ANALYZING IMPACT OF CAR FEATURES ON PRICE AND PROFITABILITY

Project Description:

The project analyzing impact of car features on price and profitability is about finding the required insights for the client from the automotive industry which is evolving very fast. The problem statement is how can a car manufacturer optimize pricing and product development decision while meeting consumer demand. We are provided by a raw data called Car_data.sv.

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

After downloading the raw data we use various cleaning techniques to clean the raw data to make the data ready for analysis . During cleaning we get rid of all duplicate values in the data set . Then we delete all the blank rows to ensure better analysis. Once the cleaning is done we look to delete the columns which are of no use in analysis but in this dataset there was no column which could be deleted.

Approach:

The main approach towards this project is to first understand the dataset provided. Then using various cleaning techniques we can clean the data and get rid of null values and duplicates to prepare data for analysis stage . We will use various data analysis techniques like using pivot tables, fuctions , regression analysis to find the insights required At the end we will display the insights extracted using various tables and charts to make an interactive dashboard and make it more easy to quickly understand the insights acquired

<u>Tech used</u>: The main software used during the project is Microsoft Excel

Insights:

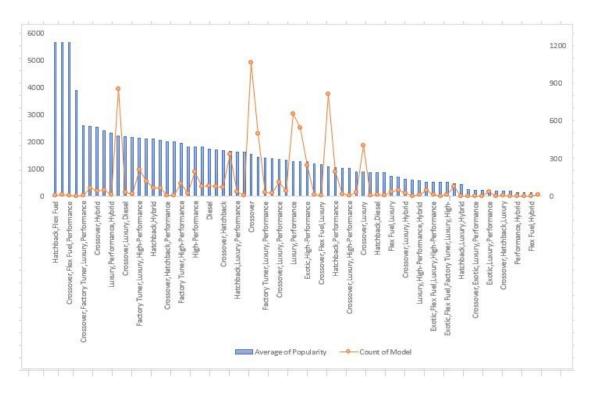
- 1) How does the popularity of a car model vary across different market categories?
 - **Task 1.A:** Create a pivot table that shows the number of car models in each market category and their corresponding popularity scores.

Market	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	5
Crossover, Performance	2586	69
Crossover,Hybrid	2563	42
Diesel,Luxury	2416	47
Luxury,Performance,Hybrid	2333	11
Flex Fuel	2226	855
Crossover,Luxury,Diesel	2196	33
Hatchback,Factory Tuner,Performance	2174	21
Factory Tuner,Luxury,High-Performance	2133	215
Hybrid	2117	121
Hatchback, Hybrid	2111	64
Crossover,Flex Fuel	2074	64
Crossover, Hatchback, Performance	2009	6
Crossover, Hatchback, Factory Tuner, Performance	2009	6
Factory Tuner, High-Performance	1966	104
Crossover, Factory Tuner, Luxury, High-Performance	1823	26
High-Performance	1823	198
Factory Tuner, Performance	1818	81
Diesel	1731	84
Flex Fuel,Performance	1702	81
Crossover, Hatchback	1676	72
Luxury, High-Performance	1668	334
Hatchback,Luxury,Performance	1632	36
Crossover,Flex Fuel,Luxury,Performance	1624	6
Crossover	1539	1068
Performance	1443	503
Factory Tuner,Luxury,Performance	1413	31
Flex Fuel,Luxury,Performance	1380	28
Crossover,Luxury,Performance	1349	112
Hatchback,Luxury	1323	45
Luxury,Performance	1293	659
Hatchback	1279	547

Exotic, High-Performance	1276	246
Hatchback,Factory Tuner,High-Performance	1205	13
Crossover,Flex Fuel,Luxury	1173	10
Luxury	1084	815
Hatchback,Performance	1074	198
Exotic,Factory Tuner,High-Performance	1046	21
Crossover,Luxury,High-Performance	1037	9
Flex Fuel,Luxury,High-Performance	898	32
Crossover,Luxury	889	406
Hatchback, Factory Tuner, Luxury, Performance	887	9
Hatchback, Diesel	873	14
Crossover, Diesel	873	7
Flex Fuel,Luxury	747	39
Luxury,Hybrid	725	48
Crossover,Luxury,Hybrid	631	24
Factory Tuner,Luxury	617	2
Luxury, High-Performance, Hybrid	569	12
Exotic,Factory Tuner,Luxury,High-Performance	523	51
Exotic,Flex Fuel,Luxury,High-Performance	520	11
Exotic,Factory Tuner,Luxury,Performance	520	3
Exotic,Flex Fuel,Factory Tuner,Luxury,High-Performance	520	13
Exotic,Luxury,High-Performance	473	77
Hatchback,Luxury,Hybrid	454	3
Flex Fuel,Factory Tuner,Luxury,High-Performance	258	1
Crossover,Exotic,Luxury,Performance	238	1
Crossover,Exotic,Luxury,High-Performance	238	1
Exotic,Luxury,Performance	217	36
Crossover,Factory Tuner,Performance	210	4
Crossover,Hatchback,Luxury	204	7
Exotic,Luxury,High-Performance,Hybrid	204	1
Performance,Hybrid	1 Chart Title	1 2
Flex Fuel,Performance,Hybrid	155	2
Flex Fuel, Hybrid	155	2
Exotic, Luxury	113	12
Grand Total	1513	7736

We create the pivot table required by putting market category in rows and calculating average popularity and count of model in every market category.

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



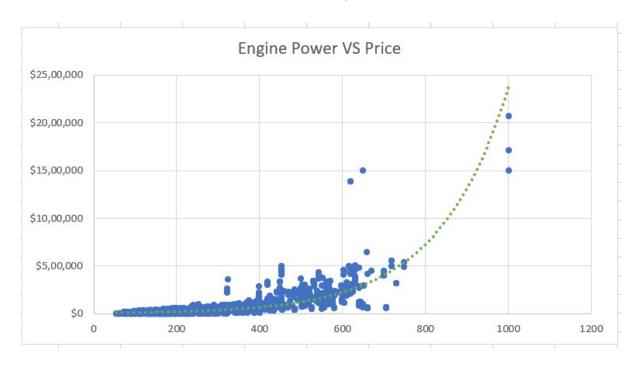
From the above graph we find out that Market Categories like

- Hatchback, Flex Fuel ,
- > Crossover, Flex Fuel, Performance
- > Flex Fuel, Diesel

are the most popular among all.

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

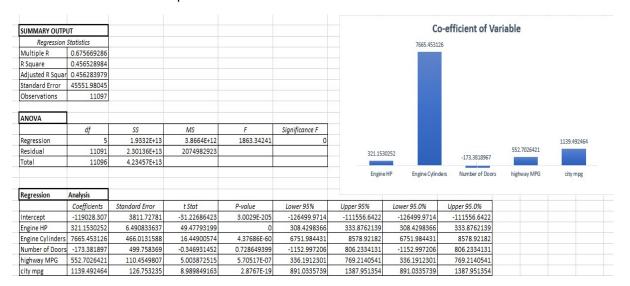
• **Task 2:** Create a scatter chart that plots engine power on the x-axis and price on the y-axis. Add a trendline to the chart to visualize the relationship between these variables.



We create this scatter plot using Engine HP and MSRP columns from the table and add a trendline to analyze the trend . From the above graph we can say that as the engine power increases the price of the car increases .

3) 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.



We already have some car features like engine hp , engine cylinders , number of doors , highway and city mpg which contribute in determining the car's price . To find the most important feature we use regression analysis on the columns mentioned above to find out the co efficient value of each variable which helps to determine the feature . The final decision is based on which variable co efficient value is highest . The variable with highest co efficient value is the most important feature . From the above graph we can say that engine cylinders is the most important feature to determine the car's price whereas number of doors is the least important feature .

4) 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.



33	Mazda	\$20,107
34	McLaren	\$2,39,805
35	Mercedes-Benz	\$72,135
36	Mitsubishi	\$21,316
37	Nissan	\$28,856
38	Oldsmobile	\$12,844
39	Plymouth	\$3,297
40	Pontiac	\$19,899
41	Porsche	\$1,01,622
42	Rolls-Royce	\$3,51,131
43	Saab	\$27,880
44	Scion	\$19,933
45	Spyker	\$2,14,990
46	Subaru	\$24,241
47	Suz <mark>uki</mark>	\$18,021
48	Toyota	\$28,759
49	Volkswagen	\$28,947
50	Volvo	\$29,725
51	Grand Total	\$41,928

We create the pivot by keeping the Make(brand) of car in rows and then calculate average msrp for each brand in pivot table .

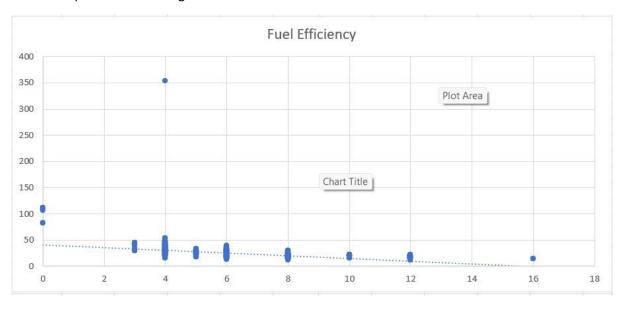
• **Task 4.B:** Create a bar chart or a horizontal stacked bar chart that visualizes the relationship between manufacturer and average price.



From the above tasks performed we can analyze that Buggati Brand of car have the highest average msrp where Plymouth brand has lowest average msrp of the car.

5) 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.

Co-relation coefficient	-0.61474

From the above task performed we can say that along the line as the number of cylinders in a car increases it has a negative effect on the highway mpg i.e highway mpg also decreases . If we want to keep higway mpg as high as possible there should only be 4 cylinders in the car .

We also found out the co-relation coefficient between cylinders and highway mpg using CORREL() function in excel . It gave a negative value which indicates that the relationship between these two variable is not strong . We also added a trend line to analyze the trend which suggests that it is going in negative direction which is not good for the industry .

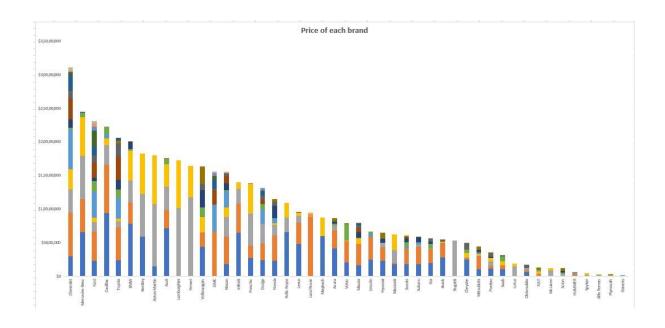
Building a dashboard:

The next part of the project is to create an interactive dashboard in excel to help the client visualize the data easily and make decisions based on the dashboard result . We make use of various charts, slicers and filters to help make the dashboard very interactive .

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

1 Sum of MSRP					'	-,-			10 10 10 10 10 10 10 10 10 10 10 10 10 1				"	,			
2 Row Labels -	Sedan	4dr SUV	Coupe	Convertible	Crew Cab Pickup	Wagon	4dr Hatchback	Extended Cab Pickup	Passenger Minivan	2dr Hatchback	Regular Cab Pickup	Passenger Van	Cargo Van	2dr SUV	Cargo Minivan	Convertible SUV	Grand Total
8 Chevrolet	\$29,42,632	\$65,09,468	\$35,04,525	\$29,53,245	\$59,27,617	\$3,00,675	\$12,09,735	\$31,17,951	\$10,47,240	\$8,000	\$22,60,032	\$5,99,670	\$74,688	\$1,93,310	\$4,20,150	\$1,06,300	\$3,11,75,238
Mercedes-Benz	\$65,43,743	\$49,24,810	\$64,73,107	\$57,53,964	10.000	\$6,46,035	\$1,22,800	2 NA 2	\$32,500		3 400 9	765 7	100	1000	\$28,950	1000	\$2,45,25,909
5 Ford	\$22,79,348	\$43,70,871	\$13,98,144	\$7,30,007	\$37,82,518	\$16,23,565	\$4,80,155	\$22,85,584	\$10,39,010	\$24,000	\$12,99,240	\$24,29,898	\$5,56,351	\$4,67,873	\$3,94,000		\$2,31,60,564
6 Cadillac	\$94,16,847	\$71,82,555	\$29,53,574	\$9,85,607	\$5,99,150	\$11,84,100	WW 0	1 100	0 100			70 0	100 0	577.00	3100 0		\$2,23,21,833
7 Toyota	\$23,80,826	\$49,57,050	\$8,11,995	\$3,86,668	\$31,31,895		\$13,97,750	\$34,91,424	\$19,52,518	\$4,73,750	\$3,69,446						\$2,05,91,277
8 BMV	\$78,29,700	\$31,60,950	\$33,04,051		- A 100	\$2,59,600				\$80,097							\$2,01,40,669
3 Bentles	\$59,20,900		\$63,56,760	\$60,12,870		1	***************************************										\$1,82,90,530
10 Aston Martin	\$14,48,735		\$92,58,845														\$1,80,29,235
fi Audi	\$71,44,348	\$26,74,900	\$35,56,290	\$32,91,405		\$8,47,350				\$4,000							\$1,75,18,293
12 Lamborghini		10 100	\$1,01,77,050	\$70,64,450		200				100	1						\$1,72,41,500
18 Ferrari			\$1,17,13,289	\$47,23,811													\$1,64,37,100
14 Volkswagen	\$44,34,595	\$20,84,955				\$14,24,825	\$25,66,055		\$9,06,430	\$26,06,540							\$1,63,26,316
15 GMC	***************************************	\$66.33,919		4.05.00	\$40,62,482		***************************************	\$21,75,866			\$12.84.328	\$5,99,670	\$4,60,085	\$1,28,319	\$1,42,750		\$1,56,38,049
16 Missan	\$17,63,130	\$41,49,630	\$29,37,632	\$14,06,552	\$24,22,300		\$10,23,090	\$10,26,379					*.,,,,,,,,,,	¥1,60,010	\$128,620		
17 Infiniti	\$64,90,009	\$43,40,200	\$21,75,750		457,55,000	\$610,000	\$10,00,000	410,60,010	\$1,0000	\$11,000	\$10,017				4(20,020	9,0,010	\$1,39,86,009
18 Porsche	\$27,13,500	\$18,15,200	\$47,58,533	\$45,04,586						\$28,827							\$1,38,20,646
19 Dodge	\$24,09,585	\$24,62,875	\$29,73,842		\$20,72,780	\$7,93,055	\$16,000	\$6,84,682	\$5,57,425			\$70,708	\$3,38,497	\$12,000	\$60,520		\$1,31,49,377
20 Honda	\$22,64,390	\$38,00,589	\$15,88,705	\$2,52,135	\$7,50,215		\$18,46,010	40,04,002	\$5,53,185		\$0,00,100	\$10,100	40,00,401	\$12,000	\$60,020		\$1,14,68,429
21 Rolls-Rosce	\$65,39,010	\$30,00,000	\$22,04,675	\$21,41,365	\$1,00,210		\$10,70,010		\$0,00,000	97,10,200							\$1,08,85,050
22 Lenus	\$48,37,596	\$31,52,974	\$10,16,472			\$31,105	\$94,700										\$96,04,912
28 Land Rover	910,01,000	\$88,39,200	\$10,10,412	\$4,72,000		\$35,000	\$34,100							\$4,76,394		\$1,45,731	
24 Maybach	\$59,76,800	\$00,33,200	3	\$27,62,750		_		8						ψ*,10,33*		\$1,70,101	\$87,39,550
25 Aoura	\$41,34,552	\$26,63,505	\$7,93,748			\$2,01360	\$3,57,440			\$4,80,917							\$86,31,522
26 Volvo	\$20,72,945	\$3131700	\$6,000			\$24,16,971	\$3,07,440			\$1,57,550							\$79,06,766
27 Mazda	\$16,18,571	\$31,75,515				\$33,350	\$8,53,180	\$5,80,033	\$4,43,130	\$1,07,000				\$12,000			\$78,81,770
28 Lincoln	\$24,58,245	\$34,22,570	\$17,342		\$4,53,260		\$0,00,100	\$0,00,033	\$4,43,600	\$10,000	\$2,00,400			\$12,000			\$66,21,122
23 Hyundai	\$23,23,987	\$19,94,390	\$6,85,920		\$4,03,260	\$2,03,700	\$5,28,880		\$1,33,075	\$7,89,650							\$64,55,902
80 Maserati	\$17,82,400	\$1,55,000	\$19,72,284			-	\$0,20,000		\$1,55,010	\$1,03,030							\$62,52,647
SI Suzuki	\$17,97,070	\$23,03,493	\$13,72,204	\$23,42,363	\$3,04,131	\$6,83,707	\$5,84,387	\$2.59,659		\$44,496				\$12,000		\$1,20,194	
32 Subaru	\$18,33,110	\$25,03,483	\$3,54,476		\$3,65,975			\$2,03,003		\$12,000				\$12,000		\$1,20,134	\$57,93,521
33 Kia	\$19,76,360	\$20,49,645			\$5,60,310	\$6,01,155			\$4,94,650								\$56,71,400
34 Buick	\$28,38,590	\$21,41,770	\$1,42,630			\$6,01,100			\$1,01,000								\$55,16,496
SS Bugatti	\$20,38,030	\$214(770	\$16,034	\$1,73,320		\$6,212			\$3,30,060								\$50,16,496 \$52,71,671
35 Chrysler	\$24,79,859	\$2,50,545		\$6,30,105		\$5,01,075			\$9,22,295	\$98,805				-			\$49,97,194
37 Mitsubishi	\$24,73,853	\$2,00,040	\$1,14,010	\$2,09,893	\$2,40,210		\$3,34,850	\$134,360	\$9,22,290						\$2,000		\$43,69,852
SI Pontiac	\$10,58,563	\$4,01,550	\$6,63,715		\$2,40,210	\$20,855	\$1,62,975	\$1,34,350	\$2,000 \$5,39,192						\$2,000		\$43,63,802
33 Saab	\$10,66,500	\$5,41,905	\$6,63,710	\$6,32,628		\$7,51280	\$1,62,970		\$0,39,82	\$1,63,000							\$30,38,899
40 Lotus	\$10,66,000	\$0,41,800	\$15,01,300			\$7,51,280	\$34,086			\$12,000							\$30,38,899
41 Oldsmobile	\$6,67,161	\$2,38,150	\$10,01,300			\$20,000			\$4,92,055								\$19,14,060
42 FIAT	\$6,67,161	\$2,38,00		\$3,27,965		\$20,000		0	\$4,82,000	\$3,25,315							\$16,30,381
48 McLaren		\$3,63,300		\$3,27,960		\$2,87,570				\$3,20,310							\$13,10,100
45 McLaren 44 Scion	400.000		\$9,18,800 \$3,30,210			4101 ***	4000470			40.00.00							\$11,95,950
	\$32,500	*******	\$3,30,210		40.00.00	\$1,84,445	\$2,82,470			\$3,66,325							\$11,95,950 \$6,19,895
45 HUMMER		\$3,77,490	*****	404000	\$2,42,405	1											\$6,19,895
46 Spyker			\$2,09,990														
G Alfa Romeo	400 700		\$1,78,200	\$1,29,800			444.000		404000	*****							\$3,08,000
48 Plymouth	\$38,759		\$8,000	\$85,631		\$16,000	\$14,000		\$31,688	\$40,000							\$2,34,078
49 Genesis	\$1,39,850	40 00 00 000	** ** ** **	** ** **	40 40 54 000	44 45 00 050	** ** ***	A4 07 FF 000	44.00.40.400	******	404 50 054	400 00 040	A44 00 004	410 01 000	AM 20 000	45.00.000	\$1,39,850
50 Grand Total	\$11,28,11,251	\$3,88,26,386	\$3,06,44,584	\$6,53,68,643	\$2,43,54,938	\$1,45,28,950	\$1,40,97,183	\$1,37,55,938	\$1,00,40,408	\$65,69,829	\$61,59,854	\$36,99,946	\$14,29,621	¥13,01,896	\$11,76,990	\$5,03,300	\$46,52,69,717

To find out the distribution of car prices for different brands and body we first create a pivot by assigning the brand to rows and body style to columns and then calculating msrp for each brand and body style with the help of pivot table . To understand the pivot table better we created a stacked column chart and come to the conclusion that Chevrolet brand is producing car of every style so their total msrp is highest , whereas Genesis brand has lowest total msrp .

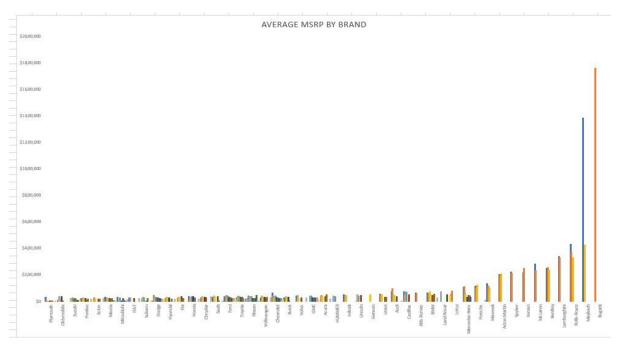


Task 2: Which car brands have the highest and lowest average MSRPs, and how does this vary by body style?

For this task we again create pivot table same like we did in the previous task the only difference is that instead of using sum of msrp in values section from above task this time we give average of msrp to pivot table to be calculated for each body type of every brand .

Myerage of Month	Column Labels	-	-		ka andras s				and the second				and the second				
			4dr SUV	Sedan	Crew Cab Pickup	Passenger Van			Extended Cab Pickup		Cargo Minivan	Convertible SUY	Regular Cab Pickup	Cargo Yan		2dr SU¥	Grand Total
Plymouth	\$28,544			\$2,769			\$2,113			\$2,000					\$2,000		\$3,29
Oldsmobile	\$2,000	\$10,616					\$32,804										\$12,84
Suzuki	A PARTICIPATION OF		\$21,133	\$17,971			The same of the sa	\$15,539		\$16,697		\$7,512			\$7,416	\$2,000	
Pontiac	\$22,547						\$21,566			\$18,108					\$18,167		\$19,89
Scion	2000	\$27,518		\$16,250			7,000,000	\$18,445		\$15,693			30000		\$20,351	100000	\$19,93
Mazda	\$28,081						\$23,323		\$11,601	\$20,809			\$9,155		\$2,000	\$2,000	\$20,10
Mitsubishi	\$29,985		\$26,101	\$24,058	\$26,690		\$2,000		\$19,194	\$12,879	\$2,000		\$2,000	2	\$12,764		\$21,31
FIAT	\$23,426		\$24,620					\$22,121							\$19,136		\$22,20
Subaru		\$16,113					C VIDEOUS	\$2,000		\$21,189			E		\$2,000		\$24,2
Dodge	\$2,000					\$14,142	\$25,338		\$16,302	\$2,000			\$14,850	\$12,537	\$2,000	\$2,000	
Hjundai		\$22,126					\$26,615			\$17,629					\$18,364		\$24,90
4 Kia		\$20,376	\$31,533	\$23,812			\$32,977	\$18,217		\$19,379							\$25,31
Honda	\$36,019						\$36,875			\$26,372					\$17,217		\$26,60
Chrysler	\$24,235						\$29,75			30000733					\$32,935		\$26,72
Saab	\$28,756		\$41,685				(f	\$34,149		\$2,034			Contract of the Contract of th		\$2,000	· vocanie	\$27,88
Ford	\$34,762						\$22,587			\$18,468	\$19,700		\$17,798	\$20,606	\$2,000	\$16,134	
Togota	\$25,778						\$30,039			\$22,187	0.000.00		\$17,593		\$18,950		\$28,75
0 Nissan	\$39,071						\$22,962		\$20,528	\$22,241	\$21,437	\$43,692	\$2,213		\$2,098		\$28,85
Yolkswagen	\$27,674						\$29,240			\$28,198			A CONTRACTOR OF THE PARTY OF TH		\$24,135		\$28,94
2 Chevrolet	\$62,835				\$39,256	\$28,556	\$24,934		\$24,170	\$18,329	\$20,007	\$17,717	\$19,825	\$8,299	\$2,000	\$13,808	\$29,00
8 Buick	\$25,618						\$30,000								2000000		\$29,00
1 Yolvo	\$40,533	\$2,000	\$45,387	\$22,290				\$26,27							\$26,258		\$29,72
5 GMC		2000000	\$37,480	No. of Control	\$39,062	\$28,556	\$25,105		\$27,896		\$23,792		\$25,183	\$21,909		\$7,125	
6 Aoura		\$39,687	\$42,960	\$33,614				\$33,560		\$51,063					\$17,176		\$35,08
HUMMER	- Constant	20000000	\$37,749		\$34,629					2							\$36,46
8 Infiniti	\$46,669	\$40,292	\$45,686	\$41,076													\$42,64
Lincoln		\$2,168	\$50,332	\$41,665	\$41,205			\$44,951		3				2			\$43,56
Genesis				\$46,617													\$46,6
Lenus	\$52,452	\$50,824	\$45,042	\$48,865			8	\$31,105		\$31,567							\$47,54
2 Audi	\$70,030	\$93,587	\$48,635	\$46,392				\$33,894							\$2,000		\$54,57
Cadillac	\$70,401						(\$47,384		2			/	()			\$56.36
Alfa Romeo	\$64,900	\$59,400			5,000,000												\$61,60
BMV	\$63,814		\$58,536	\$71,832		-		\$43,267		\$55,155					\$26,699		\$62,16
Land Rover			\$71,284	7				7,2				\$48,577			-	\$39,700	
Lotus	\$51658	\$75,065								2				25			\$68,37
Mercedes-Benz	\$1,04,618			\$48,834			\$32 500	\$43,069		\$40,933	\$28,950						\$72,13
Porsche	\$1,15,502										70,,,,,,				\$5,765		\$1,01,63
Maserati	\$1,30,165													-	\$0,100		\$1,13,68
Aston Martin	\$2,03,379			\$2,06,962			8										\$1,98,12
2 Spyker		\$2,09,990		42,.0,002													\$2,14,95
3 Ferrari		\$2,49,219															\$2,38,2
MoLaren	\$2,00,22E	\$2,29,700								-				-			\$2,39,80
5 Bentley		\$2,54,270		\$2,36,836						- >>							\$2,47.9
6 Lamborghini		\$3,28,292		40,00,000													\$3,315
Rolls-Royce		\$3,67,446		\$3,26,951													\$3,51,1
Maybach	\$13,81,375			\$4,26,994										-			\$5,46,2
3 Bugatti		\$17,57,224		97,20,319													\$17,57,22
Grand Total		\$17,57,224		A 40 47F	\$37.183	\$30.578	400 OF	\$26.084	\$23.842	\$22,061	\$20.293	\$17.975	\$17.855	\$17.019	440.000	\$14.307	\$11,51,2

Our main task is to analyze which brand has the lowest and highest average msrp . To find this we plot the pivot table into clusterd column chart



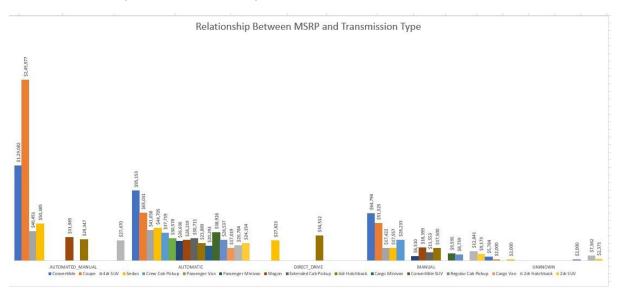
From the above chart we can say that Bugatti brand has the highest average msrp whereas Plymouth brand has the lowest average msrp for the cars .

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

For this we first create a pivot table using vehichle style for rows,transmission type for columns and with the help of pivot table we calculate average msrp .

1	Average of MSRP	Transmission Type					
2	Vehicle Style	AUTOMATED_MANUAL	AUTOMATIC	DIRECT_DRIVE	MANUAL	UNKNOWN	Grand Total
3	Convertible	\$1,29,082	\$95,153		\$64,794	\$5,784	\$88,217
4	Coupe	\$2,45,977	\$65,031		\$51,525	\$2,000	\$78,480
5	4dr SUV	\$40,451	\$41,658		\$17,422		\$40,736
6	Sedan	\$50,385	\$44,705	\$27,823	\$17,557	\$2,000	\$40,175
7	Crew Cab Pickup		\$37,719		\$28,233		\$37,183
8	Passenger Van		\$30,578				\$30,578
9	Passenger Minivan		\$26,636		\$6,510		\$26,215
10	Wagon	\$31,985	\$28,219		\$18,399		\$26,084
11	Extended Cab Pickup		\$30,711		\$11,553		\$23,042
12	4dr Hatchback	\$29,347	\$23,889	\$34,512	\$17,500		\$22,061
13	Cargo Minivan		\$20,293				\$20,293
14	Convertible SUV		\$38,926		\$9,595		\$17,975
15	Regular Cab Pickup		\$28,537		\$8,759	\$2,000	\$17,855
16	Cargo Van		\$17,019				\$17,019
17	2dr Hatchback	\$27,470	\$20,784		\$12,841	\$7,362	\$16,063
18	2dr SUV		\$24,154		\$9,173	\$2,371	\$14,307
19	Grand Total	\$1,08,719	\$41,852	\$33,620	\$28,285	\$3,648	\$41,928

To understand this pivot table more easily we created column chart .



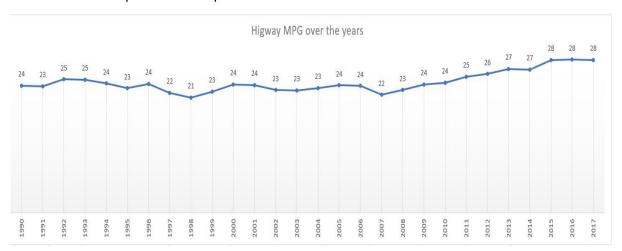
From above chart we can understand that Coupe and Convertible body style vehicles have high average msrp , whereas unkown transmission type vehicles have the lowest average msrp.

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

To find the efficiency of cars across different body styles and model years we use pivot table . We find out the average fuel efficieny (Highway MPG) of cars of different body style by assigning year and body style to rows and then asking pivot table to calculate average fuel efficiency(Highway MPG) over the years . Then we subgroup the year column to get fuel efficiency(Highway MPG) only for different years .

1	Years	¥	Average of highway MPG
2	± 1990		24
3	± 1991		23
4	± 1992		25
5	± 1993		25
6	± 1994		24
7	± 1995		23
8	± 1996		24
9	± 1997		22
10	± 1998		21
11	± 1999		23
12	± 2000		24
13	± 2001		24
14	± 2002		23
15	± 2003		23
16	± 2004		23
17	± 2005		24
18	± 2006		24
19	± 2007		22
20	± 2008		23
21	± 2009		24
22	± 2010		24
23	± 2011		25
24	± 2012		26
25	± 2013		27
26	± 2014		27

To understand this pivot table we plot line chart



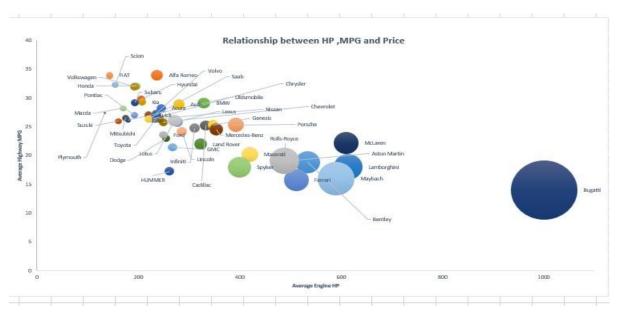
From the chart we understand that Fuel efficiency i.e. Highway MPG was increasing and decreasing year by year it was always between 24-22 Highway MPG from 1990-2007 but after 2007 fuel efficiency kept increasing .

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

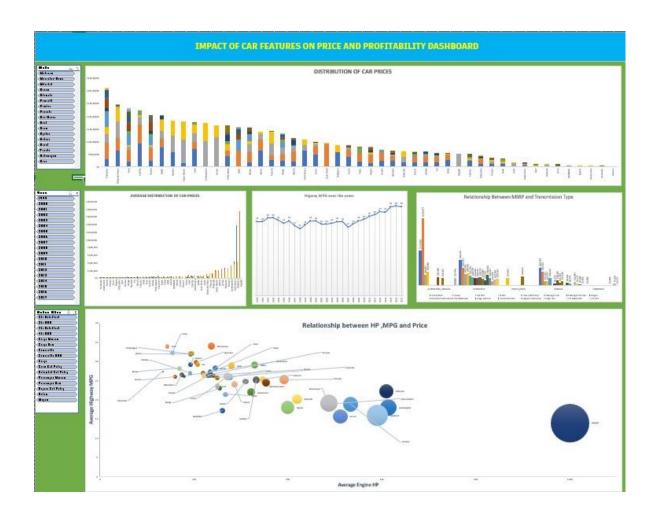
For this we create pivot table for Average Engine HP, MPG and MSRP for different brands

1	Brand -	Average of Engir	Average of highway	Average of MSRP
2	Acura	245	28	\$35,08
3	Alfa Romeo	237	34	\$61,60
4	Aston Martin	484	19	\$1,98,12
	Audi	280	29	\$54,57
6	Bentley	534	19	\$2,47,16
	BMV	330	29	\$62,16
8	Bugatti	1001	14	\$17,57,22
9	Buick	220	27	\$29,03
10	Cadillac	333	25	\$56,36
11	Chevrolet	250	26	\$29,00
12	Chrysler	229	26	\$26,72
13	Dodge	254	23	\$24,85
14	Ferrari	512	16	\$2,38,21
15	FIAT	144	34	\$22,20
16	Ford	250	24	\$28,52
17	Genesis	347	25	\$46,61
18	GMC	268	21	\$32,44
19	Honda	197	32	\$26,60
20	HUMMER	261	17	\$36,46
21	Huundai	205	30	\$24,92
	Infiniti	311	25	\$42,64
23	Kia	208	29	\$25,31
24	Lamborghini	614	18	\$3,31,56
25	Land Rover	323	22	\$68,06
26	Lexus	277	26	\$47,54
27	Lincoln	286	24	\$43,56
28	Lotus	272	26	\$68,37
29	Maserati	420	20	\$1,13,68
30	Maybach	591	16	\$5,46,22
31	Mazda	170	28	\$20.10
32	McLaren	610	22	\$2,39,80
33	Mercedes-Ber	354	25	\$72,13
34	Mitsubishi	174	27	\$21,31
35	Nissan	241	26	\$28,85
36	Oldsmobile	180	26	\$12,84
37	Plymouth	134	27	\$3,29
38	Pontiac	192	27	\$19,89
38 39	Pontiac	393	25	\$1,01,62
33 40	Rolls-Rouce	488	25	\$1,01,62
41	Saab	221	26	\$3,51,16
41 42	Scion	154	32	\$27,88 \$19,93
42 43		400	32 18	
	Spyker Subaru	193	18	\$2,14,99
44	Suzuki	193	29	\$24,24
45	- M. M. H. M. M. D. L.		26	\$18,02
46	Toyota	234		\$28,75
47	Volkswagen	193	32	\$28,94
48	Volvo Grand Total	235 254	27 26	\$29,72 \$41,92

To visualize this more efficiently we create a bubble chart where X-axis represents Avg Engine HP and Y-axis represents Avg Highway MPG for every brand and bubble size depends upon the average msrp of thar brand .



From the above graph we understand that as the engine hp increases MPG decreases and price also increases . For eg Bugatti car brand has the highest engine hp but has the lowest MPG and highest avg msrp .



Dataset attached of data analysis:

https://drive.google.com/file/d/1Dlqi-suqGO4FWJVLb_Uh7Hd6vPx5XTCG/view?usp=sharing

Dataset attached of Dashboard :

https://drive.google.com/file/d/1XbFz55KqDZfq8YOQx83hkbx95XfmBlp2/view?usp=sharing

Links for loom video

https://www.loom.com/share/7c974d04d630435b84513467c3cfaa9f (Part 1)

https://www.loom.com/share/636d105fa8364e3a8225141bb1901c88 (Part 2)

https://www.loom.com/share/1d2bf1f964fa467592d355467fe54929 (Part 3)

https://www.loom.com/share/c986c173f02d42e2bb1d1dfc265c5d5e (Part 4)

Results:

The most prominent results from the above analysis are as follows:

- Hatchback, Flex Fuel, Crossover, Flex Fuel, Performance, Flex Fuel, Diesel are most poplaur market categories for car.
- There are more models of Crossover category in the market
- More the HP more is the price of the car
- Engine cylinders is most important features in determining the price of the car
- As the no of engine cylinders in a car increases its highway mpg decreases .

During this project I got experience to handle vast amounts of data and perform analysis and use various charts for visualization and derive results . I also got experience to design a basic interactive dashboard in excel which will help me to become a better data analyst in future .