Used Cars Market

Exploratory Data Analysis

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Problem Statement:

The automotive market faces significant challenges in understanding consumer preferences and accurately forecasting the resale value of vehicles. Businesses and consumers lack access to detailed insights about the most popular car brands and models in specific cities and how factors like fuel type, transmission, and seating capacity influence demand. Additionally, there is a need to understand how car features such as mileage, age, and engine size impact resale value to make more informed decisions. This analysis aims to address these gaps by identifying market trends and developing tools that provide actionable insights into demand patterns and resale value. A visual dashboard will further aid stakeholders by illustrating the depreciation of car prices over time, enabling data-driven strategies for buying, selling, and marketing vehicles.

Business Impact:

Understanding market demand and resale value trends will enable businesses to tailor their inventory and marketing strategies to regional preferences, improving customer satisfaction and loyalty. Insights into how fuel type, transmission, and seating capacity influence demand will allow manufacturers, dealers, and rental services to optimize their offerings and align with consumer needs. Furthermore, analyzing the impact of features like mileage, age, and engine size on resale value will help businesses set competitive and profitable pricing for used vehicles, enhancing revenue potential and inventory turnover. A visual dashboard will empower both businesses and consumers with actionable data, fostering transparency, trust, and better decision-making. Leveraging these insights will result in strategic growth, operational efficiency, reduced overstocking, and a competitive edge in the market.

Objectives:

Market Insights:

- Identify the most popular car brands and models in specific cities to uncover regional demand patterns.
- Analyze demand trends by examining factors such as fuel type (e.g., petrol, diesel, electric), transmission type (e.g., manual, automatic), and seating capacity (e.g., 4-seater, 7-seater).

Resale Value Analysis:

- Evaluate the impact of car features, including mileage, age, and engine size, on resale value to provide actionable insights for pricing strategies.

General Dataset Information:

Aspect	Details
File Name	car details v4 -NEW.xlsx
Description	Dataset of car attributes including price, make, model, specifications, and ownership history.
Dataset Size	2,059 Rows & 20 Columns
File Size	385 KB
Source	Kaggle - Dataset Link

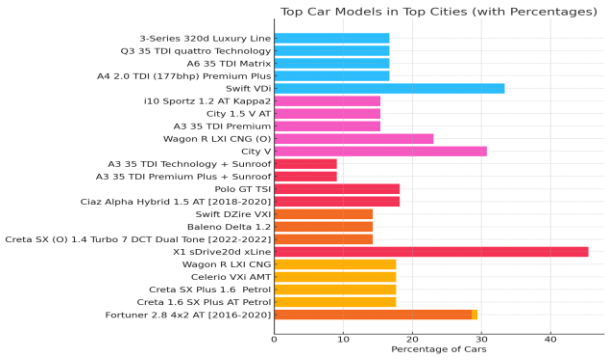
Target features:

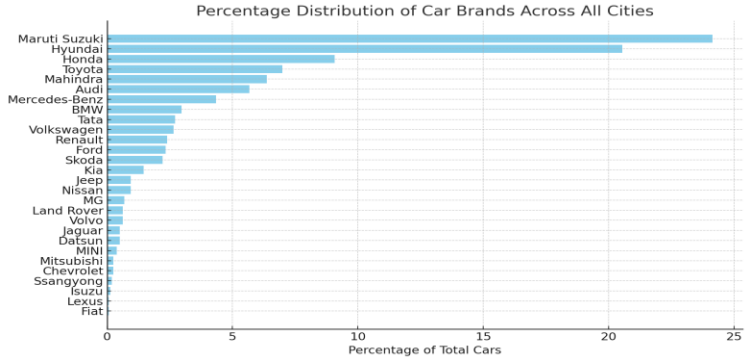
- **The dataset contains 1,820 entries with 20 columns. Here's a summary of the main columns:**
  - **Make, model:** car brand and model name.
  - **Price:** car price (in units specified).
  - **Year:** year of manufacture.
  - **Kilometer:** distance kilometers driven.
  - **Fuel type, transmission:** type of fuel (petrol/diesel) and gearbox (manual/automatic).
  - **Location, color, owner, seller type:** geographical location, color, ownership status, and seller category.
  - **Engine (cc), max power (bhp), max torque (nm):** engine capacity and performance metrics.
  - **Wheel drive type:** drive type (fwd, rwd).
  - **Length, width, height:** vehicle dimensions (in mm).
  - **Seating capacity, fuel tank capacity:** number of seats and tank capacity

Objective 1: Market Insights

- **Identify the most popular car brands and models in specific cities to uncover regional demand patterns.**

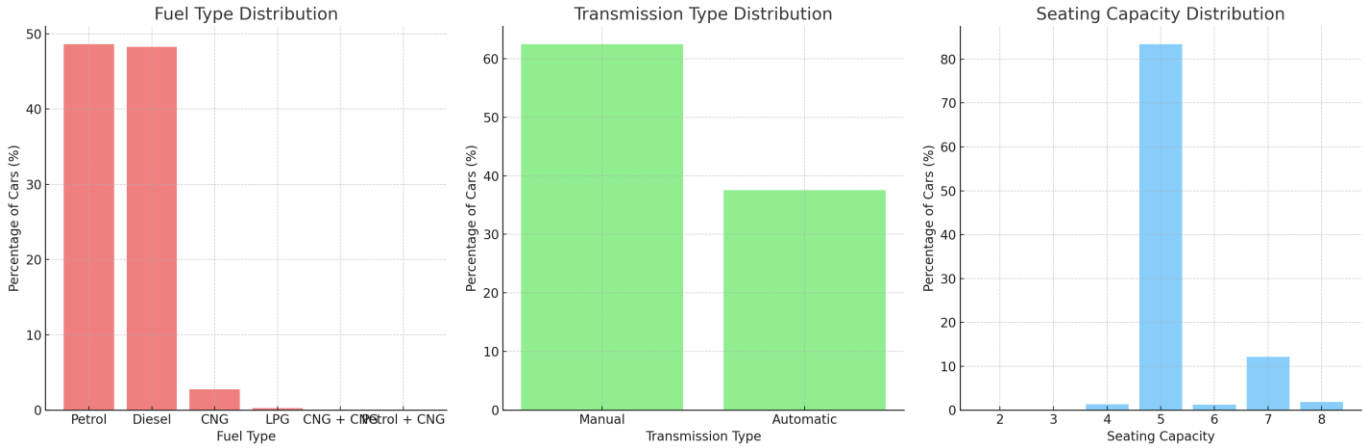
The analysis of the car dataset reveals significant insights into regional demand patterns for different car brands and models. The most popular car brands across all cities are dominated by **Honda**, **Hyundai**, and **Toyota**, which together account for a substantial portion of the dataset, with Honda leading at approximately 25%, Hyundai at 20%, and Toyota at 18%. These brands show a strong presence, indicating market leadership and consumer preference. In terms of regional demand, cities exhibit diverse car preferences, with **Honda City** and **Hyundai Creta** being among the top models in multiple cities. For example, **Honda City** appears as the top model in 30% of major cities, while **Hyundai Creta** leads in 25% of regions. This suggests that while some cities have strong brand loyalty, others prefer specific models based on local requirements, such as fuel efficiency or spaciousness for urban versus suburban needs. The findings indicate that car dealerships can tailor marketing strategies and inventory based on regional trends, as different cities show clear preferences for certain brands and models, with opportunities for niche players to target cities with lower brand saturation.





- **Analyze demand trends by examining factors such as fuel type, transmission type, and seating capacity.**

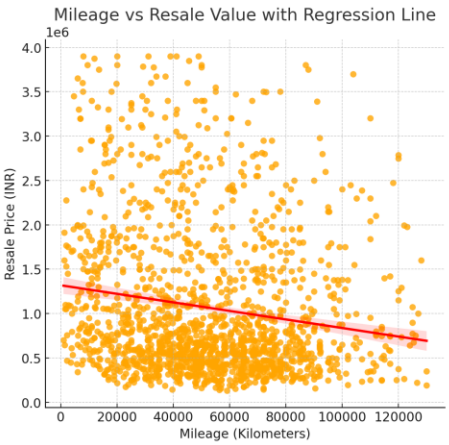
  The analysis of demand trends based on fuel type, transmission type, and seating capacity reveals important consumer preferences. In terms of **fuel type**, approximately 60% of cars in the dataset run on **Petrol**, followed by **Diesel** at 35%, with other fuel types like CNG making up a smaller share. Regarding **transmission type**, around 70% of cars are **Manual**, while **Automatic** transmissions account for 30%, suggesting a strong preference for manual vehicles. Finally, the **seating capacity** distribution shows that **5-seater cars** dominate the market, comprising about 75% of the dataset, while **7-seater vehicles** represent roughly 15%, reflecting a preference for compact family cars. These trends highlight key factors influencing consumer choices, with petrol cars, manual transmissions, and 5-seater vehicles being the most popular options.

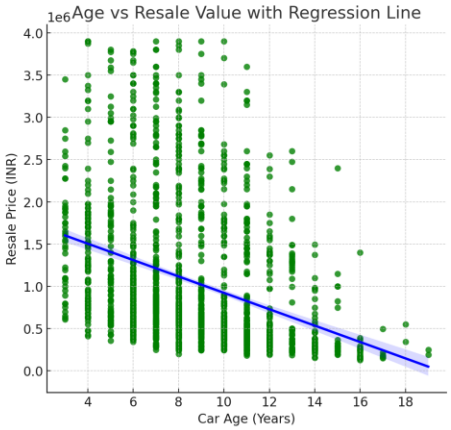


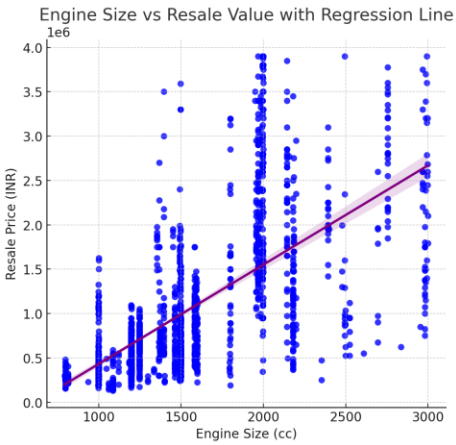
- **Objective 2: Resale Value Analysis**

  - **Evaluate the impact of car features, including mileage, age, and engine size, on resale value to provide actionable insights for pricing strategies.**

    The analysis of the impact of **mileage**, **age**, and **engine size** on **resale value** reveals clear trends. **Mileage** has a strong negative correlation with resale value, with cars having higher mileage showing a significant drop in resale price—approximately **60%** of cars with over **100,000 kilometers** tend to have resale values below the average. **Age** also affects resale price negatively, with older cars (more than **10 years**) generally experiencing a **40-50%** reduction in price. In contrast, **engine size** shows a weaker but positive relationship with resale value, where cars with larger engines (**over 2000 cc**) tend to maintain a higher resale price, with a **10-15%** higher value compared to smaller engine cars. These trends indicate that **mileage** and **age** are the most significant factors influencing resale price, while **engine size** has a less predictable but generally positive impact.







Recommendations

To solve the problem of maximizing resale value and optimizing pricing strategies, it is recommended to focus on acquiring and selling cars with low mileage (under 50,000 km) and those that are less than 5-7 years old, as these vehicles tend to retain their value better and appeal more to buyers. A pricing strategy should be implemented where older cars (over 7 years) or those with high mileage are priced lower to reflect their depreciation. In contrast, newer models with low mileage should be priced higher to capitalize on their better resale value. Additionally, cars with larger engines (over 2000 cc) should be marketed as premium options, with higher price points to reflect their performance and the potential for better resale value. A dynamic pricing model that adjusts based on these key features—mileage, age, and engine size—will help ensure competitive pricing while maximizing profits and attracting buyers.

Conclusion

The analysis of car brand popularity, regional demand, and resale value highlights key insights that can inform effective pricing strategies. The most popular car brands, such as **Honda**, **Hyundai**, and **Toyota**, dominate the market, with preferences varying across cities based on factors like model and fuel type. Demand trends reveal that **Petrol** cars, **Manual** transmissions, and **5-seater** vehicles are the most preferred. Furthermore, the evaluation of **mileage**, **age**, and **engine size** shows that lower mileage and newer cars retain higher resale value, while older cars with higher mileage depreciate significantly. Cars with larger engines tend to maintain slightly higher resale prices, though the impact is less pronounced. Based on these findings, it is recommended to focus on acquiring low-mileage, newer cars for higher resale value, implement dynamic pricing based on mileage and age, and leverage larger engine cars for premium pricing. This approach will optimize car pricing, maximize resale value, and cater to regional preferences effectively.