IMPACT OF CAR FEATURES

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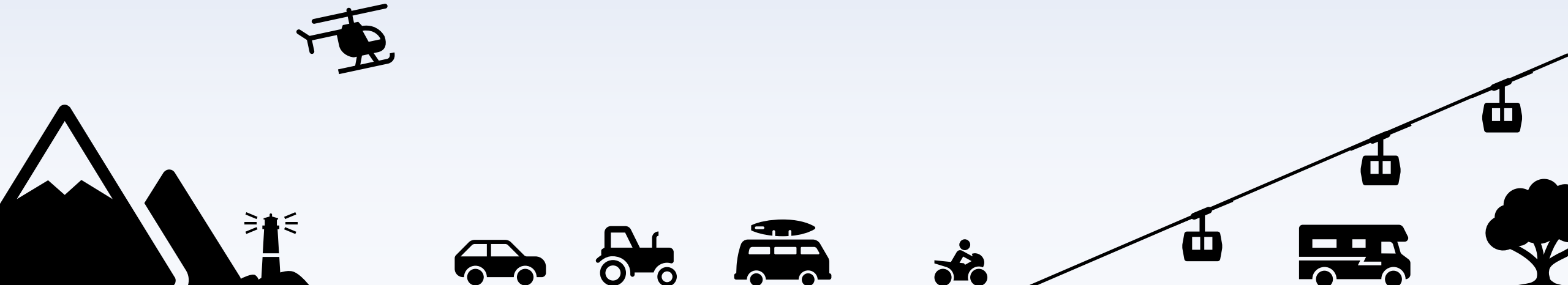


PROJECT DESCRIPTION

With the growing technology the automobile industry has also evolved in past few years and the demand of the customer has also changed considering the hike in fuel prices and Sustainability of the planet. So, in this project I will be analyzing the effects of various features of cars on its final price and will try to find out how we can maximize the profit of the car brands.

The dataset which I will be working on consists of information of more than 11,000 cars and its features in detail.

Number of observations: 11,159

Number of variables: 16

File type: CSV (Comma Separated Values)

To work on this Dataset first It must be cleaned which I will be doing using the COUNTBLANK function to find the numbers of blank cells, if the number of blank cells in a row is less than 30% then we use descriptive statistics to fill the empty cells using mean median or mode.

The prices of the cars are assumed to be in same currency and milage are assumed to be in the unit of km/liter.

APPROACH

The approach to this project is to do the Data Analysis using the various functions such as CORREL to find the correlation between two variables and then use regression analysis feature of Excel to predict the outcomes and Pivot Tables to get the desired data in a sorted manner and then use various charts such as bar chart, line chart, etc. to visualize the result and its trends.

I added extra column of Avg Milage which is the average of City and Highway milage for each car model for an overall analysis of the trend.

Seeing the data of numbers of cylinder in Electric cars which was zero(0), I filled the missing data with zero in No. of Cylinder Column for the Electric Cars.

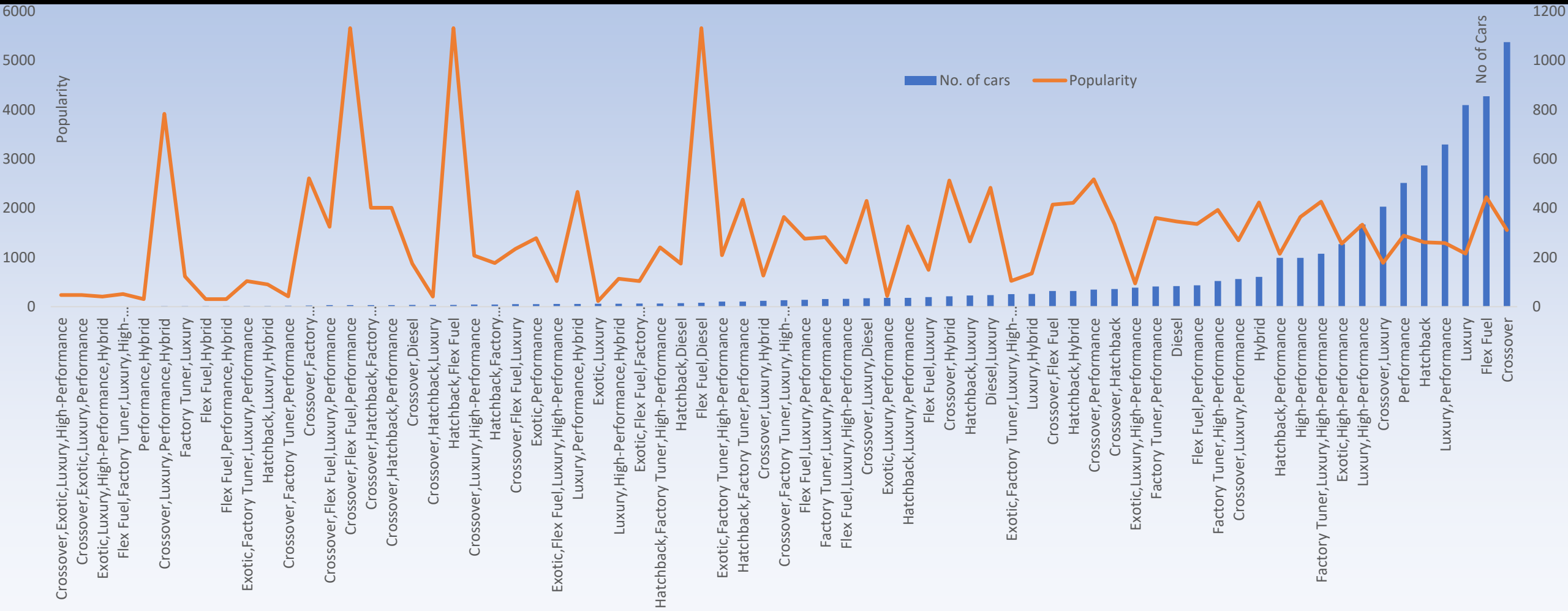
There were outliers in the form of Electric cars as they were having exceptionally high milage with respect to convectional engine cars.

TECH-STACK USED

I have used Microsoft Excel 365 to do the analysis of the given data.
I have used Microsoft Excel because it is a spreadsheet developed for various platforms. It has calculation or computation capabilities with graphing tools, pivot tables, and also has a macro programming language called Visual Basic for Applications which would make doing the analysis and visualisation effortless.
I have used the add on package of Excel for Data Analysis

Hyperlink:
https://docs.google.com/spreadsheets/d/1uJ2Hfza4A1Zxu_IdxqP1woiCZevQv5h_/edit?usp=sharing&ouid=115516897268360068412&rtpof=true&sd=true

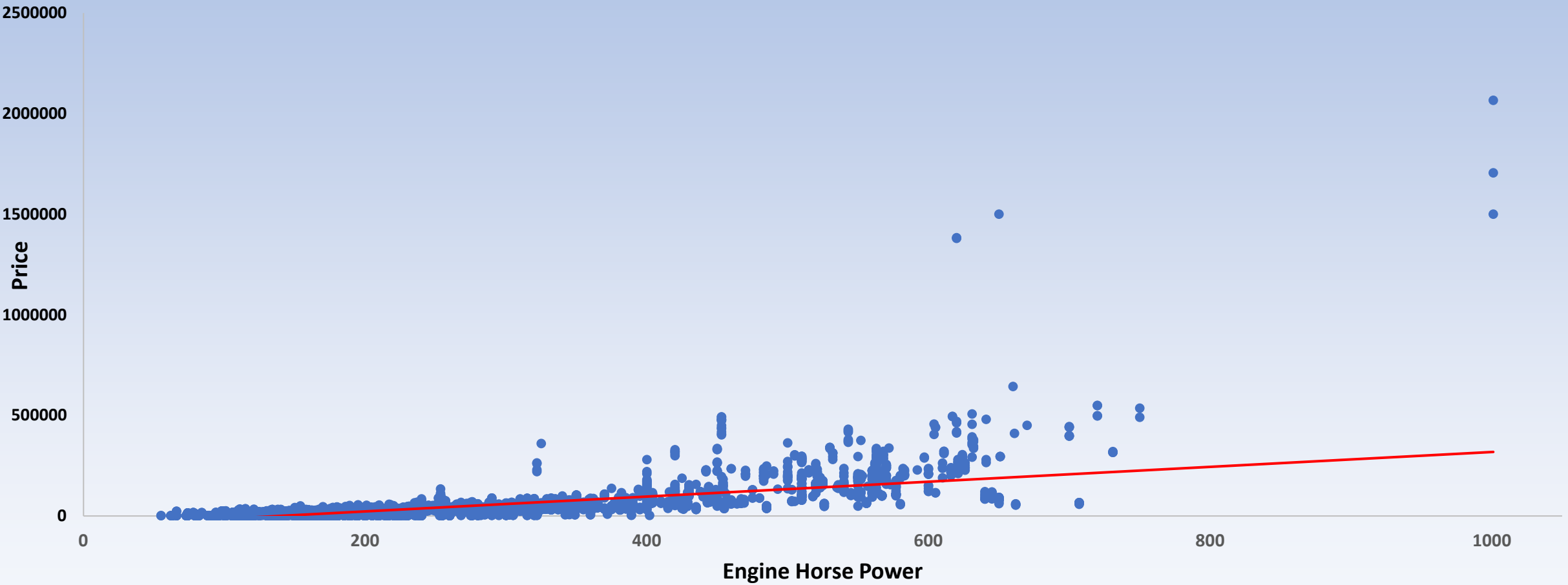
POPULARITY OF CAR MODELS ACROSS MARKET CATEGORIES



INSIGHTS- As we can see from the combo chart that most of the popular cars are very less in number in the market and the cars with average popularity are present in the market in heavy numbers.

Category	No	Popularity	Category	No	Popularity	Category	No	Popularity	Category	No	Popularity
Crossover,Exotic,Luxury,High-Performance	1	238	Crossover,Hatchback,Luxury	7	204	Flex Fuel,Luxury,Performance	28	1380	Diesel	84	1731
Crossover,Exotic,Luxury,Performance	1	238	Hatchback,Flex Fuel	7	5657	Factory Tuner,Luxury,Performance	31	1413	Flex Fuel,Performance	87	1680
Exotic,Luxury,High-Performance,Hybrid	1	204	Crossover,Luxury,High-Performance	9	1037	Flex Fuel,Luxury,High-Performance	32	898	Factory Tuner,High-Performance	104	1966
Flex Fuel,Factory Tuner,Luxury,High-Performance	1	258	Hatchback,Factory Tuner,Luxury,Performance	9	887	Crossover,Luxury,Diesel	34	2149	Crossover,Luxury,Performance	112	1349
Performance,Hybrid	1	155	Crossover,Flex Fuel,Luxury	10	1173	Exotic,Luxury,Performance	36	217	Hybrid	121	2117
Crossover,Luxury,Performance,Hybrid	2	3916	Exotic,Performance	10	1391	Hatchback,Luxury,Performance	36	1632	Hatchback,Performance	198	1074
Factory Tuner,Luxury	2	617	Exotic,Flex Fuel,Luxury,High-Performance	11	520	Flex Fuel,Luxury	39	747	High-Performance	198	1823
Flex Fuel,Hybrid	2	155	Luxury,Performance,Hybrid	11	2333	Crossover,Hybrid	42	2563	Factory Tuner,Luxury,High-Performance	215	2133
Flex Fuel,Performance,Hybrid	2	155	Exotic,Luxury	12	113	Hatchback,Luxury	45	1323	Exotic,High-Performance	254	1280
Exotic,Factory Tuner,Luxury,Performance	3	520	Luxury,High-Performance,Hybrid	12	569	Diesel,Luxury	47	2416	Luxury,High-Performance	334	1668
Hatchback,Luxury,Hybrid	3	454	Exotic,Flex Fuel,Factory Tuner,Luxury,High-Performance	13	520	Exotic,Factory Tuner,Luxury,High-Performance	51	523	Crossover,Luxury	406	889
Crossover,Factory Tuner,Performance	4	210	Hatchback,Factory Tuner,High-Performance	13	1205	Luxury,Hybrid	52	674	Performance	503	1443
Crossover,Factory Tuner,Luxury,Performance	5	2607	Hatchback,Diesel	14	873	Crossover,Flex Fuel	64	2074	Hatchback	574	1309
Crossover,Flex Fuel,Luxury,Performance	6	1624	Flex Fuel,Diesel	16	5657	Hatchback,Hybrid	64	2111	Luxury,Performance	659	1293
Crossover,Flex Fuel,Performance	6	5657	Exotic,Factory Tuner,High-Performance	21	1046	Crossover,Performance	69	2586	Luxury	819	1079
Crossover,Hatchback,Factory Tuner,Performance	6	2009	Hatchback,Factory Tuner,Performance	21	2174	Crossover,Hatchback	72	1676	Flex Fuel	855	2226
Crossover,Hatchback,Performance	6	2009	Crossover,Luxury,Hybrid	24	631	Exotic,Luxury,High-Performance	77	473	Crossover	1075	1556
Crossover,Diesel	7	873	Crossover,Factory Tuner,Luxury,High-Performance	26	1823	Factory Tuner,Performance	82	1803			

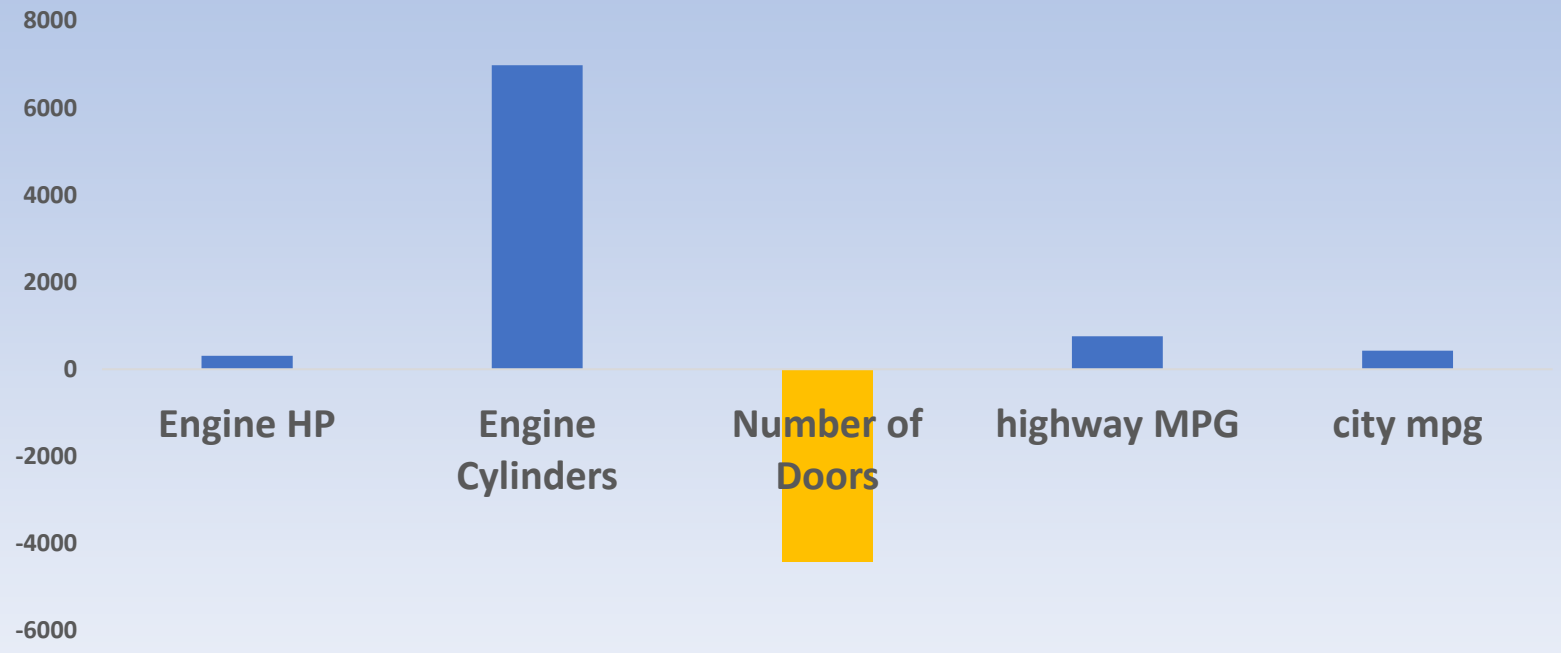
RELATIONSHIP BETWEEN ENGINE POWER AND PRICE



INSIGHTS- The price of Car increases with the increase in Horsepower of the Car

IMPORTANT FEATURE TO DETERMINE CAR PRICE

Feature	Coefficient
Engine HP	310.5043348
Engine Cylinders	6984.283124
Number of Doors	-4430.826468
Highway MPG	758.6441261
City MPG	421.95488



INSIGHTS- Engine HP, Cylinders, Highway Mpg, City Mpg has positive coefficient which means that the price of car increases with the increase in this features. Cylinder has more coefficient which means that price will increase more with slight increase in the Cylinders.

No of Doors has negative coefficient which means that the price will increase with the decrease in the no of doors in a car.

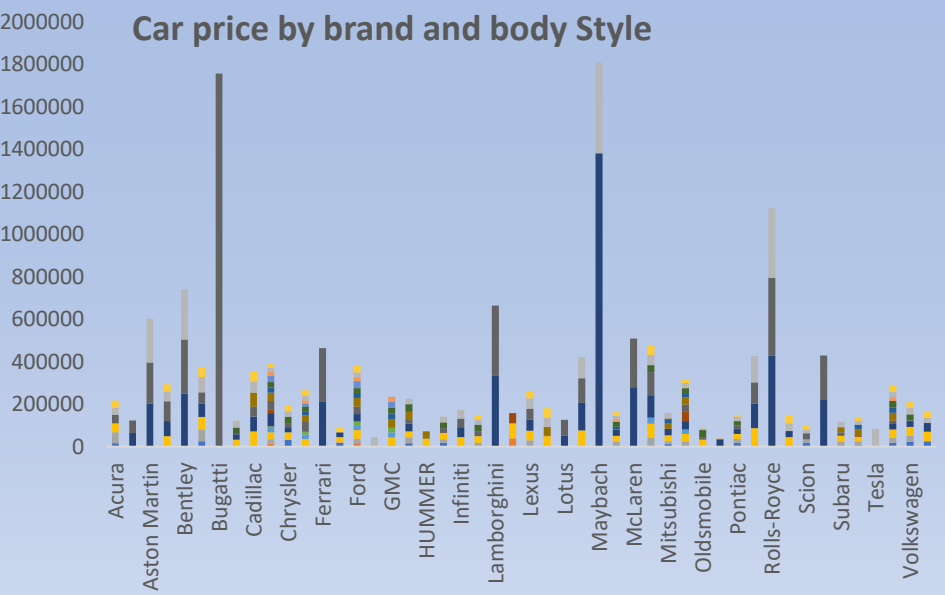
Average Price of Different Manufacturers

INSIGHTS- Bugatti has the highest Average Car Price while Plymouth has the lowest Average Car Price

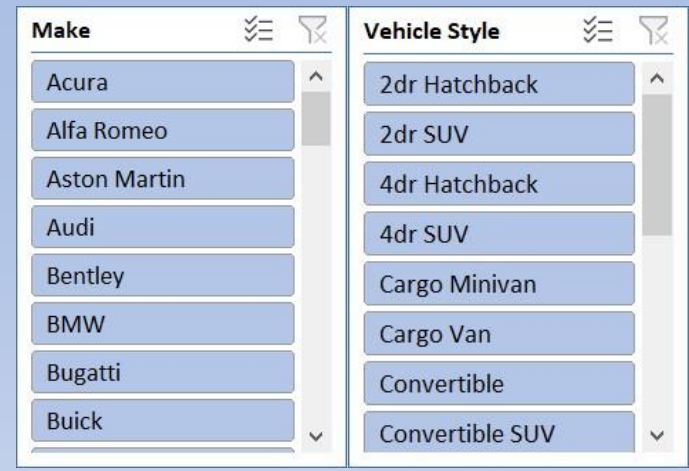
S No	Brand	Avg Price	S No	Brand	Avg Price	S No	Brand	Avg Price
1	Plymouth	3297	17	Toyota	28847	33	BMW	62163
2	Oldsmobile	12844	18	Nissan	28921	34	Land Rover	68067
3	Suzuki	18021	19	Volkswagen	28979	35	Lotus	68377
4	Pontiac	19800	20	Buick	29034	36	Mercedes-Benz	72070
5	Scion	19933	21	Chevrolet	29075	37	Tesla	85256
6	Mazda	20075	22	Volvo	29725	38	Porsche	101622
7	Mitsubishi	21341	23	GMC	32444	39	Maserati	113684
8	FIAT	22670	24	Acura	35087	40	Aston Martin	198123
9	Subaru	24241	25	HUMMER	36464	41	Spyker	214990
10	Dodge	24857	26	Infiniti	42640	42	Ferrari	238219
11	Hyundai	24926	27	Lincoln	43861	43	McLaren	239805
12	Kia	25514	28	Genesis	46617	44	Bentley	247169
13	Honda	26655	29	Lexus	47549	45	Lamborghini	331567
14	Chrysler	26723	30	Audi	54574	46	Rolls-Royce	351131
15	Saab	27880	31	Cadillac	56368	47	Maybach	546222
16	Ford	28511	32	Alfa Romeo	61600	48	Bugatti	1757224

Relationship between cylinder and fuel efficiency

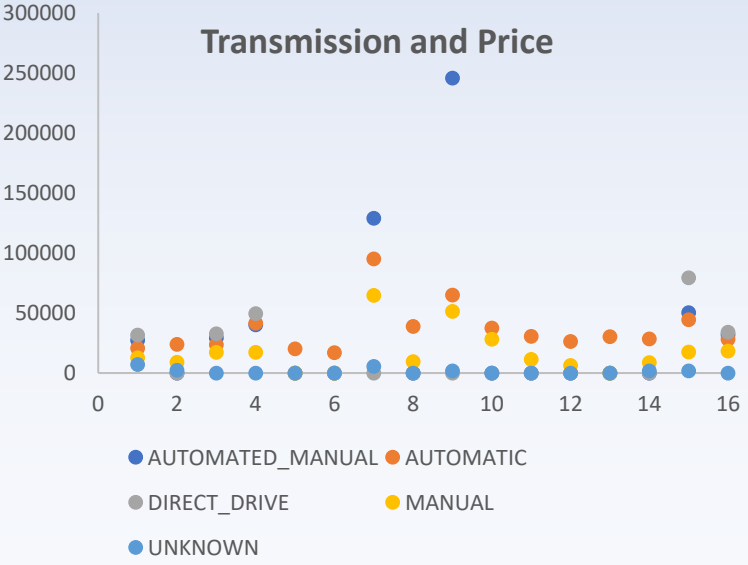
INSIGHTS- Fuel Efficiency has negative relationship with the number of cylinder in a car. They have correlation value of -0.61797 which I calculated using CORREL function in Excel.
Negative correlation means as the number of cylinder increases, the fuel efficiency of the car will decrease as we can observe in the chart as well.

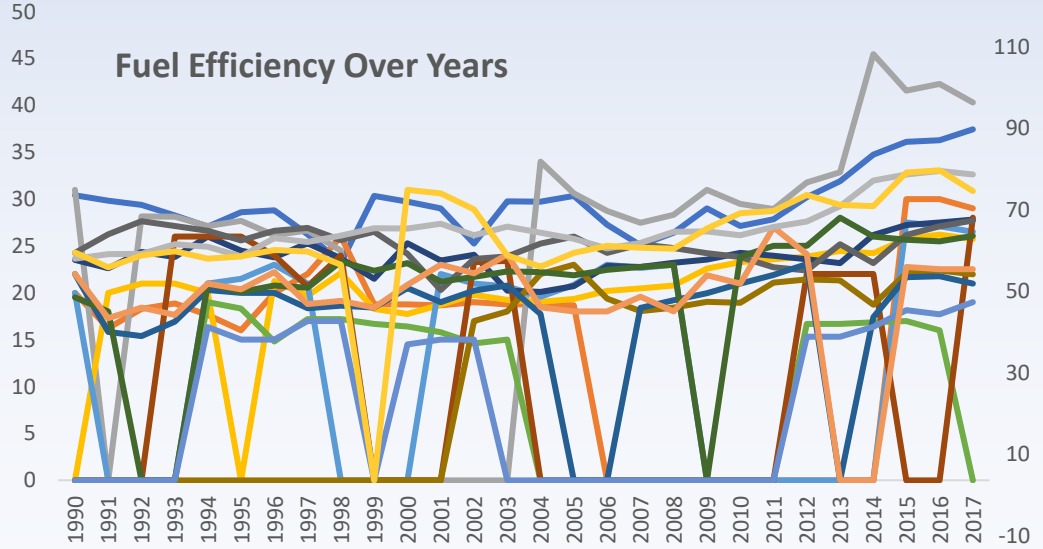

Car price by brand and body Style
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Acura
Aston Martin
Bentley
Bugatti
Cadillac
Chrysler
Ferrari
Ford
GMC
HUMMER
Infiniti
Lamborghini
Lexus
Lotus
Maybach
McLaren
Mitsubishi
Oldsmobile
Pontiac
Rolls-Royce
Scion
Subaru
Tesla
Volkswagen


Avg Price
2000000
1800000
1600000
1400000
1200000
1000000
800000
600000
400000
200000
0
Acura
Aston Martin
Bentley
Bugatti
Cadillac
Chrysler
Ferrari
Ford
GMC
HUMMER
Infiniti
Lamborghini
Lexus
Lotus
Maybach
McLaren
Mitsubishi
Oldsmobile
Pontiac
Rolls-Royce
Scion
Subaru
Tesla
Volkswagen


Make
Acura
Alfa Romeo
Aston Martin
Audi
Bentley
BMW
Bugatti
Buick
Vehicle Style
2dr Hatchback
2dr SUV
4dr Hatchback
4dr SUV
Cargo Minivan
Cargo Van
Convertible
Convertible SUV

DASHBOARD


Transmission and Price
300000
250000
200000
150000
100000
50000
0
0
2
4
6
8
10
12
14
16
AUTOMATED_MANUAL
AUTOMATIC
DIRECT_DRIVE
MANUAL
UNKNOWN


Fuel Efficiency Over Years
50
45
40
35
30
25
20
15
10
5
0
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
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2013
2014
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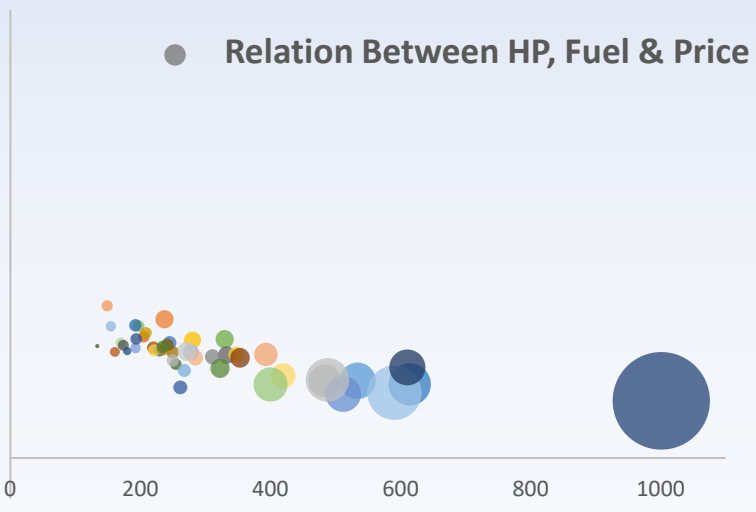
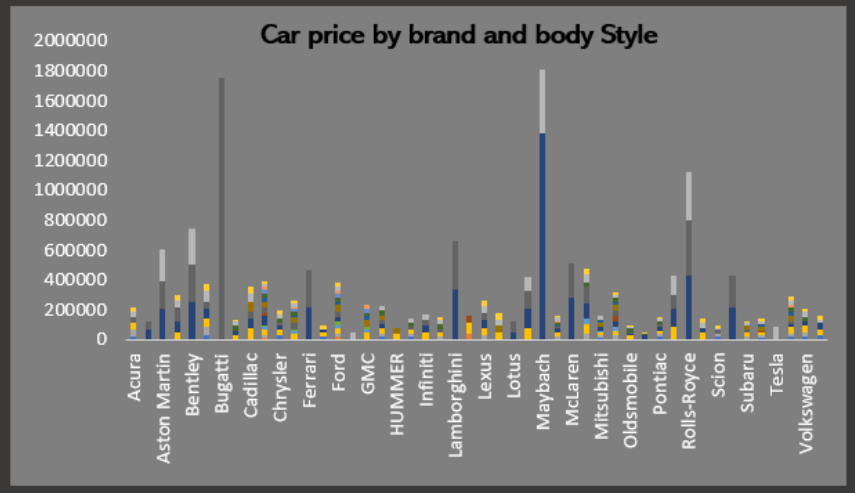
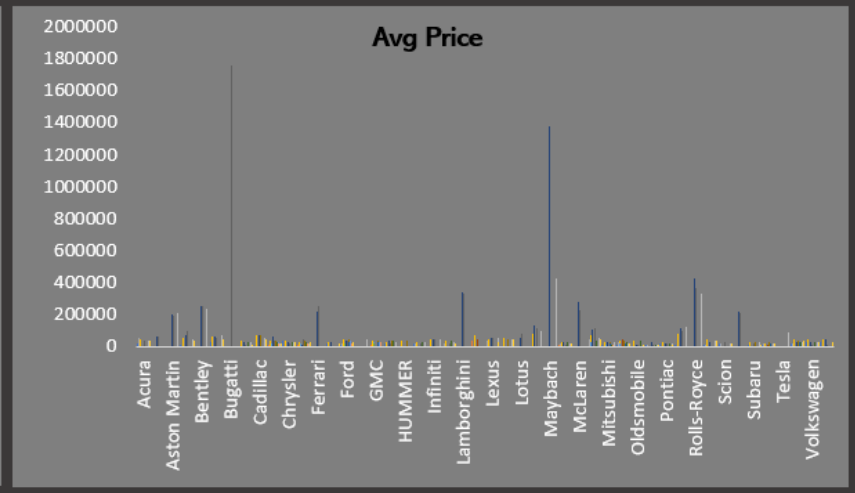
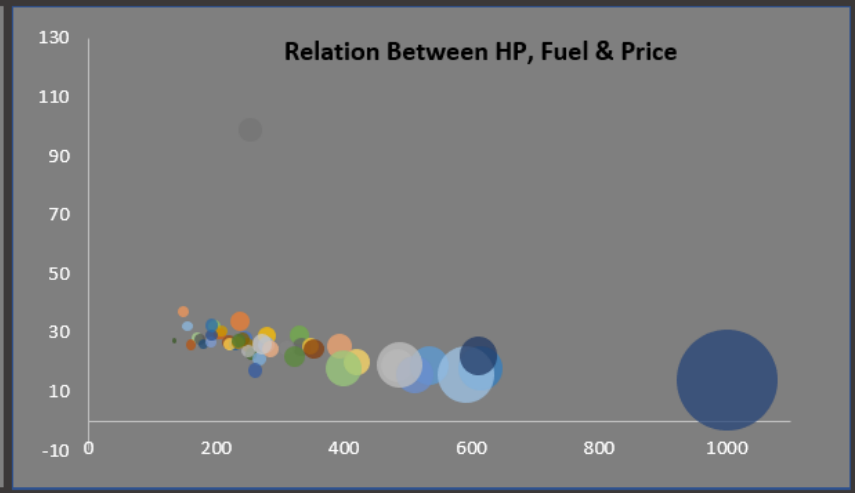
2016
2017

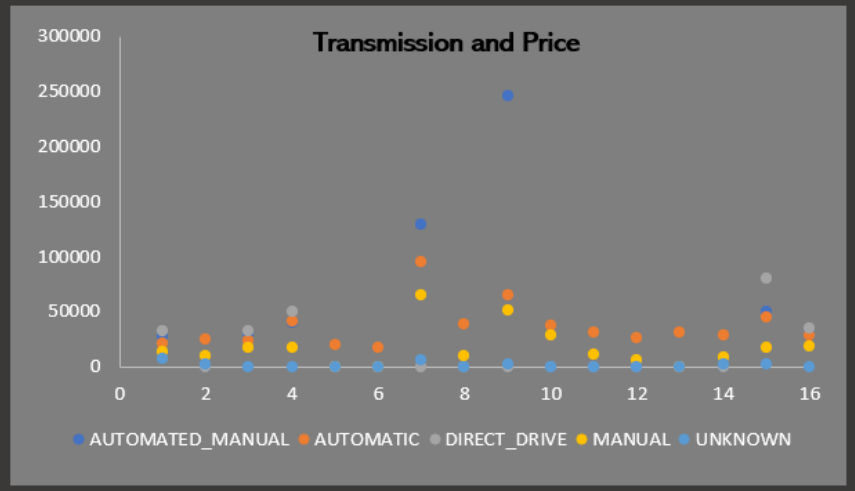

Relation Between HP, Fuel & Price
110
90
70
50
30
10
-10
0
200
400
600
800
1000

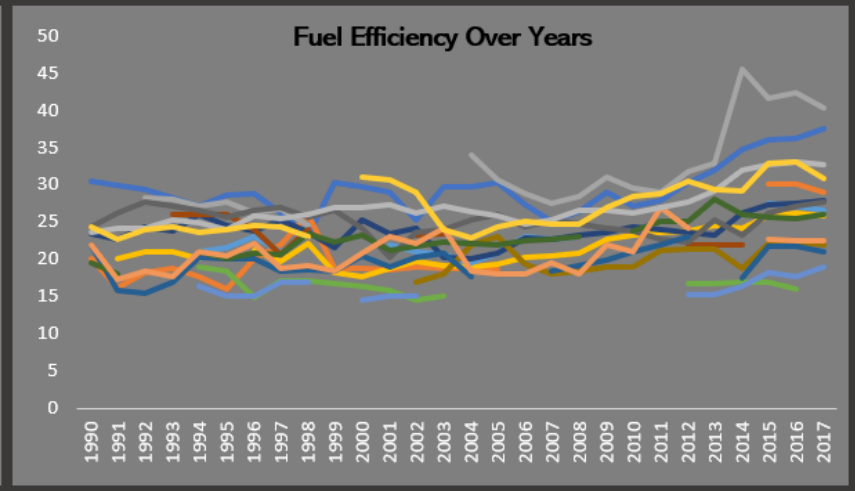
CAR FEATURE DASHBOARD

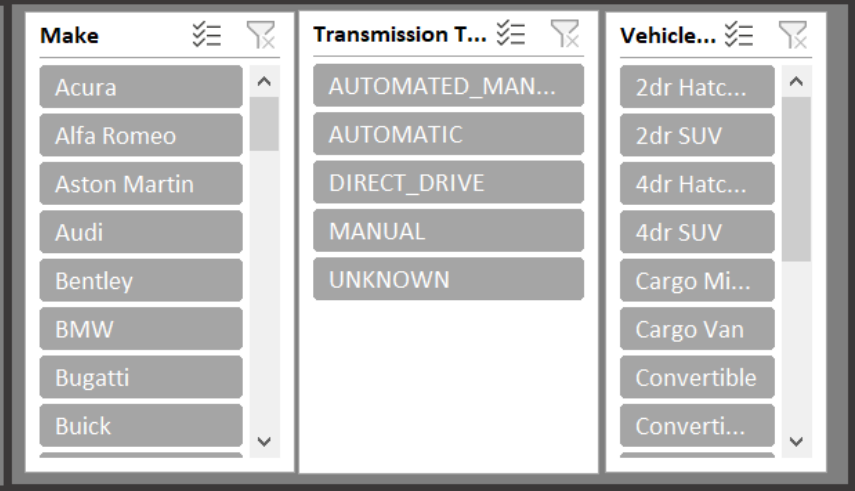












*screenshot from excel

RESULT

From the above Analysis we can conclude that to increase the price of a car the manufacturers increase the features of the car such as the Horsepower of the car or the No. of Cylinders in a car and premium features such as transmission or vehicle body style and number of Doors in a car.
To increase the profitability of a car the manufacturers can increase the number of cylinders in a car as we saw in the analysis that its coefficient is highest among other features so a slight increase can increase the price of a car in large amount. The next thing which manufacturers can do to increase the profitability is by making the car of performance category as it has one of the highest popularity so putting the price of the car a little bit dearer won't affect its sale.

Thank you

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