Impact of Car Features

Project Description

The purpose of this project is to analyse the impact of car features on price and profitability in the automotive industry. By examining a dataset containing information on various car models and their specifications, I aim to provide insights that can help car manufacturers optimize their pricing and product development decisions to maximize profitability while meeting consumer demand.

The dataset includes variables such as car make, model, year, fuel type, engine power, transmission, wheels, number of doors, market category, size, style, estimated miles per gallon, popularity, and manufacturer's suggested retail price (MSRP). By analysing this dataset, I can gain insights into trends, relationships, and patterns that can inform decision-making.

Approach

To address the business problem, I will employ various data analysis techniques in Excel, including descriptive statistics, visualization, and regression analysis. I will clean and preprocess the dataset to ensure accurate and reliable results. Our analytical methods will include pivot tables, combo charts, scatter charts with trendlines, regression analysis, bar charts, stacked bar charts, correlation analysis, and line charts. These techniques will help to explore the relationships between car features, market categories, popularity, engine power, price, fuel efficiency, and manufacturers.

Tech-Stack Used

In this project, I will utilize Excel as our primary tool for data analysis and visualization. Microsoft Excel (2021) offers powerful functionalities such as pivot tables, charts, and regression analysis, making it suitable for exploring and analyzing the given dataset. I may also use additional Excel features such as filters and slicers to create an interactive dashboard. A choice of Excel is driven by its wide-spread availability, ease of use, and suitability for the given tasks.

Insights

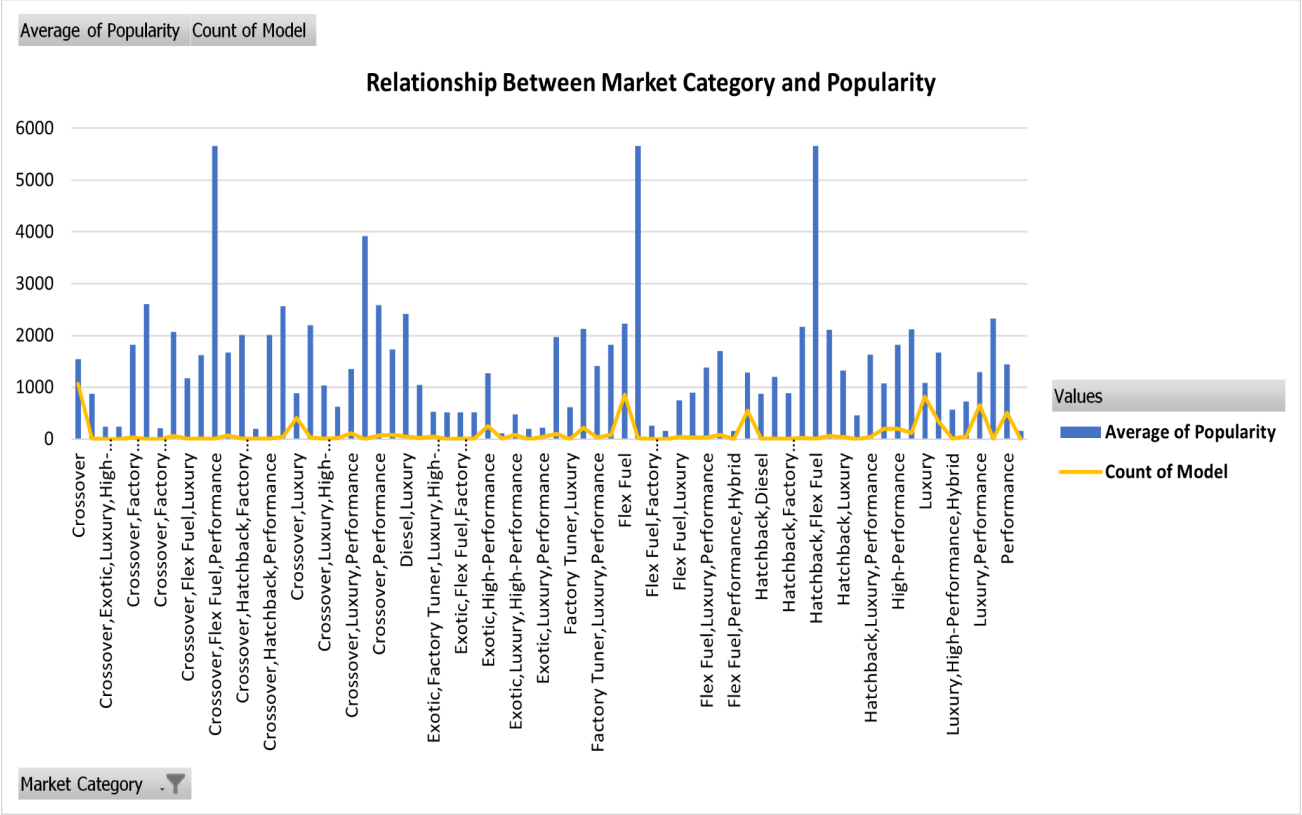
Tasks: Analysis

Insight Required: How does the popularity of a car model vary across different market categories?

- Task 1. A: Create a pivot table that shows the number of car models in each market category and their corresponding popularity scores.

Popularity of Car Model		
Market Categories	Average of Popularity	Count of Model
Hatchback,Flex Fuel	5657	7
Flex Fuel,Diesel	5657	16
Crossover,Flex Fuel,Performance	5657	6
Crossover,Luxury,Performance,Hybrid	3916	2
Crossover,Factory Tuner,Luxury,Performance	2607.4	5
Crossover,Performance	2585.956522	69
Crossover,Hybrid	2563.380952	42
Luxury,Performance,Hybrid	2333.181818	11
Diesel,Luxury	2275	51
Flex Fuel	2217.302752	872
Crossover,Luxury,Diesel	2195.848485	33
Hatchback,Factory Tuner,Performance	2159.045455	22
Factory Tuner,Luxury,High-Performance	2133.367442	215
Hatchback,Hybrid	2121.25	72
Hybrid	2105.569106	123
Crossover,Flex Fuel	2073.75	64
Crossover,Hatchback,Factory Tuner,Performance	2009	6
Crossover,Hatchback,Performance	2009	6
Factory Tuner,High-Performance	1941.415094	106
Crossover,Factory Tuner,Luxury,High-Performance	1823.461538	26
High-Performance	1821.447236	199
Factory Tuner,Performance	1733.101124	89
Diesel	1730.904762	84
Flex Fuel,Performance	1702.358025	81
Crossover,Hatchback	1675.694444	72
Luxury,High-Performance	1668.017964	334
Crossover,Flex Fuel,Luxury,Performance	1624	6
Hatchback,Luxury,Performance	1566.131579	38
Crossover	1529.030825	1103
Factory Tuner,Luxury,Performance	1413.419355	31
Flex Fuel,Luxury,Performance	1380.071429	28
Hatchback,Luxury	1379.5	46
Performance	1371.080479	584
Crossover,Luxury,Performance	1344.849558	113
Hatchback	1292.998371	614
Luxury,Performance	1292.615156	673
Exotic,High-Performance	1261.571429	252
Hatchback,Factory Tuner,High-Performance	1205.153846	13
Crossover,Flex Fuel,Luxury	1173.2	10
Luxury	1107.553467	851
Exotic,Factory Tuner,High-Performance	1046.380952	21
Hatchback,Performance	1039.646825	252
Crossover,Luxury,High-Performance	1037.222222	9
Hatchback,Factory Tuner,Luxury,Performance	886.8888889	9
Crossover,Luxury	884.5487805	410
Flex Fuel,Luxury,High-Performance	878.9090909	33
Hatchback,Diesel	873	14
Crossover,Diesel	873	7
Flex Fuel,Luxury	746.5384615	39
Luxury,Hybrid	724.6875	48
Crossover,Luxury,Hybrid	630.9166667	24
Factory Tuner,Luxury	617	2
Luxury,High-Performance,Hybrid	568.8333333	12
Exotic,Flex Fuel,Factory Tuner,Luxury,High-Performance	520	13
Exotic,Flex Fuel,Luxury,High-Performance	520	11
Exotic,Factory Tuner,Luxury,Performance	520	3
Exotic,Factory Tuner,Luxury,High-Performance	517.5384615	52
Exotic,Luxury,High-Performance	467.0759494	79
Hatchback,Luxury,Hybrid	454	3
Flex Fuel,Factory Tuner,Luxury,High-Performance	258	1
Crossover,Exotic,Luxury,High-Performance	238	1
Crossover,Exotic,Luxury,Performance	238	1
Exotic,Luxury,Performance	217.0277778	36
Crossover,Factory Tuner,Performance	210	4
Crossover,Hatchback,Luxury	204	7
Exotic,Luxury,High-Performance,Hybrid	204	1
Flex Fuel,Hybrid	155	2
Performance,Hybrid	155	1
Flex Fuel,Performance,Hybrid	155	2
Exotic,Luxury	112.6666667	12

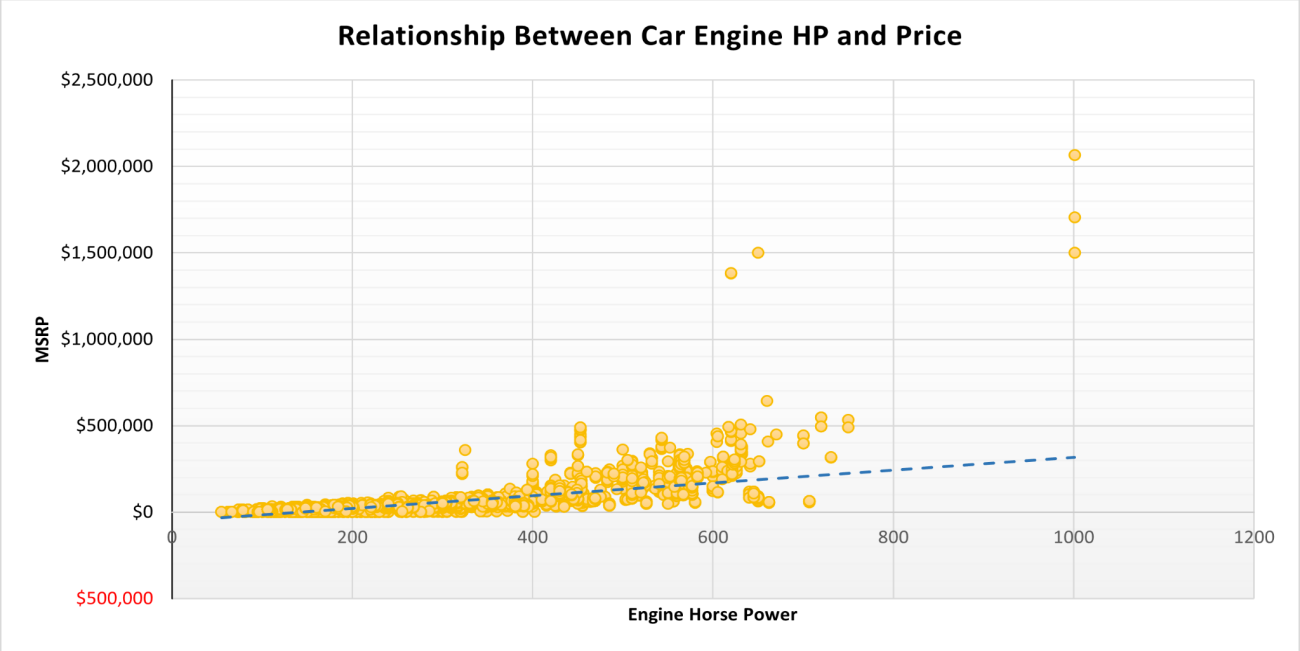
- Task 1. B: Create a combo chart that visualizes the relationship between market category and popularity.



Insight: - Crossover, flex fuel, diesel, hatchback, and performance are the most popular market categories for car models.

Insight Required: What is the relationship between a car's engine power and its price?

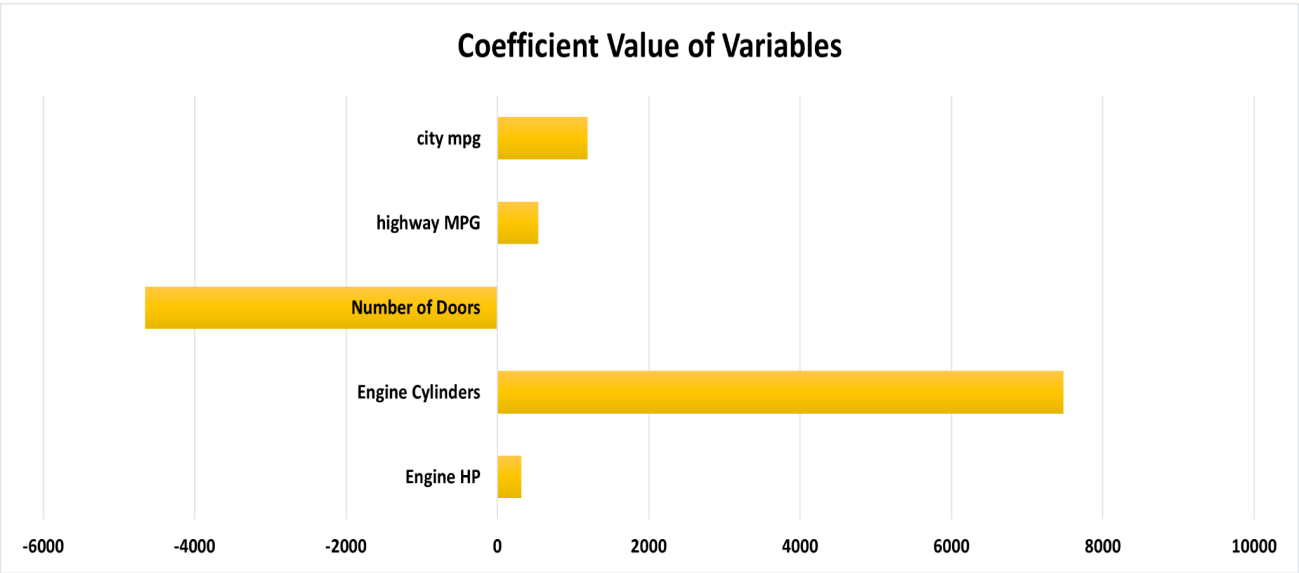
- Task 2: Create a scatter chart that plots engine power on the x-axis and price on the y-axis. Add a trendline to the chart to visualize the relationship between these variables.



Insight: - If the power of the engine increases then the price will also increase. So, We can have a positive relationship between both of them.

Insight Required: Which car features are most important in determining a car's price?

- Task 3: Use regression analysis to identify the variables that have the strongest relationship with a car's price. Then create a bar chart that shows the coefficient values for each variable to visualize their relative importance.



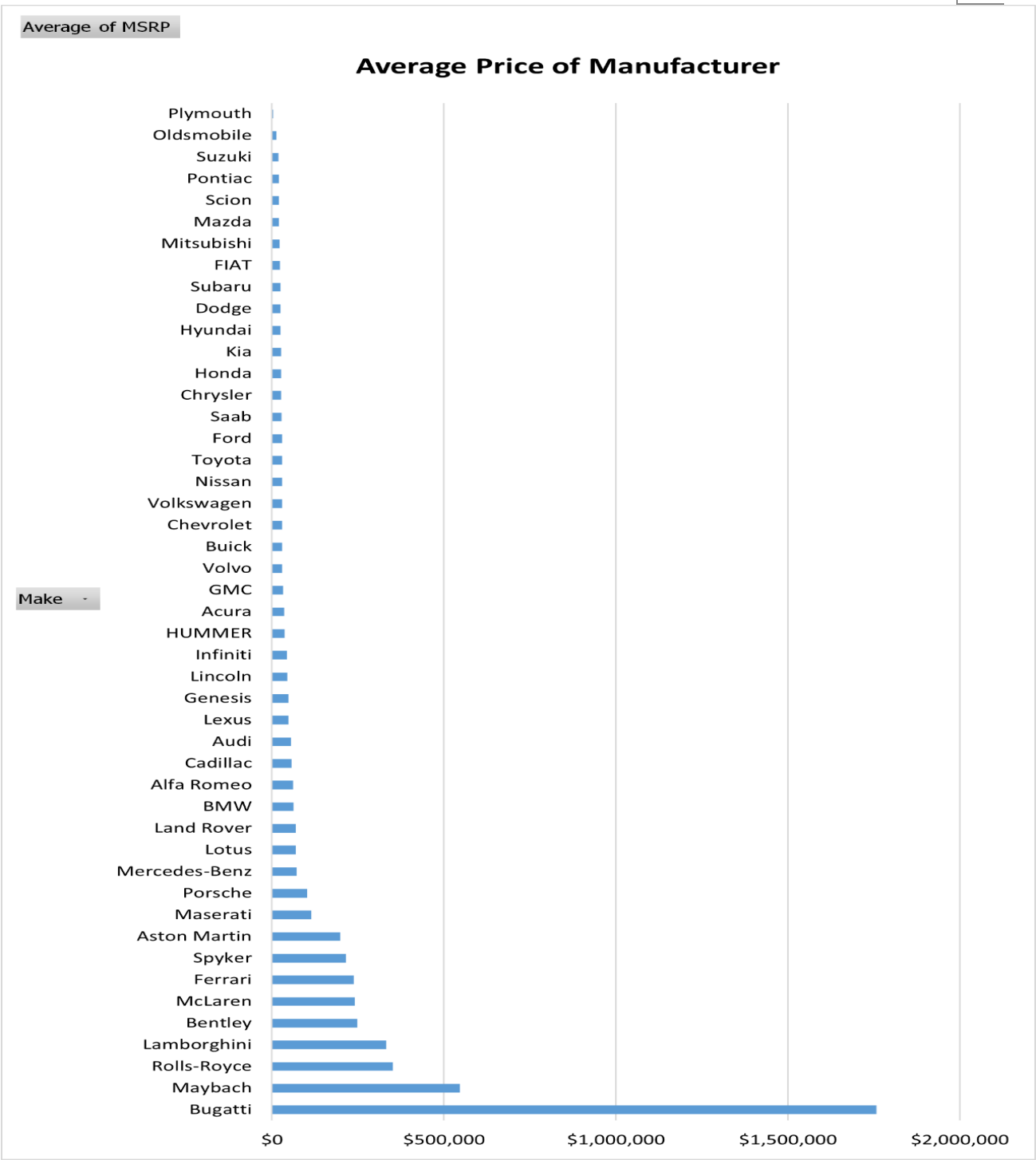
Insight: - Engine cylinders are one of the most important features that determine the price of a car.

Insight Required: How does the average price of a car vary across different manufacturers?

●Task 4. A: Create a pivot table that shows the average price of cars for each manufacturer.

Manufacturer	Average Price
Bugatti	1757223.667
Maybach	546221.875
Rolls-Royce	351130.6452
Lamborghini	331567.3077
Bentley	247169.3243
McLaren	239805
Ferrari	237383.8235
Spyker	213323.3333
Aston Martin	197910.3763
Maserati	114207.7069
Porsche	101622.3971
Mercedes-Benz	71537.80966
Lotus	69188.27586
Land Rover	67823.21678
Alfa Romeo	61600
BMW	61546.76347
Cadillac	56231.31738
Audi	53452.1128
Lexus	47549.06931
Genesis	46616.66667
Lincoln	42494.37179
Infiniti	42394.21212
HUMMER	36464.41176
Acura	34887.5873
GMC	30493.29903
Toyota	28946.15343
Volvo	28541.16014
Nissan	28513.36679
Chevrolet	28273.35695
Buick	28206.61224
Volkswagen	28076.2
Saab	27413.5045
Ford	27393.42051
Chrysler	26722.96257
Honda	26629.81879
Kia	25112.38938
Subaru	24827.50391
Hyundai	24597.0363
Dodge	22390.05911
FIAT	22206.01695
Mitsubishi	21215.47143
Scion	19932.5
Mazda	19719.05707
Pontiac	19321.54839
Suzuki	17907.20798
Oldsmobile	11542.54
Plymouth	3122.902439

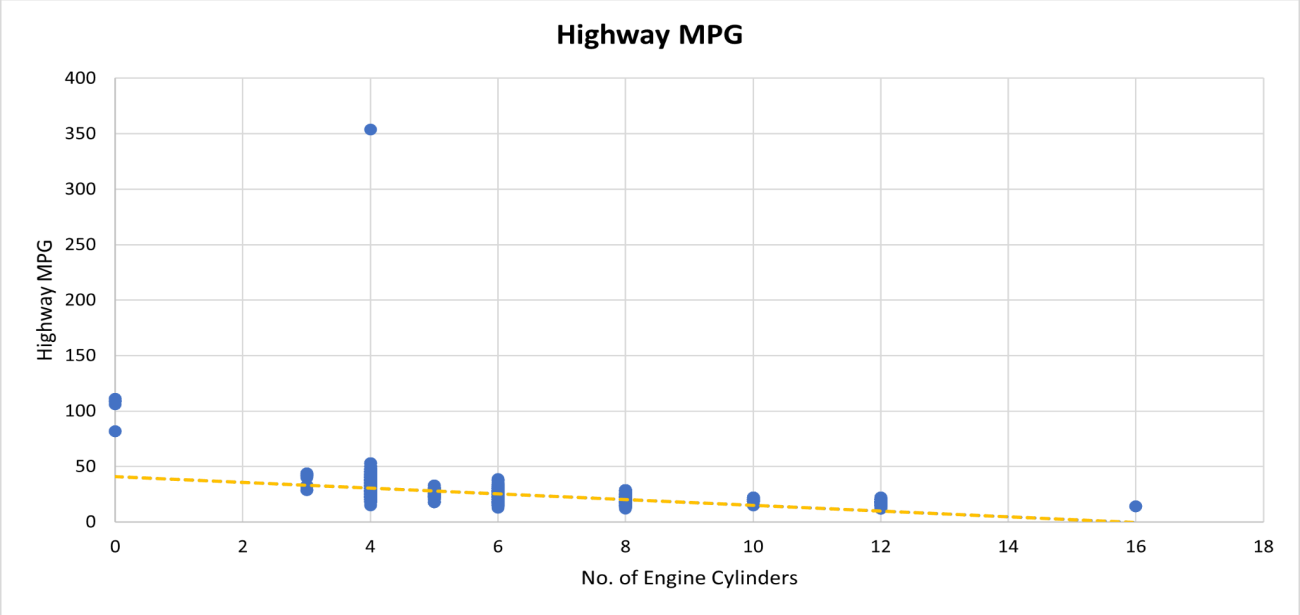
●Task 4. B: Create a bar chart or a horizontal stacked bar chart that visualizes the relationship between the manufacturer and the average price.



Insight: - The Bugatti has the highest average price and the Plymouth has the lowest average price.

Insight Required: What is the relationship between fuel efficiency and the number of cylinders in a car's engine?

- Task 5. A: Create a scatter plot with the number of cylinders on the x-axis and highway MPG on the y-axis. Then create a trendline on the scatter plot to visually estimate the slope of the relationship and assess its significance.



- Task 5. B: Calculate the correlation coefficient between the number of cylinders and highway MPG to quantify the strength and direction of the relationship.

Correlation Coefficient	-0.62032

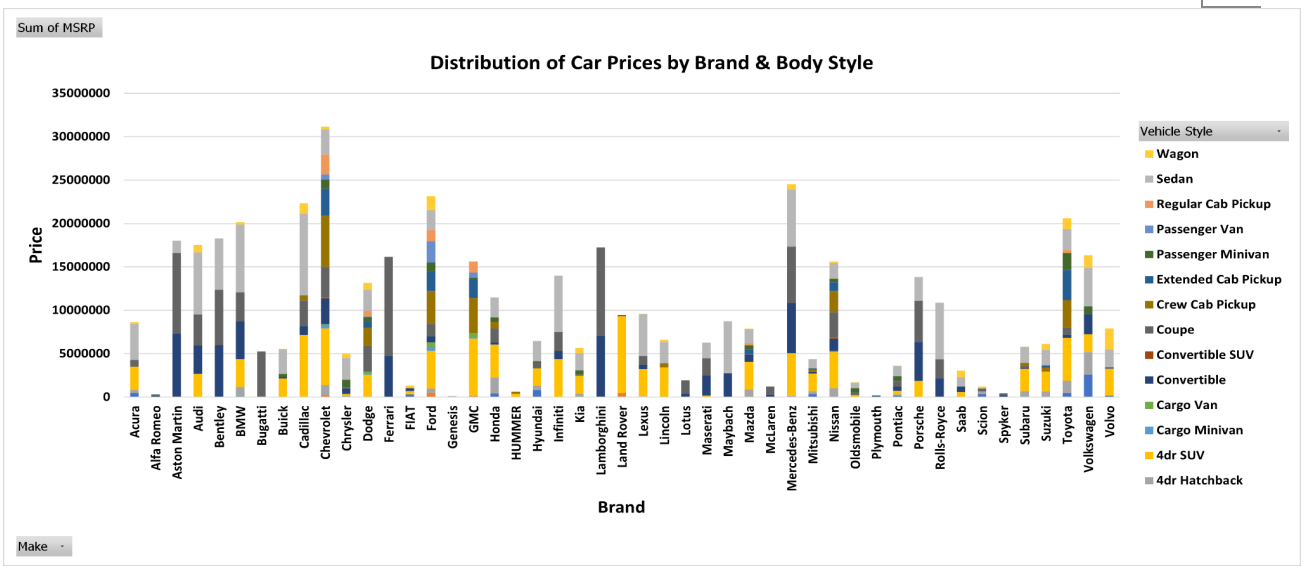
Insight: - As we can see here if the number of cylinders increases then the highway mpg will decrease. So, we can say that there is a negative relationship between both of them.

Note: - Here is the correlation coefficient between the number of cylinders and highway MPG the value is -0.620323148

Click here to view My Analysis File.

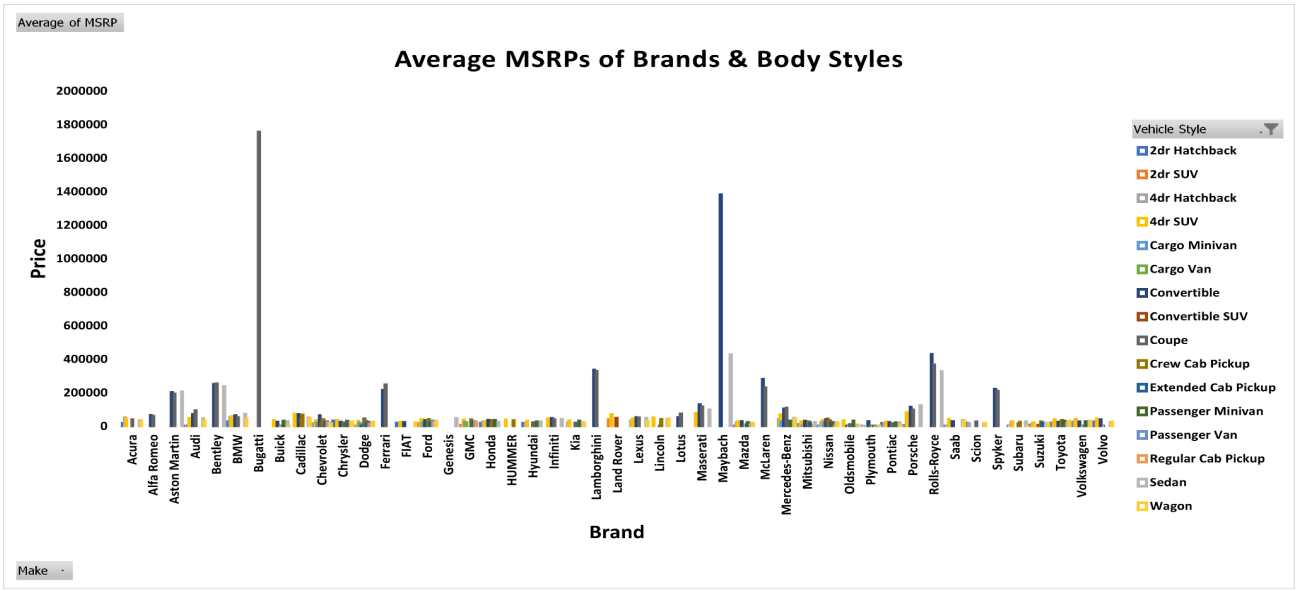
Tasks: Building the Dashboard

Task 1: How does the distribution of car prices vary by brand and body style?



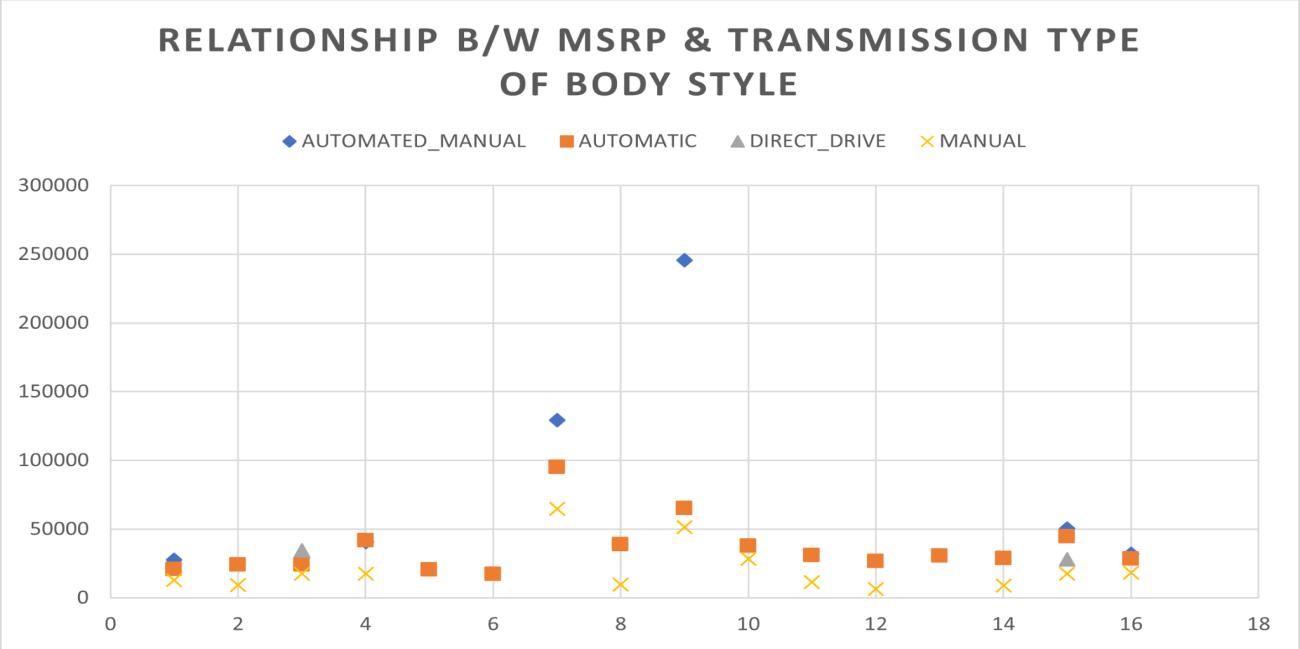
Insight: - Chevrolet has the highest price distribution by body style.

Task 2: Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?



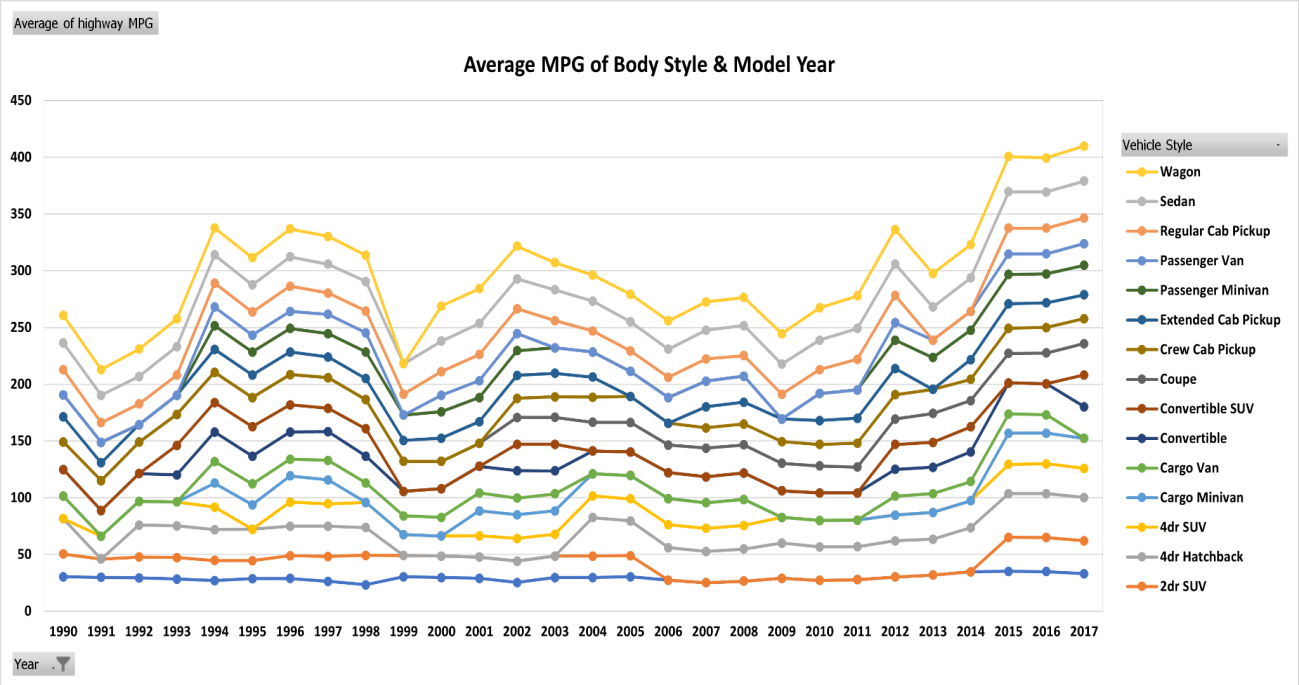
Insight: - Bugatti has the highest average MSRP and Plymouth has the lowest average MSRP.

Task 3: How do the different features such as transmission type affect the MSRP, and how does this vary by body style?

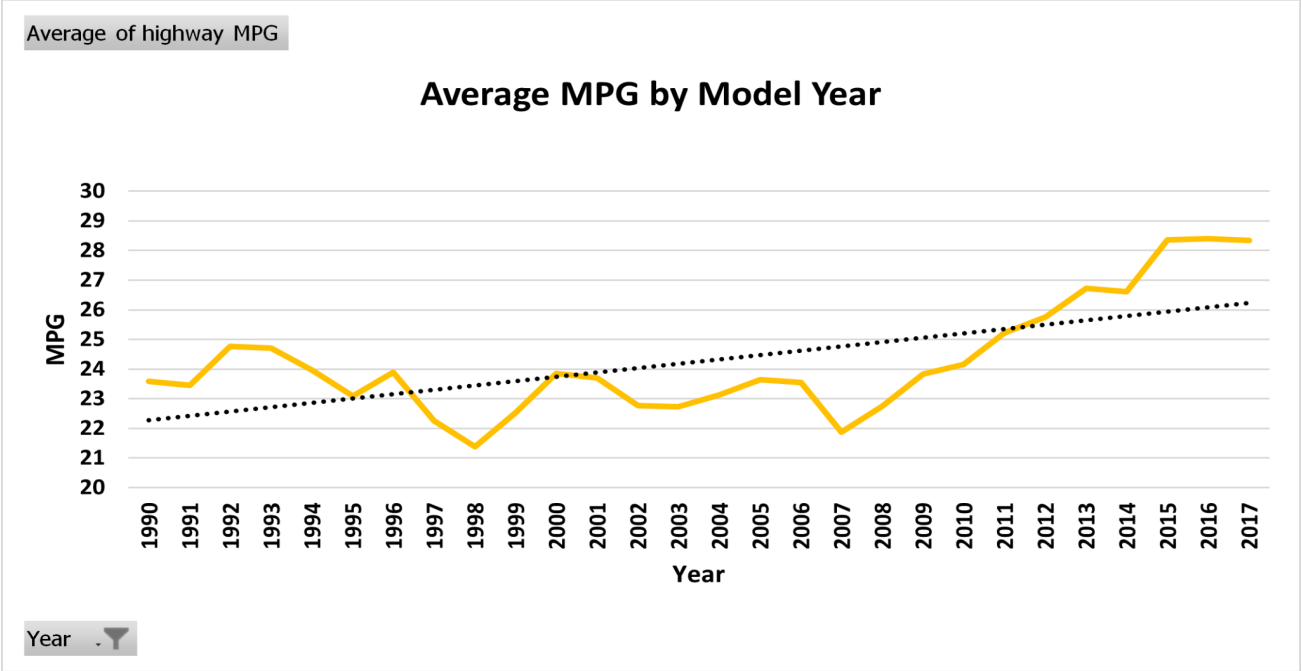


Insight: - The automated manual is the most expensive transmission. And the automatic is a popular transmission.

Task 4: How does the fuel efficiency of cars vary across different body styles and model years?

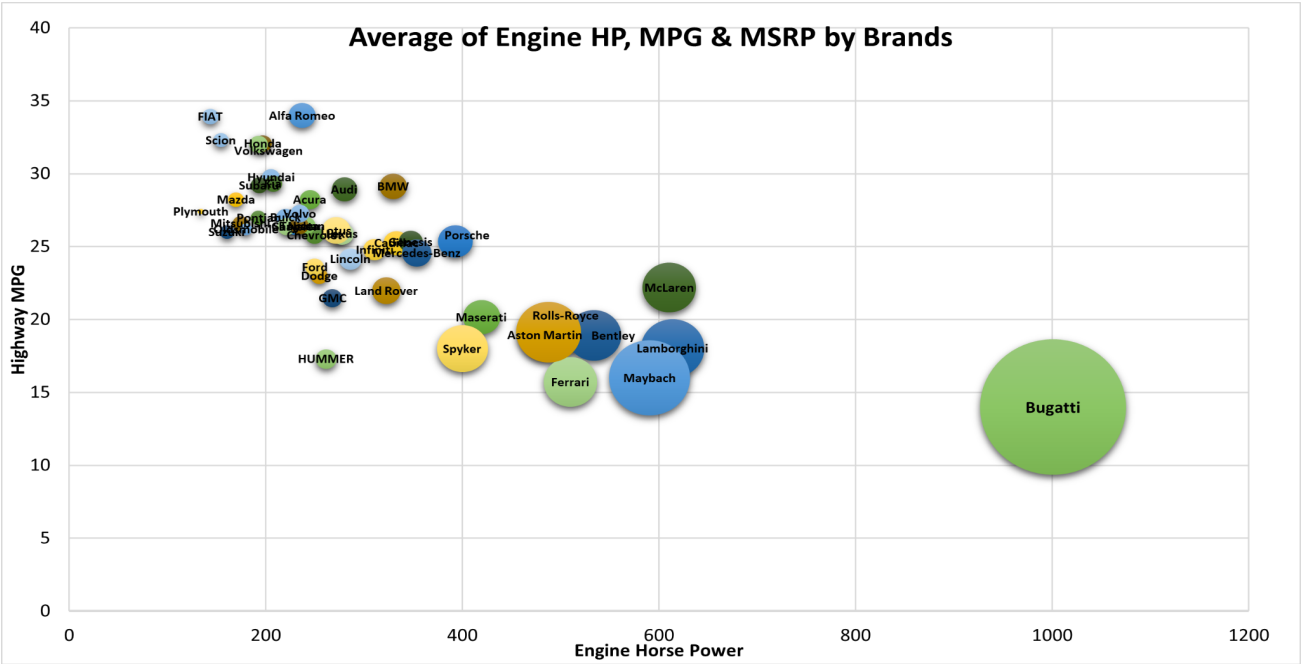


Insight: - The fuel efficiency of cars increased across different body styles.



Insight: - Overall fuel efficiency increased regularly after 2007 at a slower rate year-on-year.

Task 5: How do the car's horsepower, MPG, and price vary across different Brands?



Insight: - If engine horsepower goes up then highway mpg will go down and the price also will go up.

Click here to view My Dashboard File.

Results

The interactive dashboard created in Excel allows stakeholders to explore various aspects of the dataset. They can visualize the distribution of car prices by brand and body style, compare average MSRPs across different brands and body styles, analyse the impact of transmission type on MSRP by body style, observe the trend of fuel efficiency across different body styles and model years, and understand the relationships between horsepower, MPG, and price across different car brands.

The insights gained from the analysis provide valuable information for car manufacturers to make informed decisions regarding pricing, product development, marketing, and competitiveness in the market. By optimizing these factors, manufacturers can maximize profitability while meeting consumer demand.

Thankyou