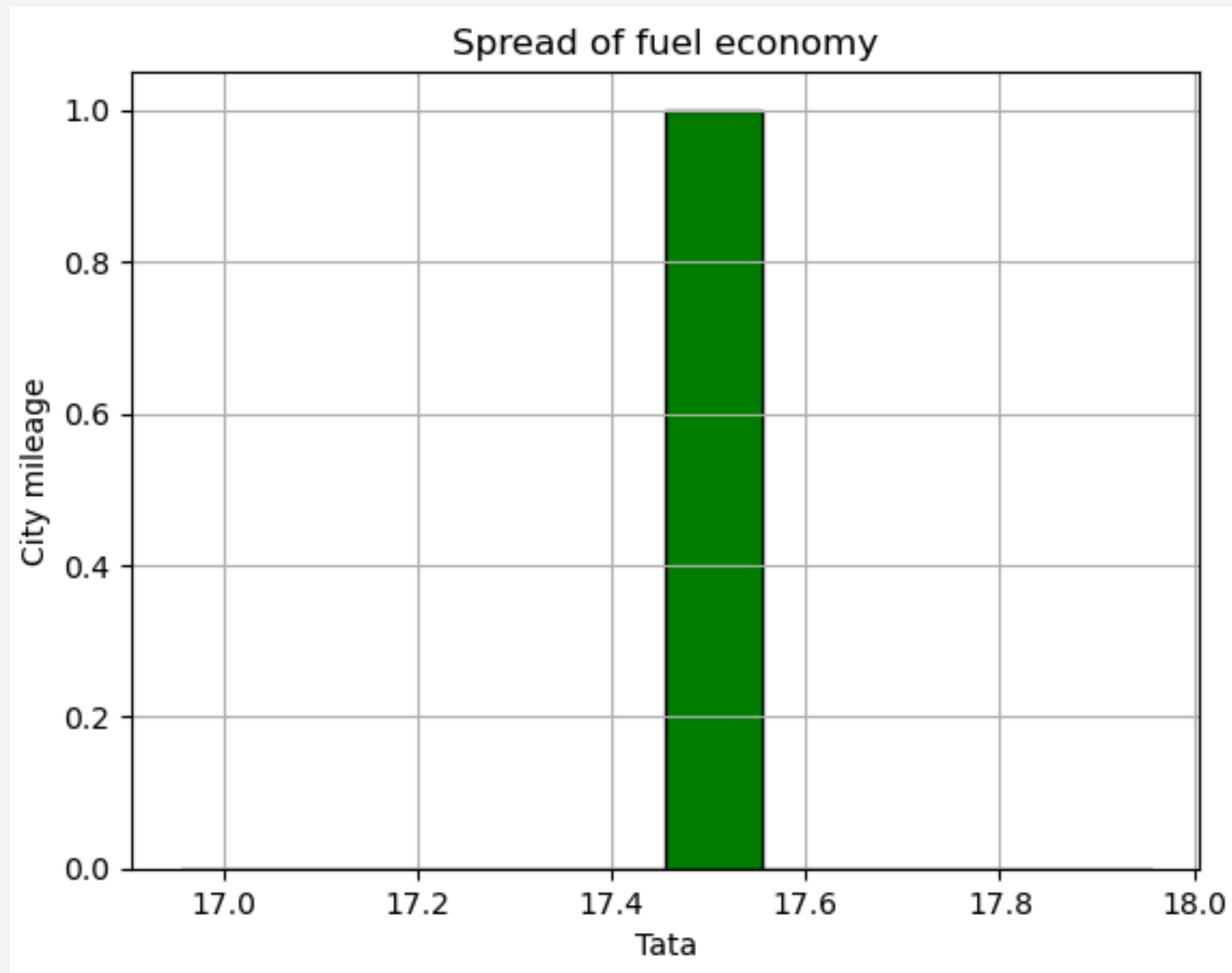
Interpretation:

- **Suzuki** is the First most skewed mileage distribution.
- **Hyundai** is the Second most skewed mileage distribution.
- **Bmw i**s the Third most skewed mileage distribution.
- **Tata** is the Fourth most skewed mileage distribution.

Part 2
User Comfort Exploration

Task 2

Explore seating capacity, central locking, and child safety locks to understand user comfort and family-friendly features

Average Seating Capacity:5.27

Central_Locking:

Yes :1127

Not Available :149

Child_Safety_Locks:

Yes :1201

Not Available :75

Interpretation :

Average Seating Capacity:
- The average seating capacity of 5.27 aligns with consumer expectations for family vehicles, providing adequate room for most families while also considering vehicle design flexibility

.Central Locking:
- The high percentage of cars with central locking indicates that manufacturers are prioritizing convenience and security, which is appealing to a wide range of consumers. The small number of vehicles without this feature may represent older models or budget-oriented options.

Child Safety Locks:
- The very high percentage of vehicles with child safety locks is a positive indicator of safety standards in the automotive industry, showing a commitment to the well-being of child passengers.

Part 2
User Comfort Exploration

Task 3

Investigate the presence of high-speed alerts, seat belt reminders, and door-ajar warnings to assess the integration of safety and convenience features with respect to each feature mentioned above.

Interpretation :

'High-Speed Alert System Count:
High_Speed_Alert_System
Not Available 1068
Yes 208
Seat Belt Remindercount:
Fasten_Seat_Belt_Warning
Yes 1086
Not Available 190
'Door Ajar Warning Count:
Door_Ajar_Warning
Yes 1133
Not Available 143

High-Speed Alert System:
- The high percentage of vehicles without a high-speed alert system (83.6%) indicates that this feature is not widely adopted in the dataset. This could be due to several factors, including cost, target market (e.g., economy cars), or the age of the vehicles. Manufacturers may prioritize other safety features over high-speed alerts.

Seat Belt Reminder:
- The high percentage (85.5%) of cars with seat belt reminders reflects a commitment to safety standards and regulations, emphasizing the importance of seat belt use among passengers. The remaining 14.5% without this feature may include older models or budget-friendly cars.

Door Ajar Warning:
- The presence of a door ajar warning in 88.5% of the vehicles indicates that manufacturers are prioritizing safety by ensuring that drivers are alerted if doors are not securely closed, reducing the risk of accidents.

Conclusion:

The analysis of vehicle data provides valuable insights into key performance metrics, including city mileage and safety features. Here are the main takeaways:

Fuel Efficiency:

Renault stands out as the leader in city mileage, showcasing superior fuel efficiency compared to other manufacturers like Mahindra and Maruti Suzuki. This trend suggests that consumers prioritizing fuel economy may gravitate towards brands offering higher mileage.

Safety Features:

A significant number of vehicles are equipped with essential safety features such as child safety locks, seat belt reminders, and door ajar warnings. This indicates a commitment to passenger safety across the industry. However, the adoption of advanced systems like high-speed alerts remains relatively low, highlighting an opportunity for manufacturers to enhance their safety offerings.

Market Trends:

The data reflects current market preferences for vehicles that balance fuel efficiency and safety. As consumers become more environmentally conscious, manufacturers may need to focus on improving fuel economy alongside integrating advanced safety technologies.

Opportunities for Improvement:

While the data shows a positive trend in both fuel efficiency and safety, there remains room for improvement, particularly in the adoption of advanced safety systems. This could enhance the overall driving experience and address growing consumer concerns regarding safety on the road.

In conclusion, the insights gained from this analysis underscore the importance of fuel efficiency and safety in the automotive market, guiding both manufacturers and consumers toward informed decisions.

Thank You