ANALYZING THE IMPACT OF CAR FEATURES ON PRICE AND PROFITABILITY

BY

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AGENDA

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PROJECT DESCRIPTION

- The automotive industry has been rapidly evolving and it has become important to understand the factors that drive consumer demand for cars.
- For the given dataset, as a Data Analyst, the client has asked How can a car manufacturer optimize pricing and product development decisions to maximize profitability while meeting consumer demand.
- The goal of this project is to use data analysis techniques such as regression analysis and market segmentation to provide insights for the manufacturer to help improve its competitiveness in the market and increase its profitability over time.

APPROACH

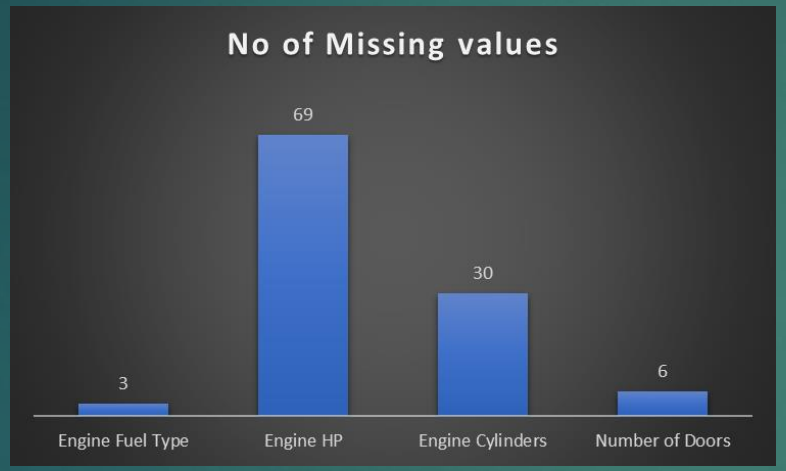
- The given dataset Car_data is downloaded and using excel the dataset is cleaned and thoroughly understood.
- The questions posed by the client are analysed and required insights are gathered using data analysis techniques.
- Along with that, an interactive dashboard as per the client requirements is also created.

TECH-STACK USED

- Microsoft Excel 2022 is used for data cleaning, analysing and visualisation. Dashboard is also created using excel.
- Microsoft PowerPoint for making presentation.

Data Cleaning

- The dataset contains 16 columns and 11915 rows. Among these 715 duplicate values were removed and 4 columns contained missing values.



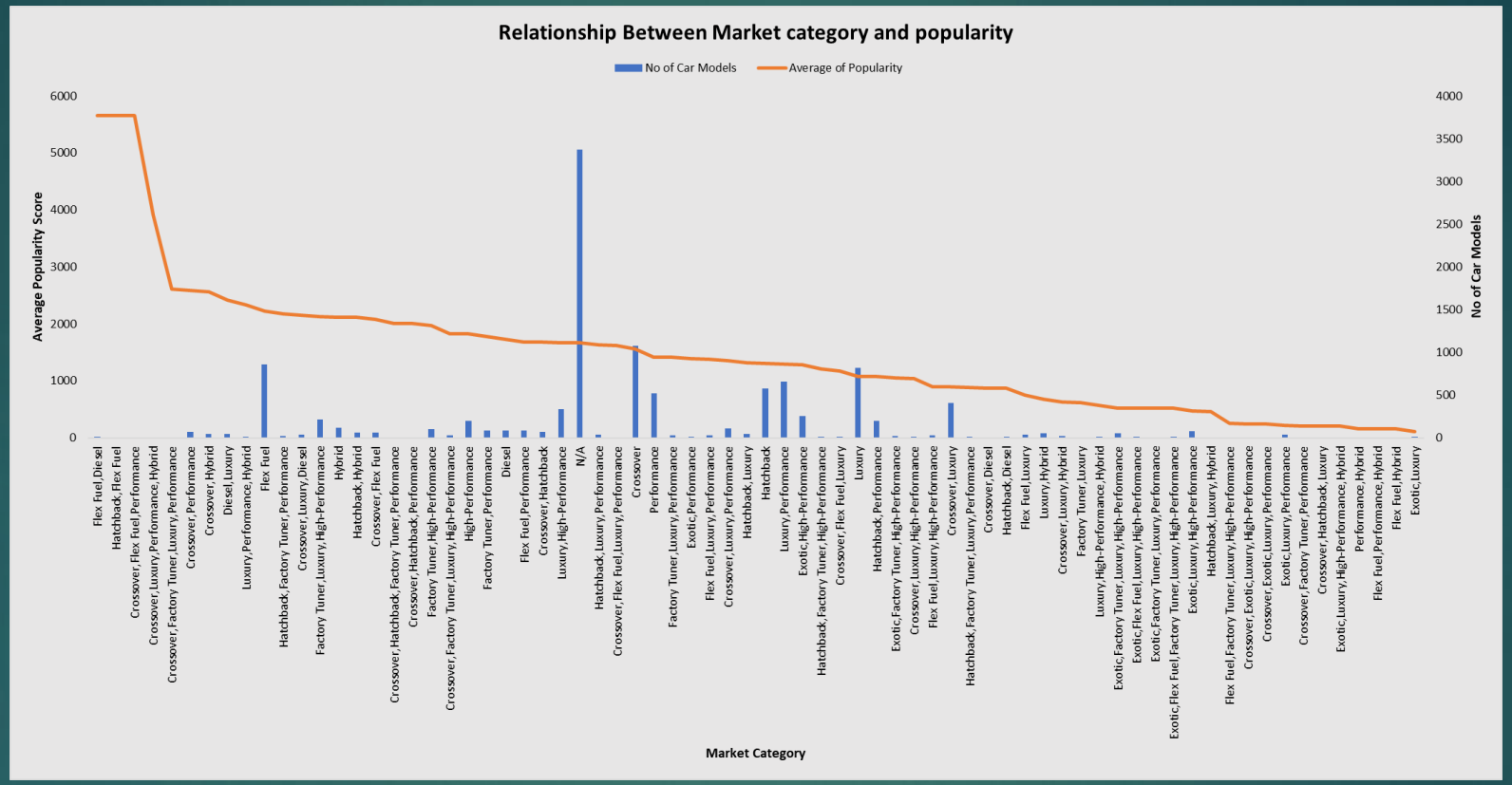
- The rows with null values for engine fuel type are dropped.
- The null values in engine cylinders column are for electric vehicles and Mazda RX series, which does not have any cylinders, so these values are replaced as 0.
- The missing values in number of doors are for Tesla Model S and Ferrari FF, and these values are replaced as 4 and 2 respectively using pivot table analysis.

- The missing values in Engine HP were of these models;

Make	Model	Engine HP
Toyota	RAV4 EV	176
Tesla	Model S	360
Nissan	Leaf	107
Mitsubishi	i-MiEV	66
Mercedes-Benz	M-Class	356
Lincoln	Continental	288
Lincoln	MKZ	228
Kia	Soul EV	109
Honda	Fit EV	123
Ford	Escape	168
Ford	Focus	143
Ford	Freestar	201/193
Fiat	500e	111
Chevrolet	Impala	305

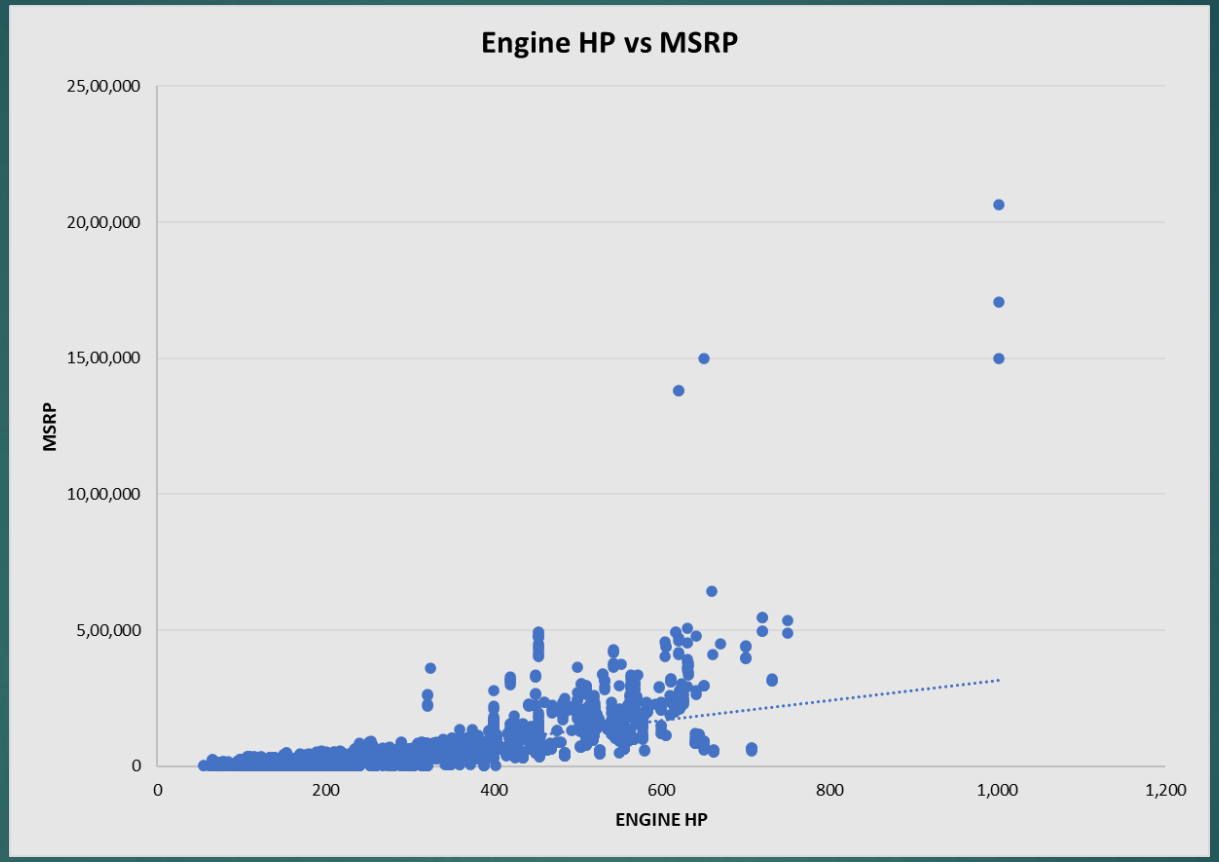
- The missing values were replaced using pivot table analyse and for those models whose data were not available was imputed through data obtained from online.
- The cleaned dataset contains 16 columns and 11199 rows.

Q.1) How does the popularity of a car model vary across different market categories?



- Car Models in the categories “Flex Fuel, Diesel” , “Hatchback, Flex Fuel” and “Crossover, Flex Fuel, Performance” have the highest average popularity scores.
- Categories related to performance tends to have above average popularity scores indicating a strong interest in performance-oriented car models.

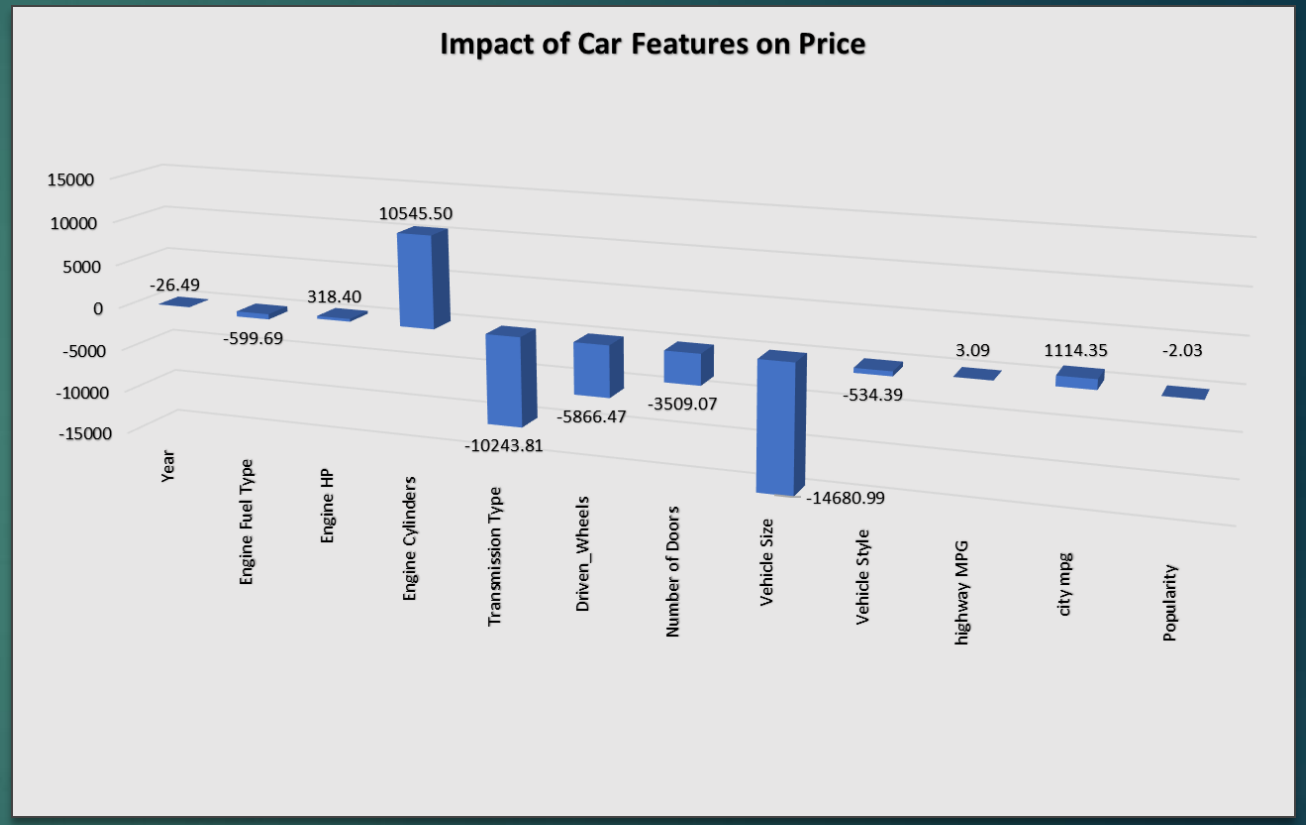
Q.2) What is the relationship between a car's engine power and its price?



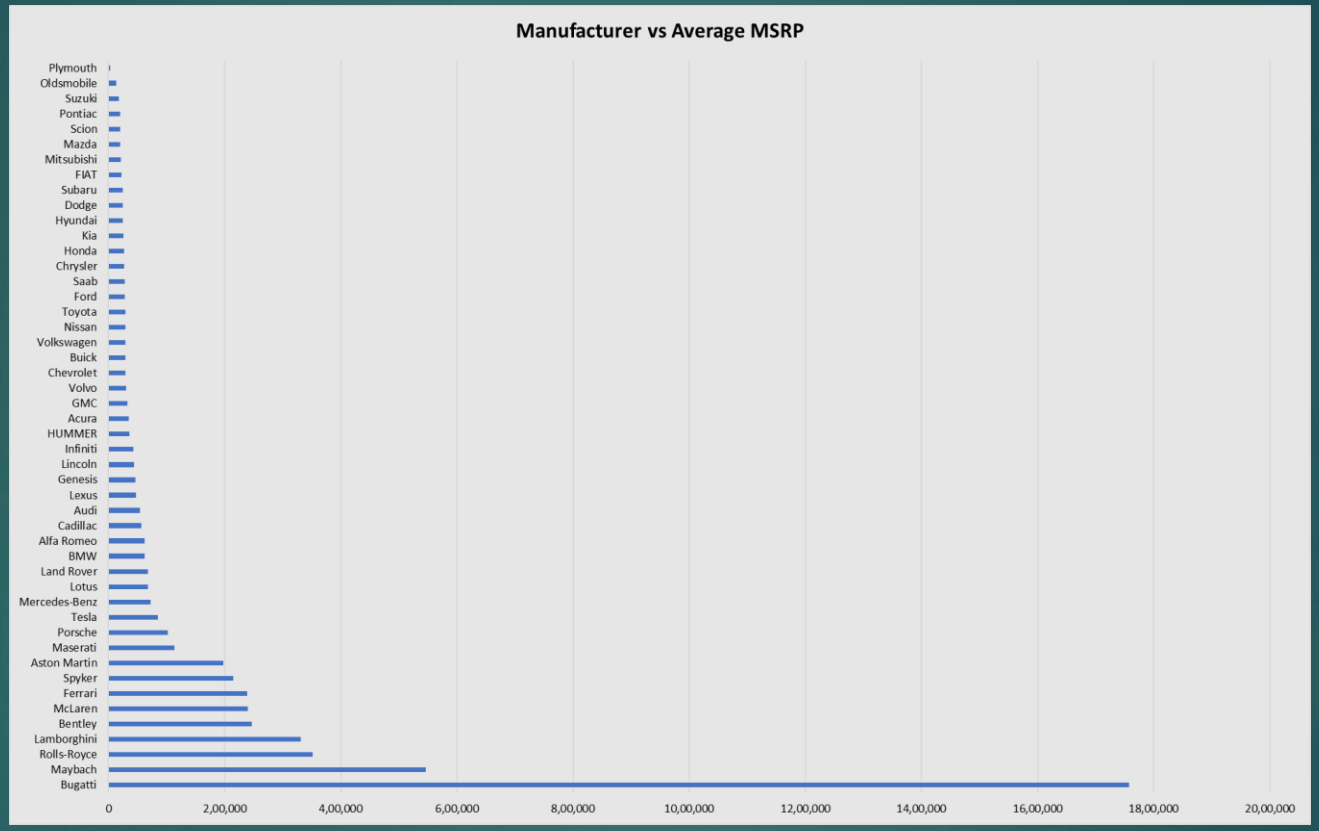
- The Positive slope in the graph suggests that on average, the price of a car tends to increase as the Engine horsepower increases.
- An R^2 value of 0.433 indicates a moderately positive relationship between the two.

Q.3) Which car features are most important in determining a car's price?

- The positive coefficients of City MPG, Highway MPG and Engine HP suggests that as these factors increases the price of the car increases as well. The extreme high coefficient of Engine Cylinders indicates that cars with more cylinders have significantly higher prices which offer higher performance.
- The strong negative coefficients of features such as vehicle size suggests that compact vehicles have lower prices and large vehicles have higher and that of transmission type suggest that certain type such as manual have lower price and automated manual have high prices.

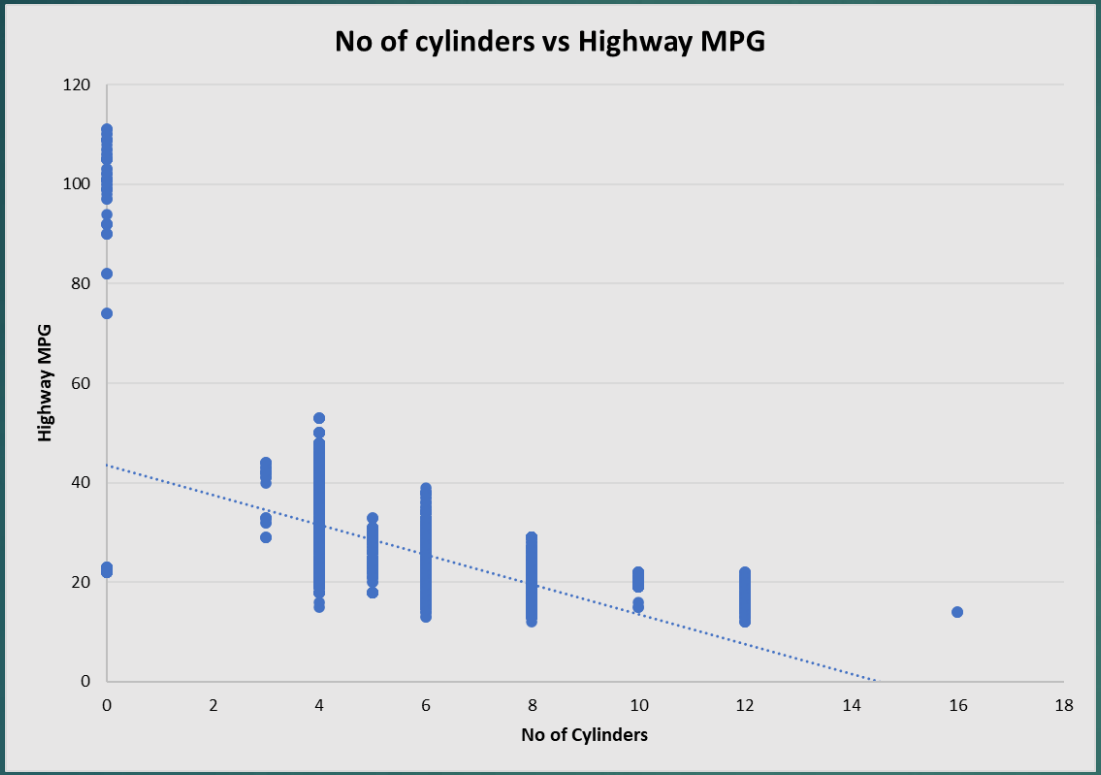


Q.4) How does the average price of a car vary across different manufacturers?



- The top 3 Manufacturers with highest average MSRP are Luxury brands such as Bugatti, Maybach and Rolls-Royce and among them Bugatti have an extremely high average MSRP.
- It can be seen that most brands have an average MSRP around 20,000-90,000 USD.

Q.5) What is the relationship between fuel efficiency and the number of cylinders in a car's engine?



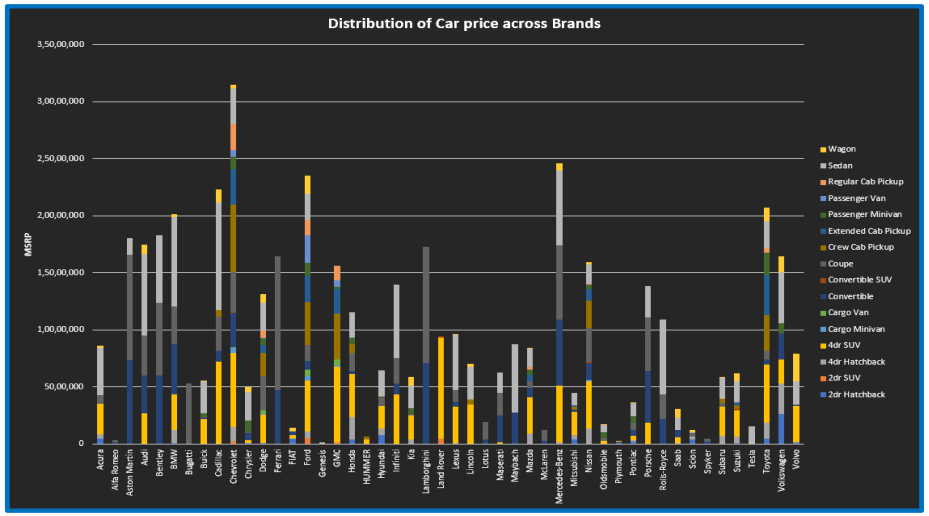
Correlation Coefficient= -0.647

- The negative slope of the trendline as well as the correlation coefficient indicates a strong negative relationship between the number of cylinders of a car and its highway MPG.
- It suggests that as the number of cylinders increases the highway MPG decreases significantly.
- The graph also indicates that cars with 0 cylinders, i.e., electric vehicles have more highway MPG than the rest.

CAR FEATURES ANALYSIS DASHBOARD

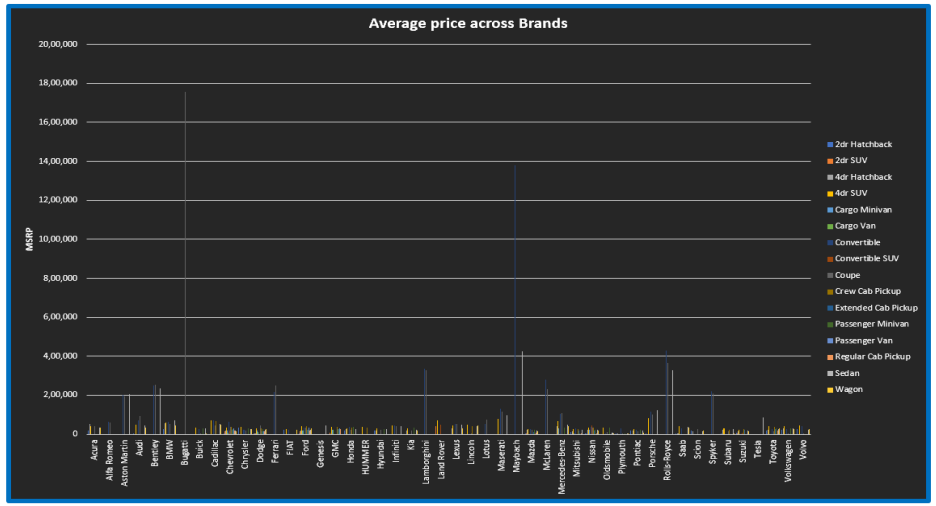
Brand

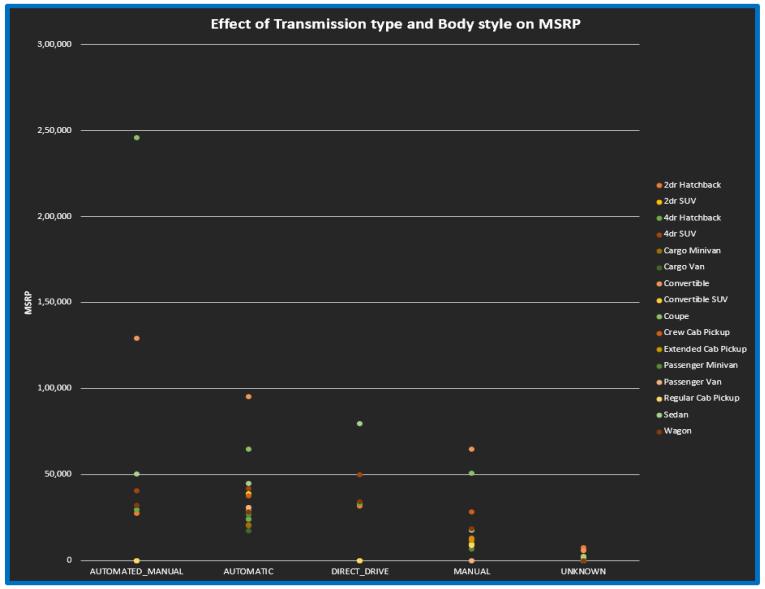
Acura	Alfa Romeo	Aston Martin	Audi	Bentley	BMW	Bugatti	Buick	Cadillac	Chevrolet	Chrysler	Dodge
Ferrari	FIAT	Ford	Genesis	GMC	Honda	HUMMER	Hyundai	Infiniti	Kia	Lamborghini	Land Rover
Lexus	Lincoln	Lotus	Maserati	Maybach	Mazda	McLaren	Mercedes-Benz	Mitsubishi	Nissan	Oldsmobile	Plymouth
Pontiac	Porsche	Rolls-Royce	Saab	Scion	Spyker	Subaru	Suzuki	Tesla	Toyota	Volkswagen	Volvo

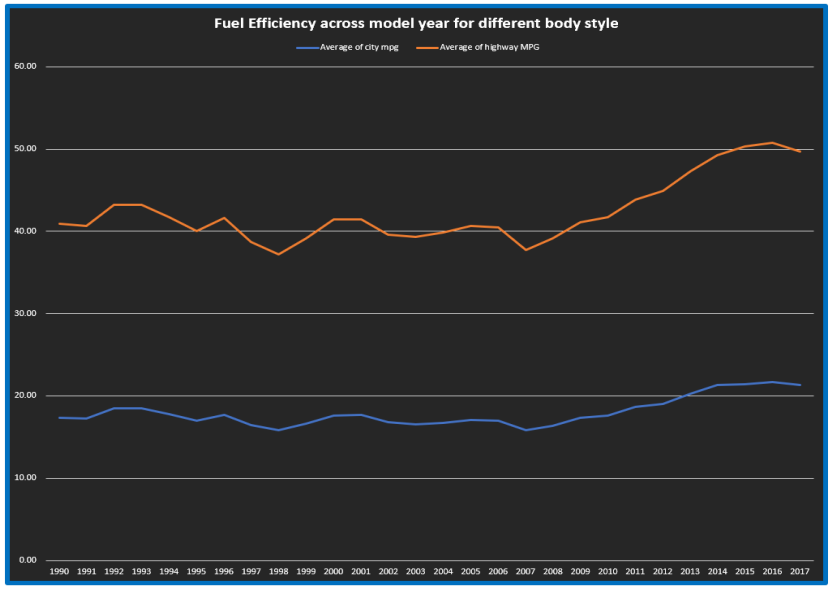


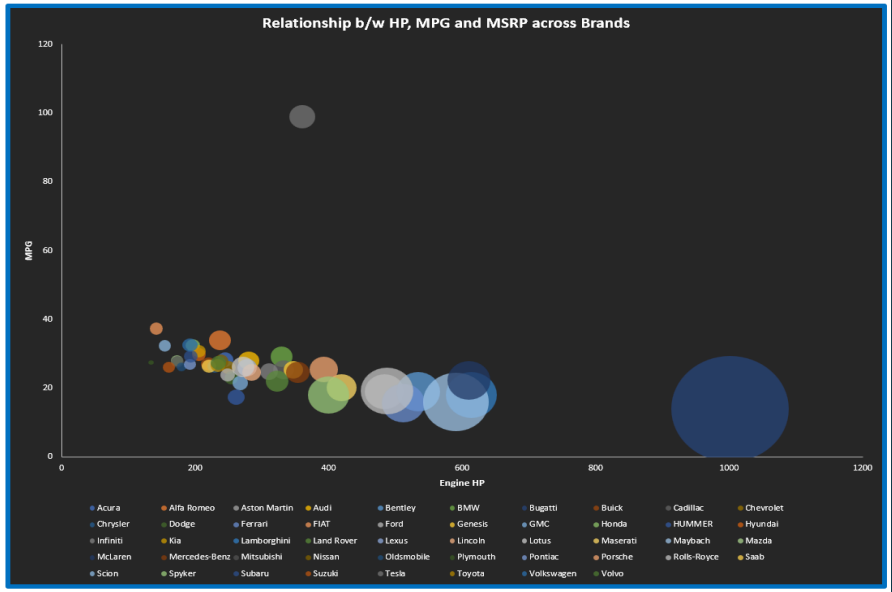
Vehicle Style

2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV
Coupe
Crew Cab Pickup
Extended Cab Pickup
Passenger Minivan
Passenger Van
Regular Cab Pickup
Sedan
Wagon









INSIGHTS

The key insights obtained from the analysis are;

- Categories related to performance tends to have above average popularity scores, indicating a strong interest in performance-oriented car models.
- Flex fuel and Diesel categories have the highest average popularity, with an average popularity score of 5657.
- The price of a car increases as the engine power increases.
- Bugatti has the highest average MSRP and most of the brands produce cars that falls into average MSRP range of 20,000- 90,000 USD.
- It was analysed that as the number of cylinders increases, highway MPG decreases significantly. It was also found that electric cars have the highest MPG.
- Older car models tends to be more affordable and size of the car significantly impacts its pricing.

RESULTS

- The insights gathered from this project helps manufacturers to identify the trends and patterns of features that affect the pricing of a car.
- This project helped me as a data analyst to use various techniques like regression analysis and pivot table analysis to gain valuable insights from the dataset.
- It also helped to create an interactive dashboard that analyses the questions posed by the client.
- The analysis file along with the dashboard is provided in the link below. The file should be downloaded and viewed in Microsoft Excel.
- Drive link for excel file -https://docs.google.com/spreadsheets/d/1mexWK72VbcqT-GTGKSR6Jn_jk6EWK7bE/edit?usp=sharing&ouid=113891162099459296915&rtpof=true&sd=true