Analysing the Impact of Car Features on Price and Profitability

Task -7

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- **PROJECT DESCRIPTION**:
  The dataset contains information about car features such as the model name, brand name, number of doors, efficiency of fuels, prices etc. on which analysis have to be performed to help understand the market and make business decisions.

- **APPROACH**:
  We approach the project by analysing the dataset by cleaning it, finding the blanks and missing values, and imputing the missing values with the appropriate method(mean, median ,mode).We then find outliers and handle them to make data more efficient. Once this is done, the dataset becomes ready to be analysed and visualized.

- **TECH -STACK USED:**
  Microsoft excel was used for doing the tasks. Microsoft word was used for the report of the same.

- **INSIGHTS**:
  Following insights were drawn based on understanding and capabilities:

  1. As the power of engine increases, the price of cars also increases.

  2. The engine power and number of cylinders highly affect the price of cars.

  3. Luxury, sports and exotic cars are the most expensive.

  4. As the number of cylinders increases, fuel efficiency decreases.

- **RESULTS**:
  Following results were obtained while doing the project:
  1. importing dataset in excel:

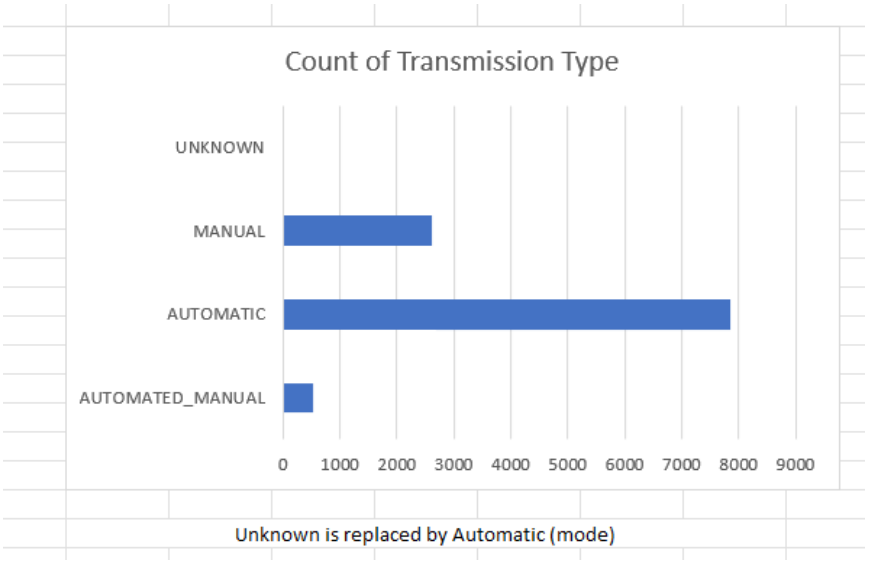
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Make	Model	Year	Engine Fue	Engine HP	Engine Cyli	Transmissi	Driven_Wh	Number of	Market Cat	Vehicle Siz	Vehicle Sty	highway M	city mpg	Popularity	MSRP	
2	BMW	1 Series M	2011	premium ur	335	6	MANUAL	rear wheel	2	Factory Tur	Compact	Coupe	26	19	3916	46135	
3	BMW	1 Series	2011	premium ur	300	6	MANUAL	rear wheel	2	Luxury,Perf	Compact	Convertible	28	19	3916	40650	
4	BMW	1 Series	2011	premium ur	300	6	MANUAL	rear wheel	2	Luxury,High	Compact	Coupe	28	20	3916	36350	
5	BMW	1 Series	2011	premium ur	230	6	MANUAL	rear wheel	2	Luxury,Perf	Compact	Coupe	28	18	3916	29450	
6	BMW	1 Series	2011	premium ur	230	6	MANUAL	rear wheel	2	Luxury	Compact	Convertible	28	18	3916	34500	
7	BMW	1 Series	2012	premium ur	230	6	MANUAL	rear wheel	2	Luxury,Perf	Compact	Coupe	28	18	3916	31200	
8	BMW	1 Series	2012	premium ur	300	6	MANUAL	rear wheel	2	Luxury,Perf	Compact	Convertible	26	17	3916	44100	
9	BMW	1 Series	2012	premium ur	300	6	MANUAL	rear wheel	2	Luxury,High	Compact	Coupe	28	20	3916	39300	
10	BMW	1 Series	2012	premium ur	230	6	MANUAL	rear wheel	2	Luxury	Compact	Convertible	28	18	3916	36900	
11	BMW	1 Series	2013	premium ur	230	6	MANUAL	rear wheel	2	Luxury	Compact	Convertible	27	18	3916	37200	
12	BMW	1 Series	2013	premium ur	300	6	MANUAL	rear wheel	2	Luxury,High	Compact	Coupe	28	20	3916	39600	
13	BMW	1 Series	2013	premium ur	230	6	MANUAL	rear wheel	2	Luxury,Perf	Compact	Coupe	28	19	3916	31500	
14	BMW	1 Series	2013	premium ur	300	6	MANUAL	rear wheel	2	Luxury,Perf	Compact	Convertible	28	19	3916	44400	
15	BMW	1 Series	2013	premium ur	230	6	MANUAL	rear wheel	2	Luxury	Compact	Convertible	28	19	3916	37200	
16	BMW	1 Series	2013	premium ur	230	6	MANUAL	rear wheel	2	Luxury,Perf	Compact	Coupe	28	19	3916	31500	
17	BMW	1 Series	2013	premium ur	320	6	MANUAL	rear wheel	2	Luxury,High	Compact	Convertible	25	18	3916	48250	
18	BMW	1 Series	2013	premium ur	320	6	MANUAL	rear wheel	2	Luxury,High	Compact	Coupe	28	20	3916	43550	
19	Audi	100	1992	regular unl	172	6	MANUAL	front whee	4	Luxury	Midsize	Sedan	24	17	3105	2000	
20	Audi	100	1992	regular unl	172	6	MANUAL	front whee	4	Luxury	Midsize	Sedan	24	17	3105	2000	
21	Audi	100	1992	regular unl	172	6	AUTOMATI	all wheel d	4	Luxury	Midsize	Wagon	20	16	3105	2000	
22	Audi	100	1992	regular unl	172	6	MANUAL	front whee	4	Luxury	Midsize	Sedan	24	17	3105	2000	
23	Audi	100	1992	regular unl	172	6	MANUAL	all wheel d	4	Luxury	Midsize	Sedan	21	16	3105	2000	
24	Audi	100	1993	regular unl	172	6	MANUAL	front whee	4	Luxury	Midsize	Sedan	24	17	3105	2000	
25	Audi	100	1993	regular unl	172	6	AUTOMATI	all wheel d	4	Luxury	Midsize	Wagon	20	16	3105	2000	
26	Audi	100	1993	regular unl	172	6	MANUAL	front whee	4	Luxury	Midsize	Sedan	24	17	3105	2000	
27	Audi	100	1993	regular unl	172	6	MANUAL	front whee	4	Luxury	Midsize	Sedan	24	17	3105	2000	
28	Audi	100	1993	regular unl	172	6	MANUAL	all wheel d	4	Luxury	Midsize	Sedan	21	16	3105	2000	
29	Audi	100	1994	regular unl	172	6	AUTOMATI	front whee	4	Luxury	Midsize	Wagon	21	16	3105	2000	
30	Audi	100	1994	regular unl	172	6	MANUAL	all wheel d	4	Luxury	Midsize	Sedan	22	16	3105	2000	
31	Audi	100	1994	regular unl	172	6	MANUAL	front whee	4	Luxury	Midsize	Sedan	22	17	3105	2000	
32	Audi	100	1994	regular unl	172	6	AUTOMATI	front whee	4	Luxury	Midsize	Sedan	22	16	3105	2000	

2. Handling missing values:
Missing values were found in four columns, engine HP, engine fuel type, number of doors and engine cylinders. The blanks in these columns, however, were not more than 50%, hence were not dropped. The blanks were replaced by appropriate values of mean, median, mode.

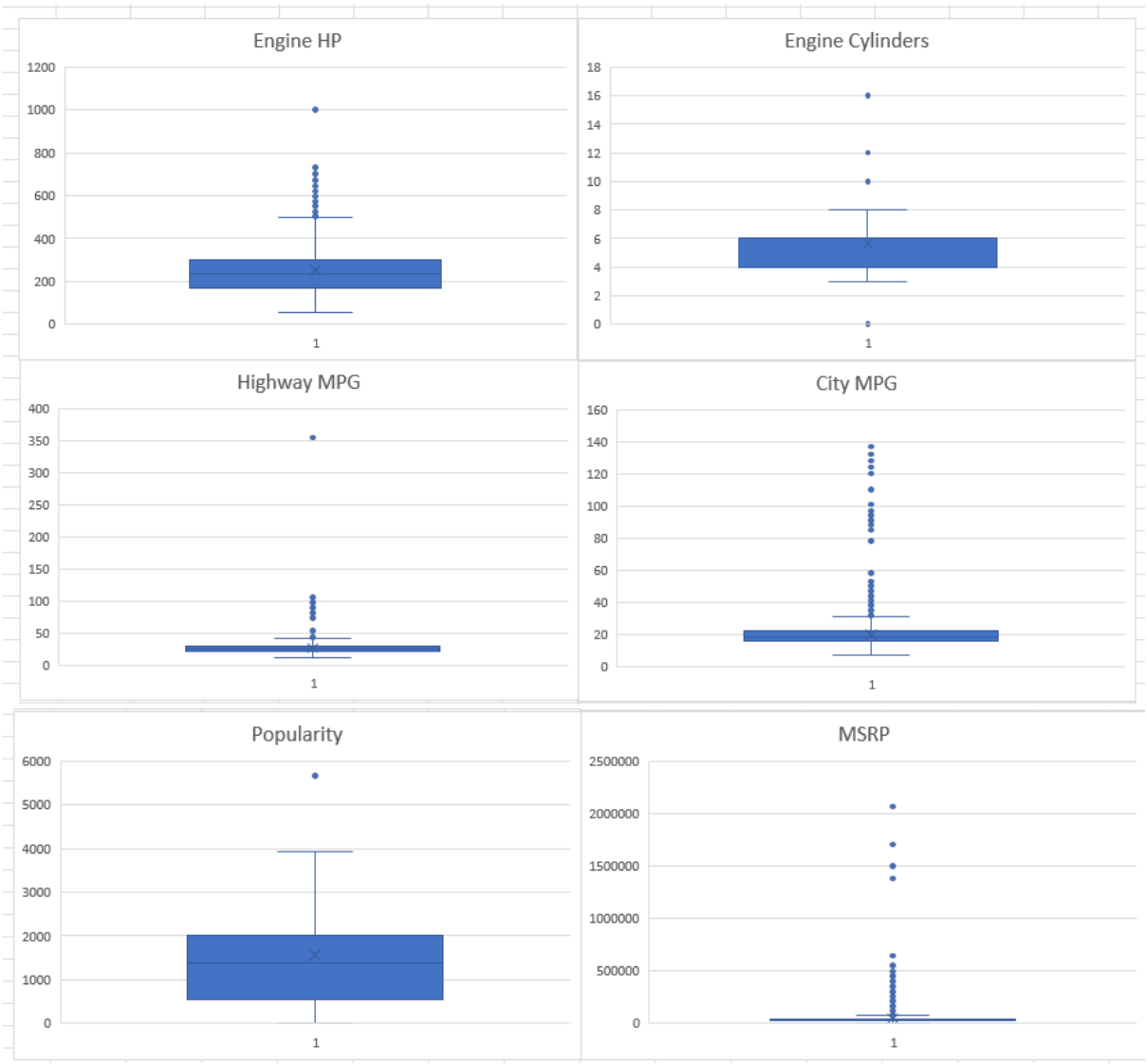
Row Labels	Count of Engine Fuel Type	Average of Number of Doors
Acura	**246**	**4**
premium unleaded (recommended)	146	4
premium unleaded (required)	40	3
regular unleaded	60	3
Alfa Romeo	**5**	**2**
premium unleaded (required)	5	2
Aston Martin	**91**	**2**
premium unleaded (required)	91	2
Audi	**321**	**3**
diesel	28	4
flex-fuel (premium unleaded recommended/E85)	5	3
premium unleaded (recommended)	94	3
premium unleaded (required)	149	3
regular unleaded	45	4
Bentley	**74**	**3**
flex-fuel (premium unleaded required/E85)	24	3
premium unleaded (required)	50	3
BMW	**324**	**3**
diesel	20	4
electric	4	4
premium unleaded (recommended)	27	3
premium unleaded (required)	263	3
regular unleaded	10	2
Bugatti	**3**	**2**
premium unleaded (required)	3	2
Buick	**190**	**4**

Row Labels	Average of Engine HP	Average of Engine Cylinders
diesel	184	5
electric	145	0
flex-fuel (premium unleaded recommended/E85)	283	5
flex-fuel (premium unleaded required/E85)	515	9
flex-fuel (unleaded/E85)	286	7
flex-fuel (unleaded/natural gas)		6
natural gas	110	4
premium unleaded (recommended)	277	5
premium unleaded (required)	376	7
regular unleaded	208	5
(blank)	155	6
Grand Total	**253**	**6**

Transmission Channel column had unknown values and were replaced by the most occurring category, which came out to be “Automatic” type.


Count of Transmission Type
UNKNOWN
MANUAL
AUTOMATIC
AUTOMATED_MANUAL
0
1000
2000
3000
4000
5000
6000
7000
8000
9000
Unknown is replaced by Automatic (mode)

3. Outliers:

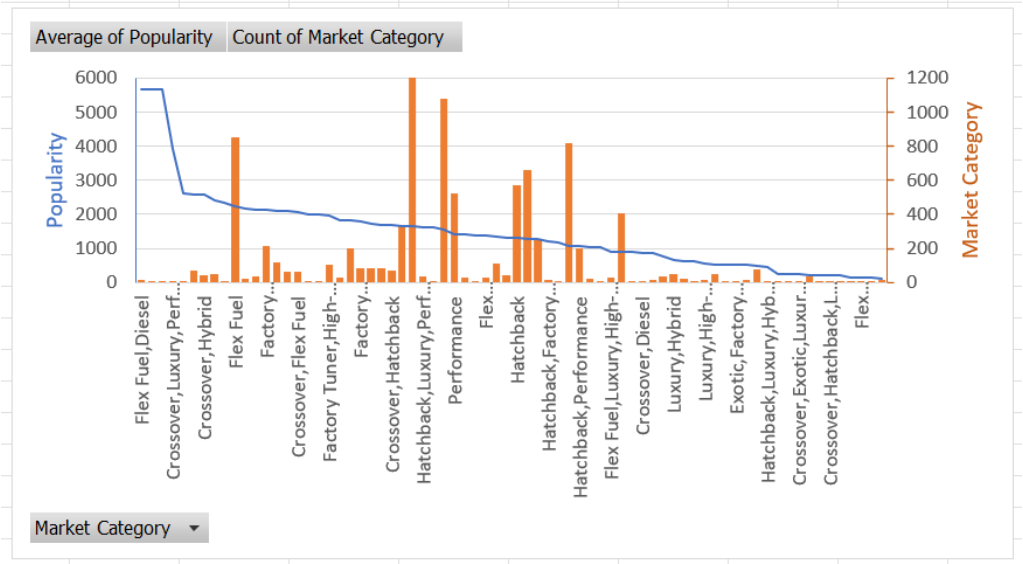

Engine HP
Engine Cylinders
Highway MPG
City MPG
Popularity
MSRP

The outliers in the dataset belong to a specific category in the dataset.
For example, outliers in ‘Engine HP’ represented cars that require maximum engine power, that is, all cars that in sports/luxury category.
Hence, these outliers were not removed. The only outlier in ‘Popularity’ column was removed.

4. Analysis:

a) Understanding relation between market category and its popularity:

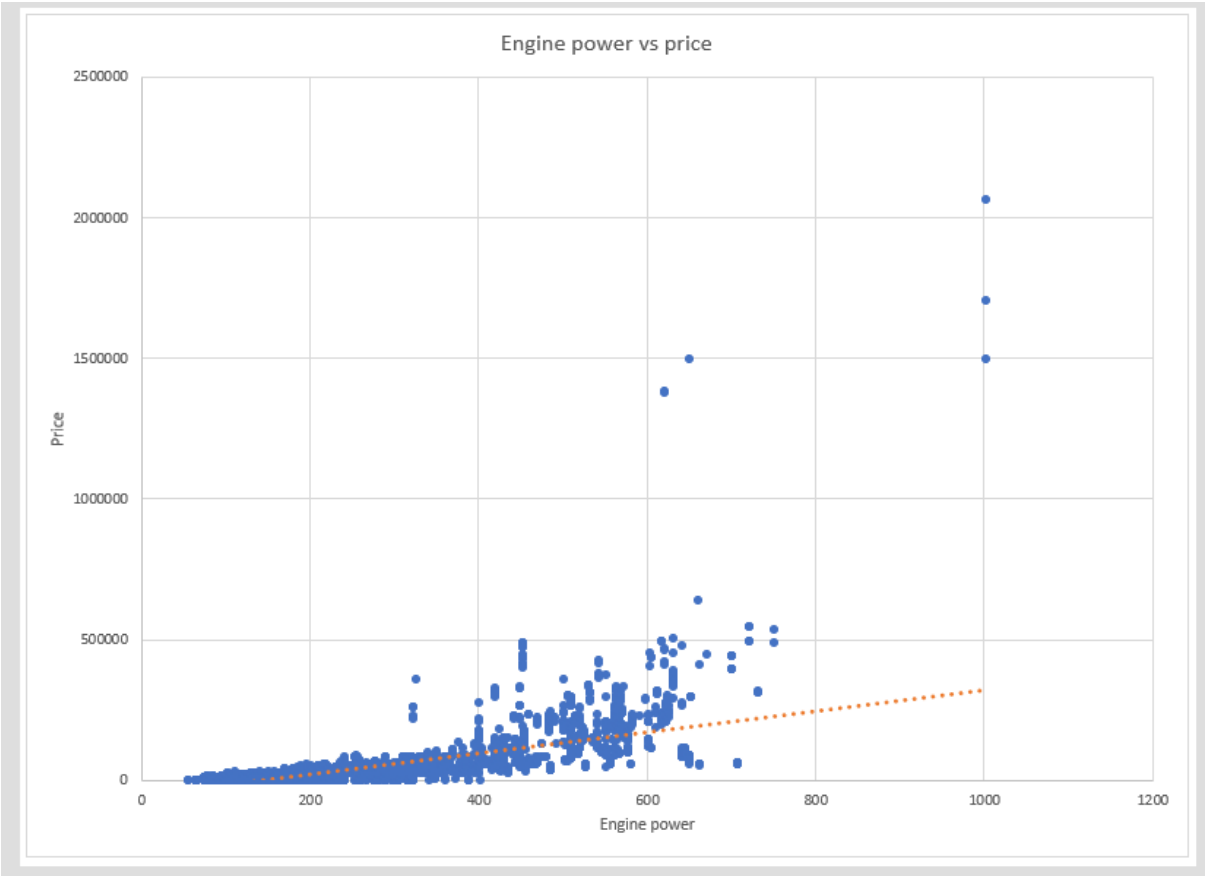
market category	Average of Popularity	Count of Market Category
Flex Fuel,Diesel	5657	16
Hatchback,Flex Fuel	5657	7
Crossover,Flex Fuel,Performance	5657	6
Crossover,Luxury,Performance,Hybrid	3916	2
Crossover,Factory Tuner,Luxury,Performance	2607	5
Crossover,Performance	2586	69
Crossover,Hybrid	2563	42
Diesel,Luxury	2416	47
Luxury,Performance,Hybrid	2333	11
Flex Fuel	2226	855
Hatchback,Factory Tuner,Performance	2174	21
Crossover,Luxury,Diesel	2149	34
Factory Tuner,Luxury,High-Performance	2133	215
Hybrid	2117	121
Hatchback,Hybrid	2111	64
Crossover,Flex Fuel	2074	64
Crossover,Hatchback,Factory Tuner,Performance	2009	6
Crossover,Hatchback,Performance	2009	6
Factory Tuner,High-Performance	1966	104
Crossover,Factory Tuner,Luxury,High-Performance	1823	26
High-Performance	1823	198
Factory Tuner,Performance	1774	84
Diesel	1731	84
Flex Fuel,Performance	1680	87



Most Popular Cars: Flex Fuel, Diesel

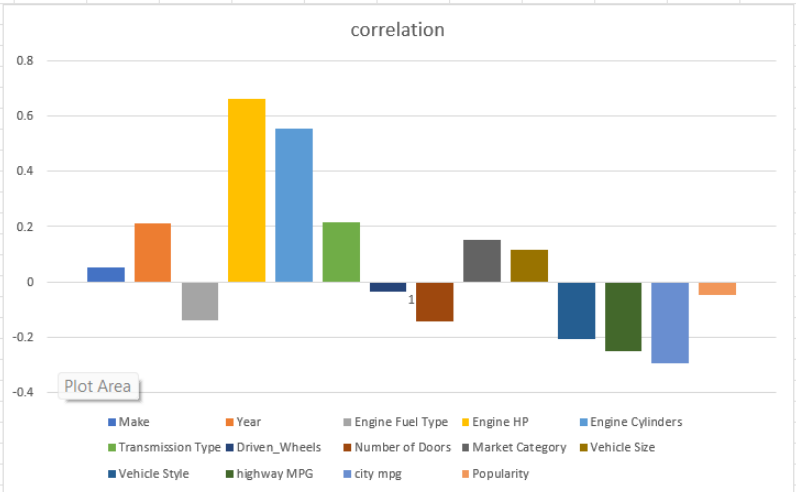
Least Popular Cars: Exotic, luxury

b) Understanding relation between engine power and price of cars:



c) Correlation of each car feature and the price of cars:

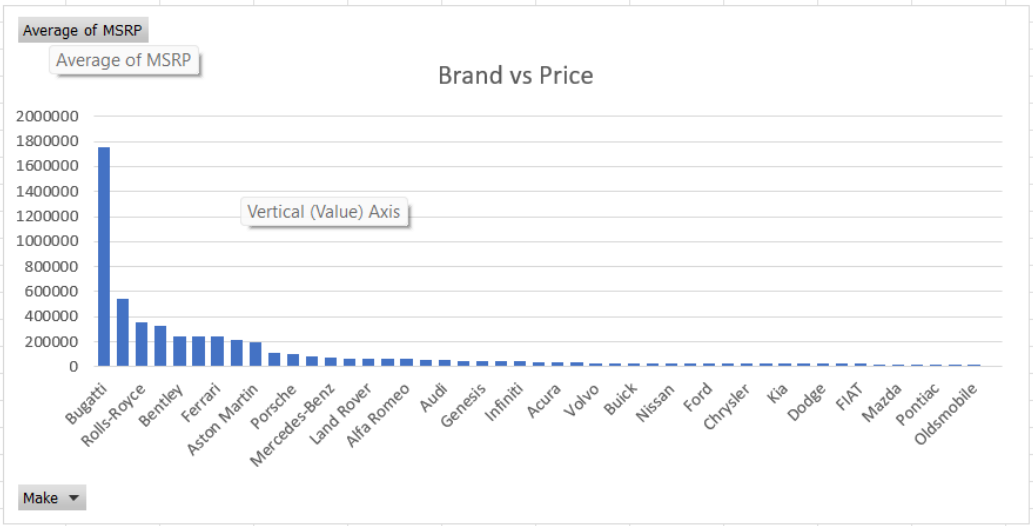
correlation with MSRP	
Make	0.051879
Year	0.211529
Engine Fuel Type	-0.138295
Engine HP	0.660886
Engine Cylinders	0.555365
Transmission Type	0.214419
Driven_Wheels	-0.035394
Number of Doors	-0.144914
Market Category	0.150428
Vehicle Size	0.116215
Vehicle Style	-0.207681
highway MPG	-0.252349
city mpg	-0.293097
Popularity	-0.048294



Engine HP and Engine Cyclinders have the highest positive correlation coefficient

d) Understanding relation between car manufacturers and price of cars:

Row Labels	Average of MSRP
Bugatti	1757223.667
Maybach	546221.875
Rolls-Royce	351130.6452
Lamborghini	331567.3077
Bentley	247169.3243
McLaren	239805
Ferrari	238218.8406
Spyker	214990
Aston Martin	198123.4615
Maserati	113684.4909
Porsche	101622.3971
Tesla	85255.55556
Mercedes-Benz	72069.52786

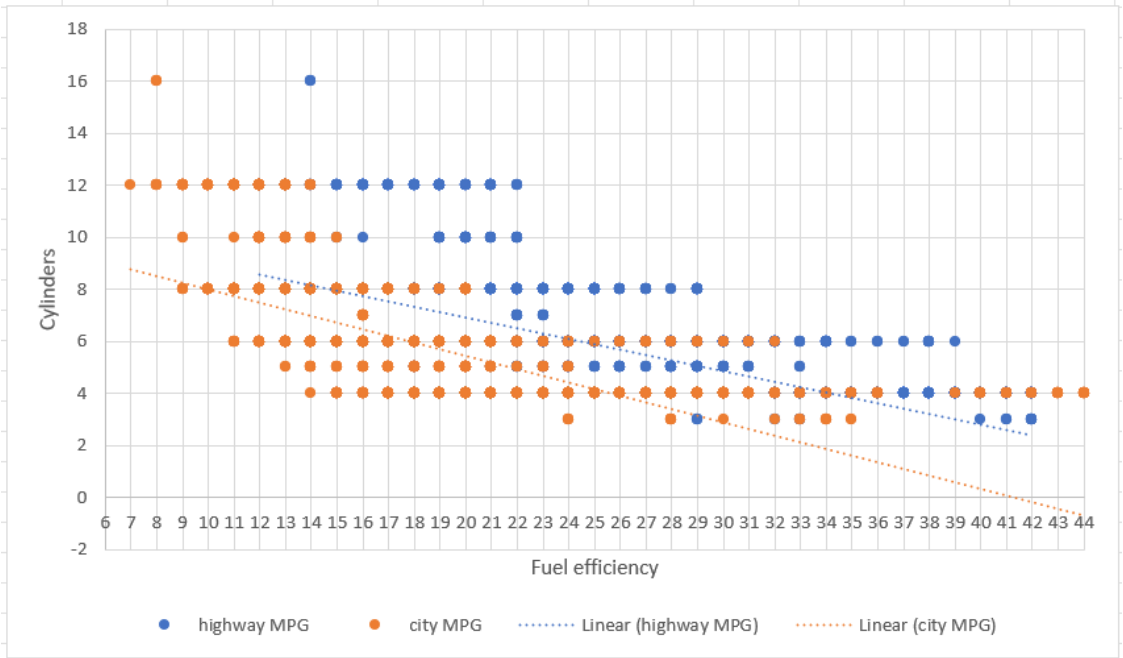


Cars like Bugatti,Maybach, Rolls-Royce are the most expensive cars as they provide luxury

Cars like suzuki, oldsmobile, plymouth are everyday cars and hence are least priced

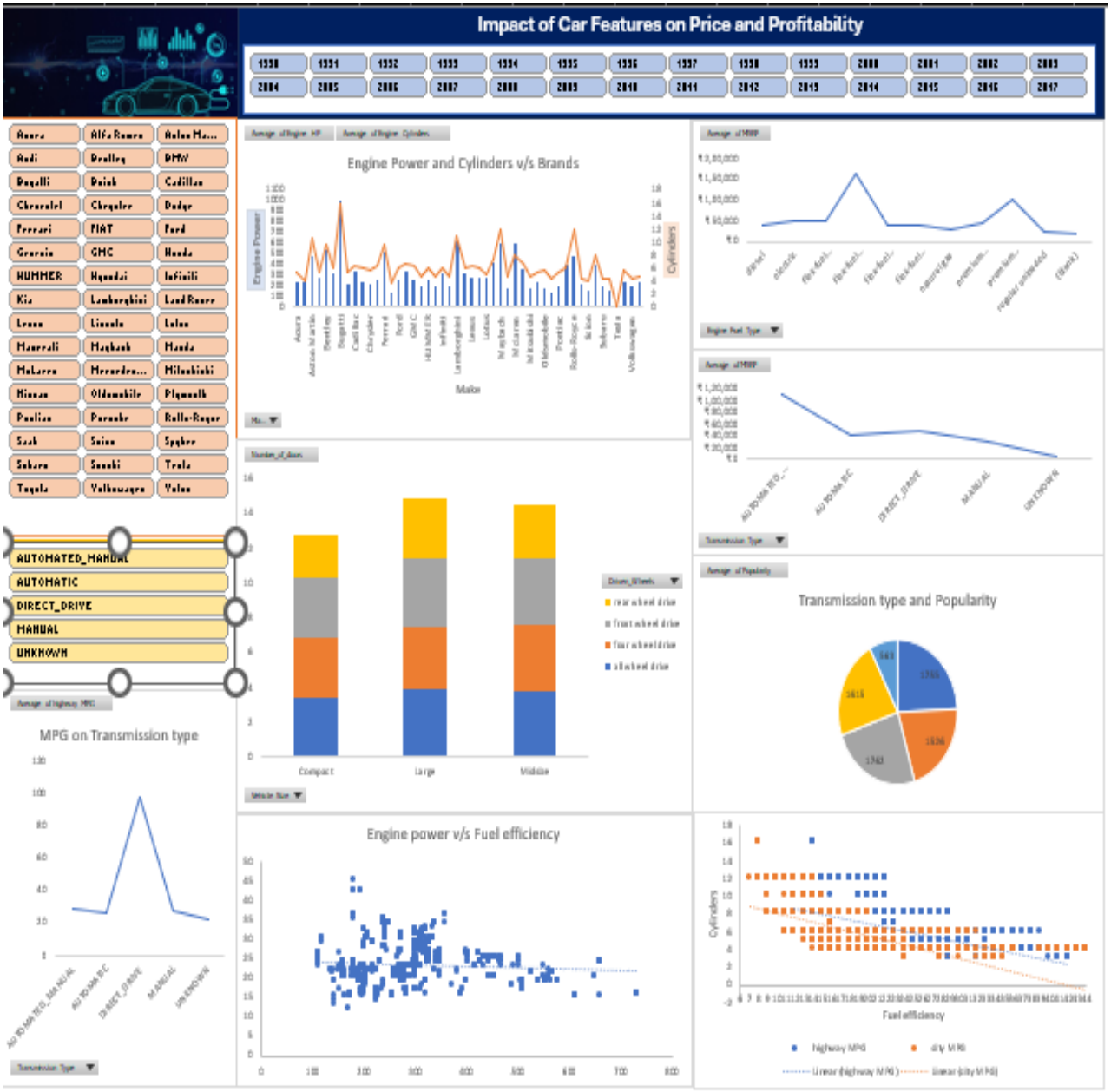
e) Fuel efficiency v/s Number of cylinders:

highway MPG	city mpg	Engine Cylinders
26	19	6
28	19	6
28	20	6
28	18	6
28	18	6
28	18	6
26	17	6
28	20	6
28	18	6
27	18	6
28	20	6



It can be seen that as efficiency and number of cylinders are inversely proportional.

f) Dashboard:
The dashboard is created using slicers and pivot charts in excel.



- **Conclusion**: In conclusion, this project underscores the importance of understanding the impact of car features on pricing in the automotive industry. By leveraging Excel for data analysis, we have equipped stakeholders with actionable insights to navigate the competitive landscape and drive business success.

- Link to my excel sheet:

  click here to get my excel sheet