Analyzing the Impact of Car Features on Price and Profitability

PROJECT DESCRIPTIONS :

The automotive industry has been rapidly evolving over the past few decades, with a growing focus on fuel efficiency, environmental sustainability, and technological innovation. With increasing competition among manufacturers and a changing consumer landscape, it has become more important than ever to understand the factors that drive consumer demand for cars.

In recent years, there has been a growing trend towards electric and hybrid vehicles and increased interest in alternative fuel sources such as hydrogen and natural gas. At the same time, traditional gasoline-powered cars remain dominant in the market, with varying fuel types and grades available to consumers.

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?

This problem could be approached by analyzing the relationship between a car's features, market category, and pricing, and identifying which features and categories are most popular among consumers and most profitable for the manufacturer. By using data analysis techniques such as regression analysis and market segmentation, the manufacturer could develop a pricing strategy that balances consumer demand with profitability, and identify which product features to focus on in future product development efforts. This could help the manufacturer improve its competitiveness in the market and increase its profitability over time.

Dataset Description:

The dataset contains information on various car models and their specifications, and is titled "Car Features and MSRP". It was collected and made available on Kaggle by Cooper Union, a private college located in New York City.

Here is a brief overview of the dataset:

- **Number of observations:** 11,159
- **Number of variables:** 16
- **File type:** CSV (Comma Separated Values)

The variables in the dataset are:

- **Make:** the make or brand of the car
- **Model:** the specific model of the car
- **Year:** the year the car was released
- **Engine Fuel Type:** the type of fuel used by the car (gasoline, diesel, etc.)
- **Engine HP:** the horsepower of the car's engine
- **Engine Cylinders:** the number of cylinders in the car's engine
- **Transmission Type:** the type of transmission (automatic or manual)

- **Driven_Wheels:** the type of wheels driven by the car (front, rear, all)
- **Number of Doors:** the number of doors the car has
- **Market Category:** the market category the car belongs to (Luxury, Performance, etc.)
- **Vehicle Size:** the size of the car
- **Vehicle Style:** the style of the car (Sedan, Coupe, etc.)
- **Highway MPG:** the estimated miles per gallon the car gets on the highway
- **City MPG:** the estimated miles per gallon the car gets in the city
- **Popularity:** a ranking of the popularity of the car (based on the number of times it has been viewed on Edmunds.com)
- **MSRP:** the manufacturer's suggested retail price of the car

This dataset could be useful for a variety of data analysis tasks, such as:

- Exploring trends in car features and pricing over time
- Comparing the fuel efficiency of different types of cars
- Investigating the relationship between a car's features and its popularity
- Predicting the price of a car based on its features and market category

However, it's important to note that the dataset was last updated in 2017, so it may not reflect current trends or prices in the automotive industry.

TECH USED :

- **MICROSOFT EXCEL** is used for complete analysis in this project.
- **CANVA** is used for designing this report.
- **LOOM** is used for taking video presentation.
- **GOOGLE DRIVE** is used for storing this project.
- **POWER BI** is used for creating dashboard.

RESULTS AND INSIGHTS:

Tasks: Analysis

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

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

Row Labels	Sum of Popularity	Count of Model
Crossover	1715242	1110
Crossover,Diesel	6111	7
Crossover,Exotic,Luxury,High-Performance	238	1
Crossover,Exotic,Luxury,Performance	238	1
Crossover,Factory Tuner,Luxury,High-Performance	47410	26
Crossover,Factory Tuner,Luxury,Performance	13037	5
Crossover,Factory Tuner,Performance	840	4
Crossover,Flex Fuel	132720	64
Crossover,Flex Fuel,Luxury	11732	10
Crossover,Flex Fuel,Luxury,Performance	9744	6

|		
Crossover,Flex Fuel,Performance	33942	6
Crossover,Hatchback	120650	72
Crossover,Hatchback,Factory Tuner,Performance	12054	6
Crossover,Hatchback,Luxury	1428	7
Crossover,Hatchback,Performance	12054	6
Crossover,Hybrid	107662	42
Crossover,Luxury	362665	410
Crossover,Luxury,Diesel	73080	34
Crossover,Luxury,High-Performance	9335	9
Crossover,Luxury,Hybrid	15142	24
Crossover,Luxury,Performance	151968	113
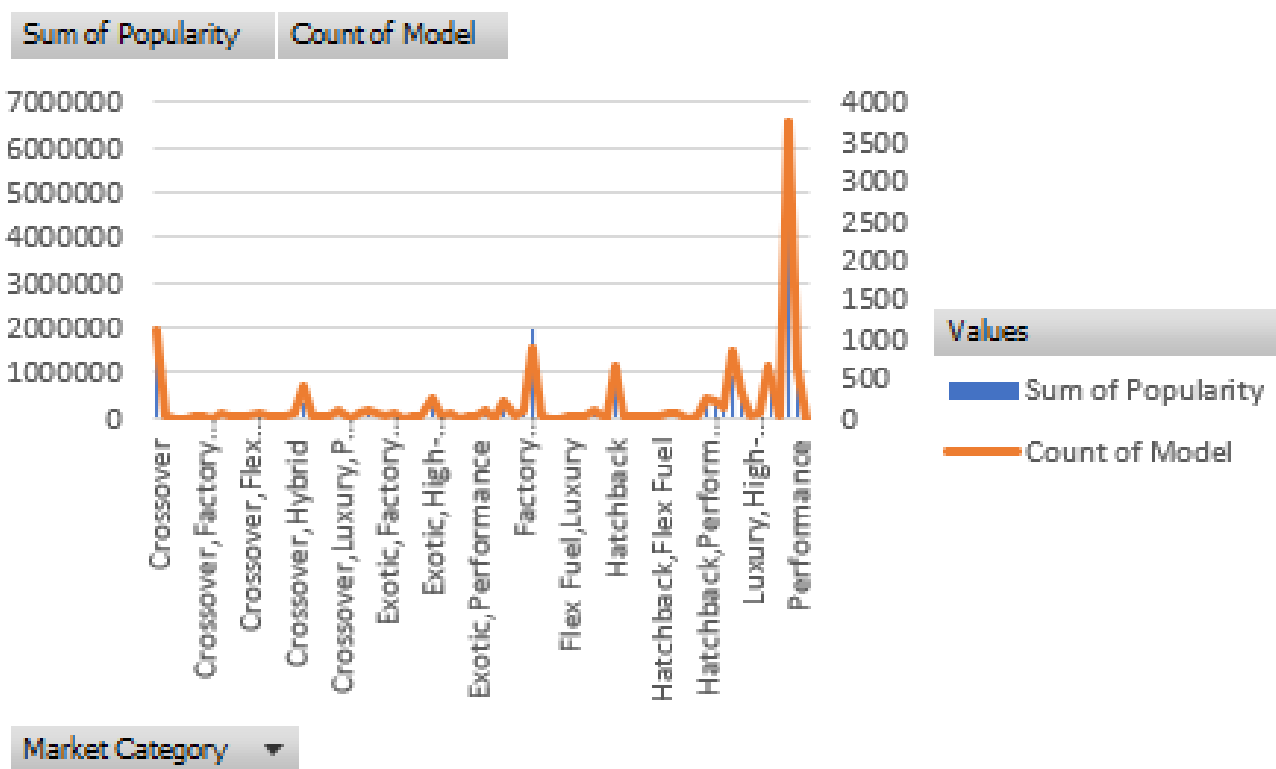
Task 2: Create a scatter chart that plots engine power on the x-axis and price on the y-axis. Add a trendline to the chart to visualize the relationship between these variables.
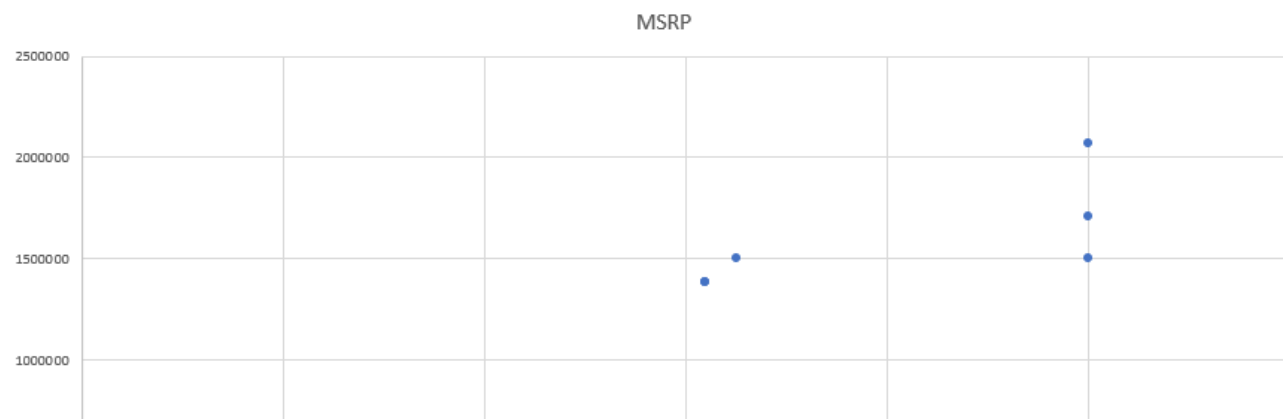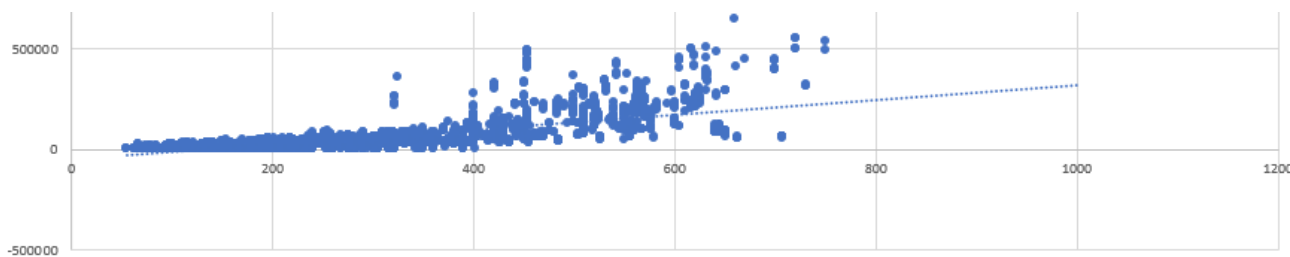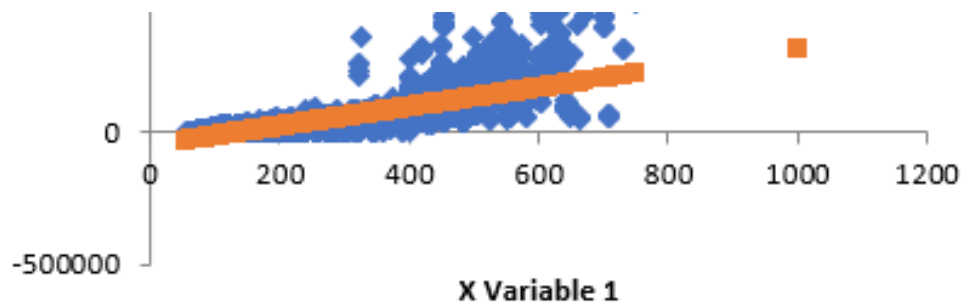
Task 3: Use regression analysis to identify the variables that have the strongest relationship with a car's price. Then create a bar chart that shows the coefficient values for each variable to visualize their relative importance.
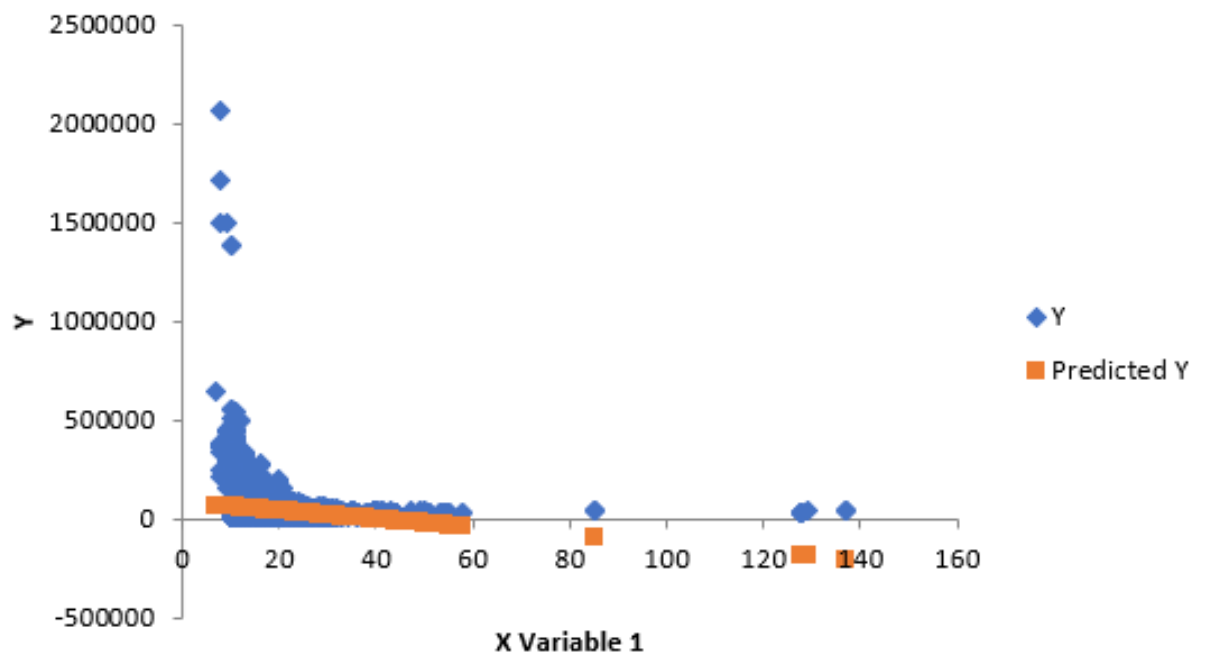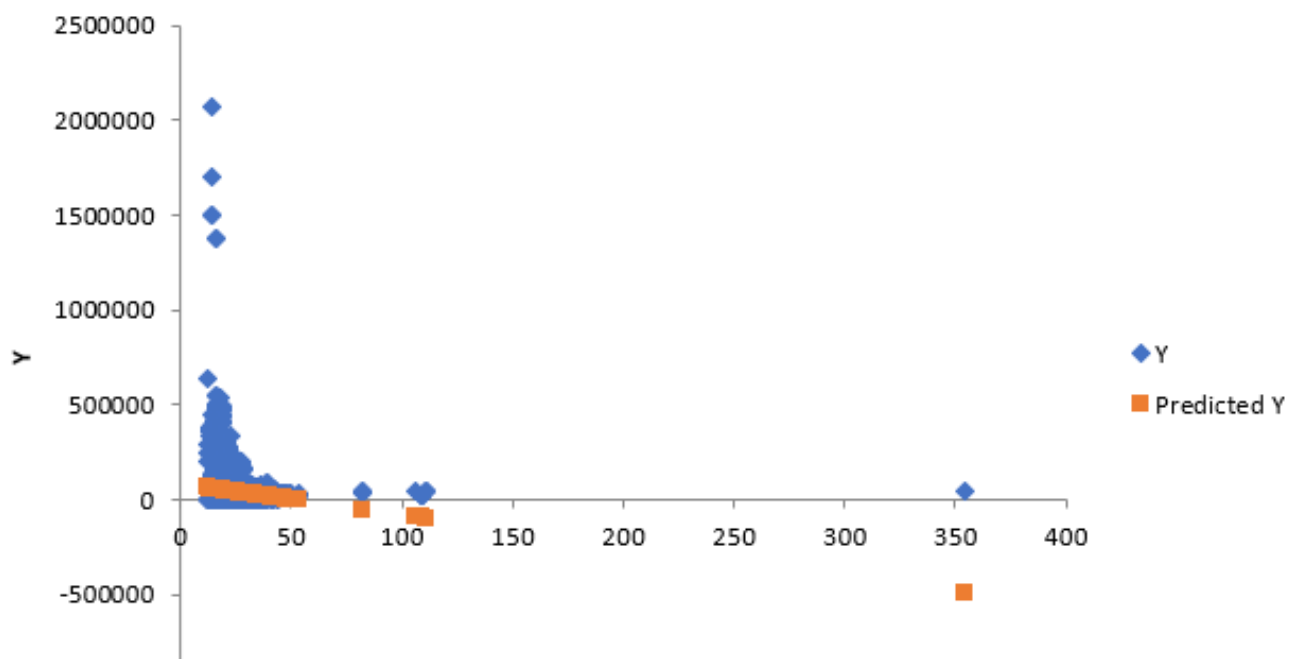

regression for cylinders
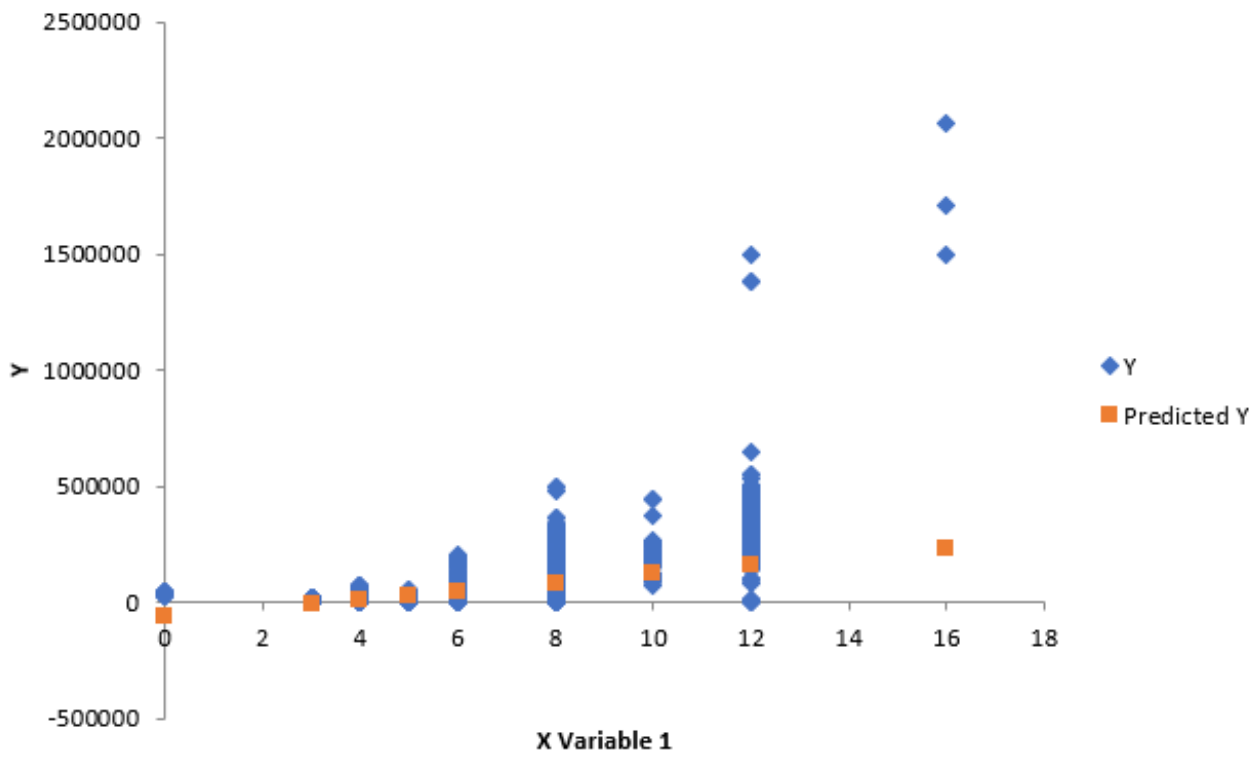
rregression for hp

regression for city mpg

regression for highway mpg

-1000000

<div align="center">X Variable 1</div>

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

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

| Row Labels ▾	Average of MSRP
Acura	34888
Alfa Romeo	61600
Aston Martin	197910
Audi	53452
Bentley	247169
BMW	61547
Bugatti	1757224
Buick	28207
Cadillac	56231
Chevrolet	28350
Chrysler	26723
Dodge	22390
Ferrari	238219
FIAT	22670
Ford	27399
Genesis	46617
GMC	30493
Honda	26674
HUMMER	36464
Hyundai	24597
Infiniti	42394
Kia	25310
Lamborghini	331567
Land Rover	67823
Lexus	47549
Lincoln	42840
Lotus	69188

Average of MSRP

average price of cars for each manufacturer.

Make ▾

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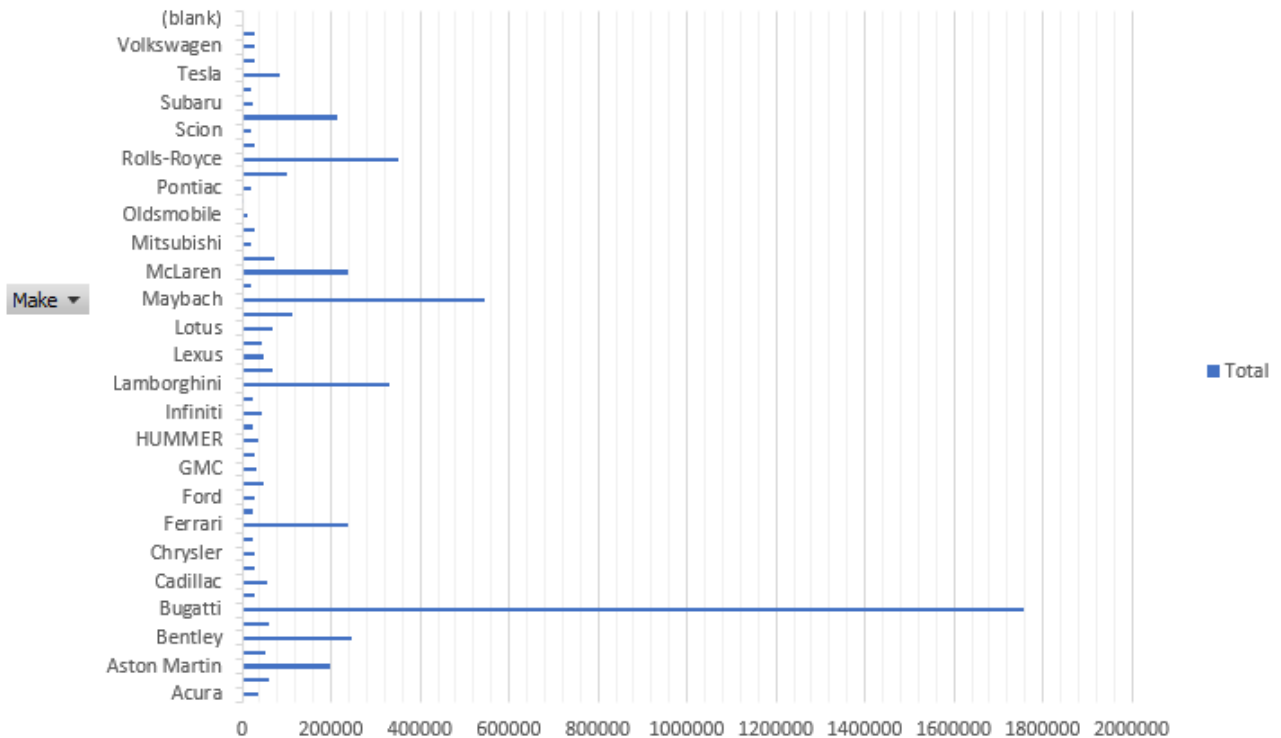
Task 5.A: Create a scatter plot with the number of cylinders on the x-axis and highway MPG on the y-axis. Then create a trendline on the scatter plot to visually estimate the slope of the relationship and assess its significance.

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

relationship btw cylinder and highway mpg
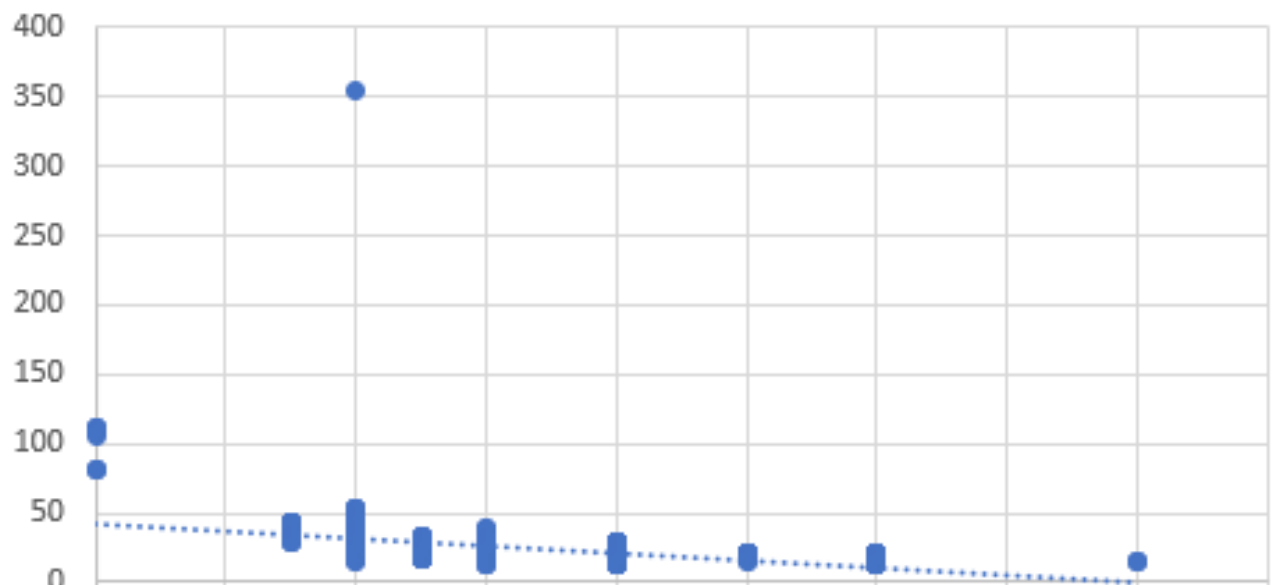
|	cylinders	mpg
cyilnders	1	
MPG	-0.62	1

INSIGHTS:

- The popularity is directly proportional to the market category. The crossover and flex fuel has large number of popularity.
- As we can see that there is rise in price if the horsepower increases. The graph clearly shows us there is line rise if the horse power increases.
- The above graphs clearly shows us that which variable has strongest relationship with car price. After the regression analysis, the car price has strongest relationship with horse power and cylinders. We can see a clear rise with the relationship btw cylinder and horse power.
- The above graph shows us the average price of all car manufacturer. Bugatti has the highest average price followed by Maybach.
- The relationship between highway mileage and Engine cylinders clearly shows us there is downfall in the trendline. i.e. If the number of cylinders increases there is a drop in highway mileage. Even the coefficient value also came in negative which denotes the down fall in mileage.

Tasks: Building the Dashboard

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

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

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

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

Task 5: How does the car's horsepower, MPG, and price vary across different Brands?
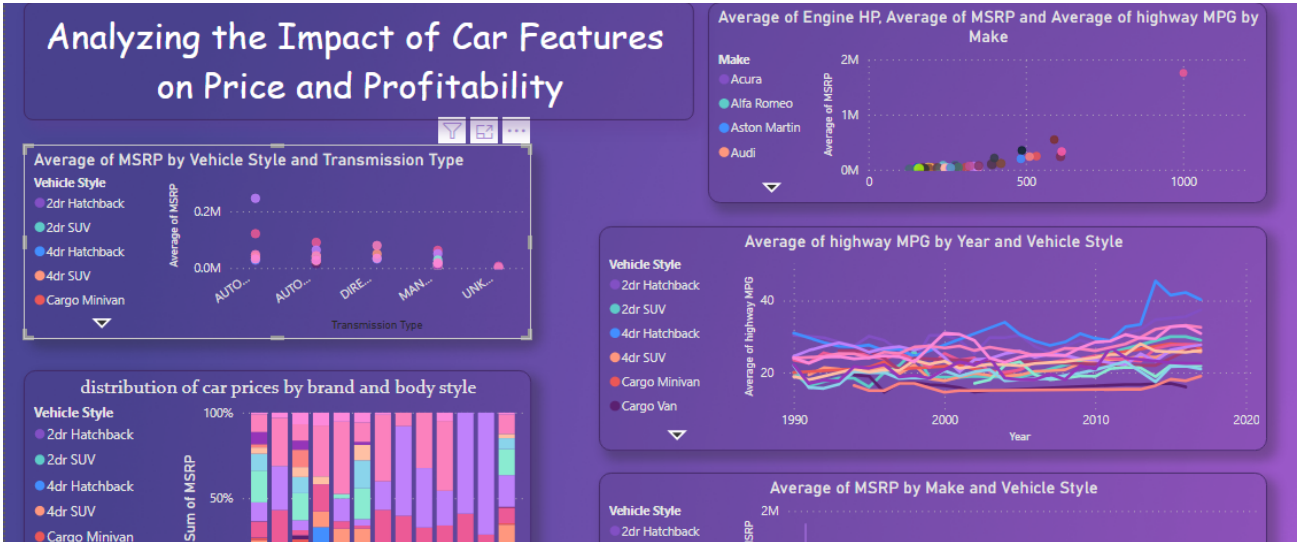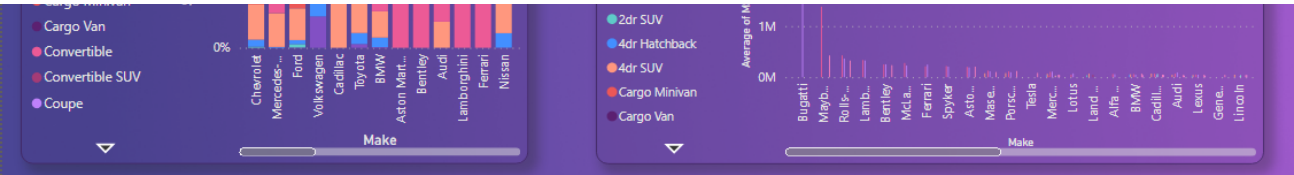
DATASET DONE WITH ANALYSIS :

https://docs.google.com/spreadsheets/d/1oPJP3slojbBsgZlvBsTZ_UTg5FtDkDuO/edit?usp=sharing&ouid=10723108969940457865&rtpof=true&sd=true

DASHBOARD :

https://drive.google.com/file/d/1G5A18BOX8LkXBwmA2wQqNtvBCULZ6Y8x/view?usp=sharing