DATA EXPLORATION, VISUALIZATION AND ANALYSIS

Used Cars Price Prediction by using Machine Learning Methods

Platform used for analysis: IBM Cognos Analytics

Batch Members:

19951A0524 – K. Anirudh Sai

19951A0566 – Jayanth Naidu
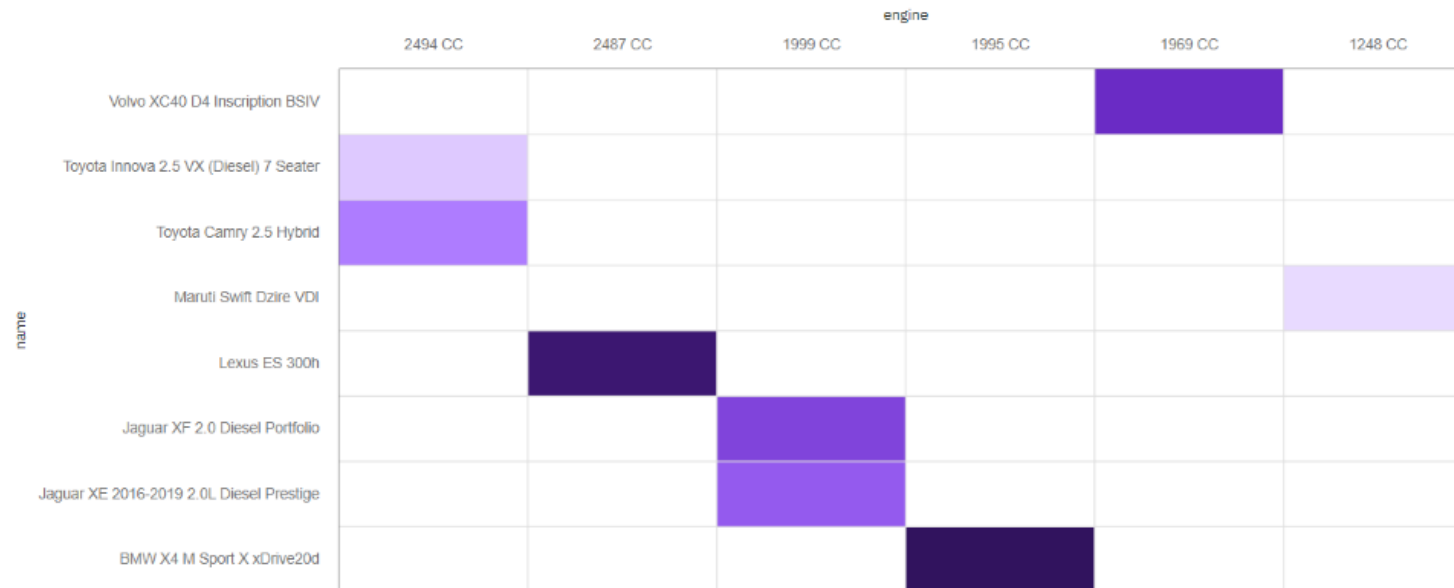
18951A05J7– P. Srinivasan

Supervisor Name-

Dr. Obulakonda Reddy

Associate Professor & Head

Computer Science and Engineering

selling_price by name and engine ⑤

selling_price (Ave...

578,658.88 5,461,290.32

engine

name	2494 CC	2487 CC	1999 CC	1995 CC	1969 CC	1248 CC
Volvo XC40 D4 Inscription BSIV					■	
Toyota Innova 2.5 VX (Diesel) 7 Seater	■					
Toyota Camry 2.5 Hybrid	■					
Maruti Swift Dzire VDI						■
Lexus ES 300h		■				
Jaguar XF 2.0 Diesel Portfolio			■			
Jaguar XE 2016-2019 2.0L Diesel Prestige			■			
BMW X4 M Sport X xDrive20d				■		

Details

The average of **selling_price** for all values of **name** and **engine** is 2,509,760.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 578,659 to a maximum of 5,461,290.

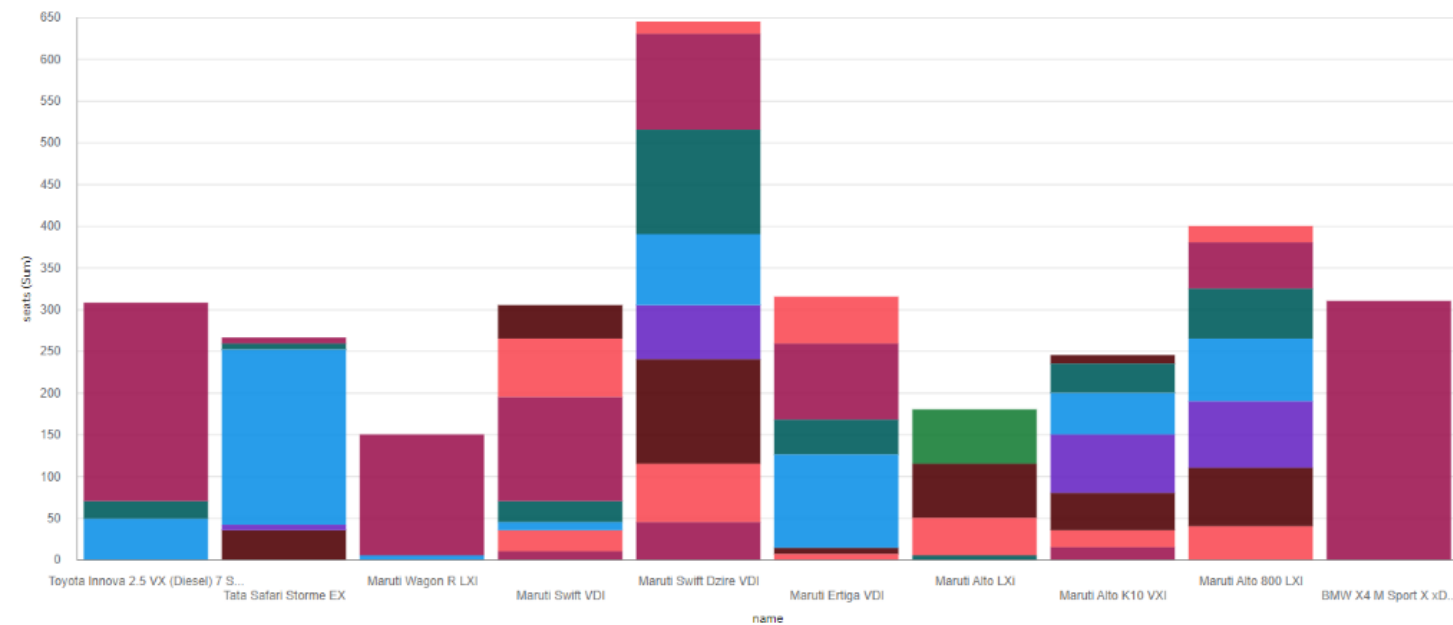**name** strongly drives **selling_price** (100%).

The value of **selling_price** is most unusual when the combinations of **name** and **engine** are BMW X4 M Sport X xDrive20d + 1995 CC, Lexus ES 300h + 2487 CC, Maruti Swift Dzire VDI + 1248 CC, Toyota Innova 2.5 VX (Diesel) 7 Seater + 2494 CC, Volvo XC40 D4 Inscription BSIV + 1969 CC and more.

Maruti Swift Dzire VDI is the most frequently occurring category of **name** with a count of 129 items (32.6 % of the total).

The value of **selling_price** is unusually high when the values of **name** are BMW X4 M Sport X xDrive20d and Lexus ES 300h.

seats by name colored by year

year
● 2019 ● 2018 ● 2017 ● 2016 ● 2015 ● 2014 ● 2013 ● 2012 ● 2011 ● 2010

X-axis (name): Toyota Innova 2.5 VX (Diesel) 7 S..., Tata Safari Storme EX, Maruti Wagon R LXI, Maruti Swift VDI, Maruti Swift Dzire VDI, Maruti Ertiga VDI, Maruti Alto LXi, Maruti Alto K10 VXI, Maruti Alto 800 LXI, BMW X4 M Sport X xD...

Y-axis: seats (Sum), 0 to 650

Details

The sum of **seats** for all values of **name** and **year** is 3124.

For **seats**, Maruti Swift Dzire VDI is the most important category of **name** with a total value of 645 (20.6 % of the total).

For **seats**, 2013 and 2015 are the most important categories of **year** with a total value of 1372 (43.9 % of the total).
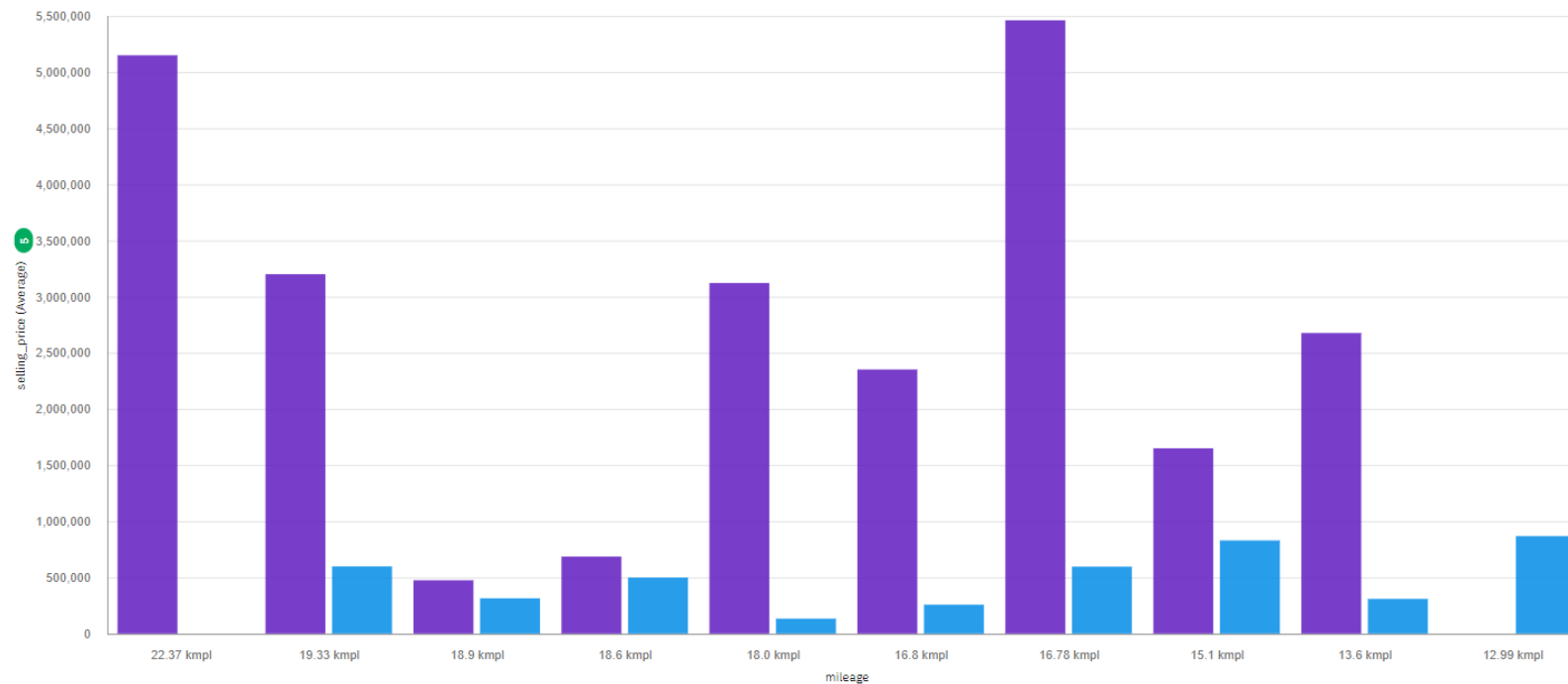
The summed values of **seats** over all combinations of the inputs range from a minimum of 5 to a maximum of 310.

The value of **seats** is most unusual when the values of **name** are Maruti Swift Dzire VDI, Maruti Wagon R LXI and Maruti Alto LXi.

The value of **seats** is unusually high when **year** is 2013.

selling_price by mileage colored by transmission

transmission
● Automatic ● Manual

Details

18.9 kmpl is the most frequently occurring category of **mileage** with a count of 225 items (22.3 % of the total).

Manual is the most frequently occurring category of **transmission** with a count of 749 items (74.3 % of the total).

mileage moderately drives **selling_price** (61%).

The value of **selling_price** is unusually high when **mileage** is 22.37 kmpl.

The average of **selling_price** for all values of **mileage** and **transmission** is 1,284,126.
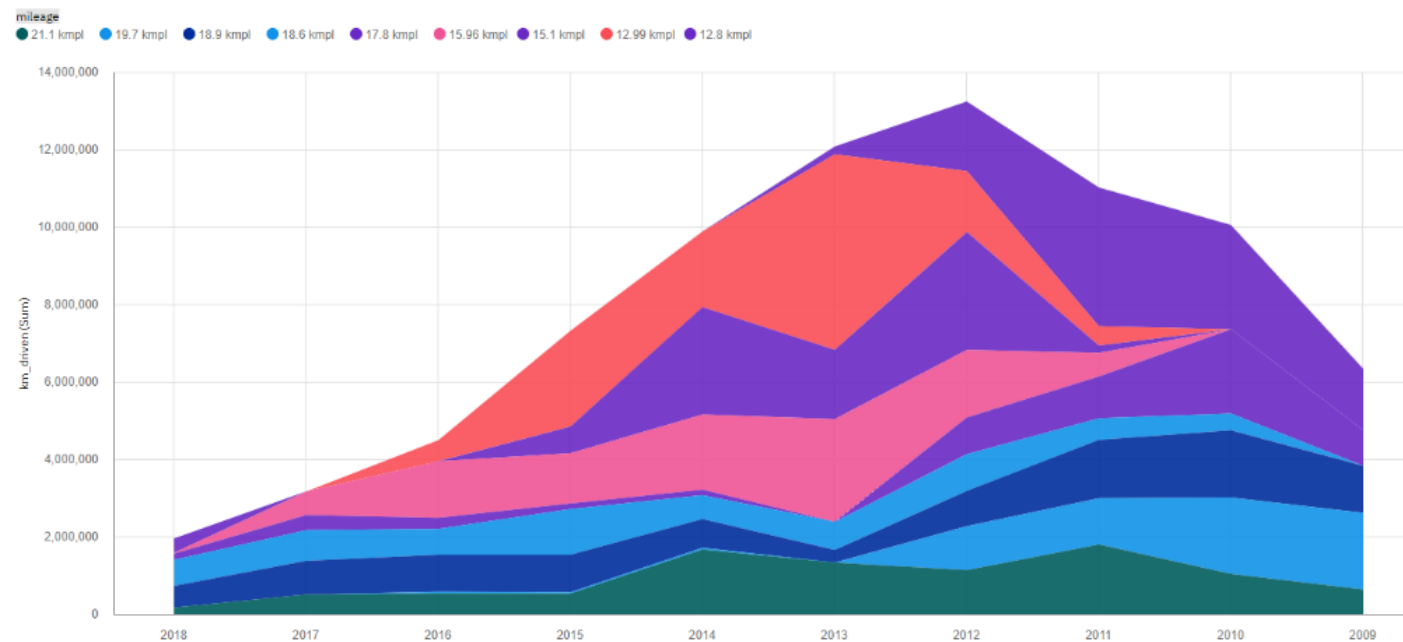
The average values of **selling_price** over all combinations of the inputs range from a minimum of 132,833 to a maximum of 5,461,290.

mileage and **transmission** strongly drive **selling_price** (96%).

The value of **selling_price** is unusually high when the combinations of **mileage** and **transmission** are 16.78 kmpl + Automatic and 22.37 kmpl + Automatic.

transmission strongly drives **selling_price** (71%).

km_driven by year colored by mileage

mileage
- 21.1 kmpl
- 19.7 kmpl
- 18.9 kmpl
- 18.6 kmpl
- 17.8 kmpl
- 15.96 kmpl
- 15.1 kmpl
- 12.99 kmpl
- 12.8 kmpl

Details

For **km_driven**, 12.99 kmpl is the most important category of **mileage** with a total value of 12,094,421 (15.2 % of the total).

The value of **km_driven** is unusually high when **mileage** is 12.99 kmpl.

For **km_driven**, 2012, 2013, 2011, 2010, and 2014 are the most important categories of **year** with a total value of 56,266,685 (70.7 % of the total).
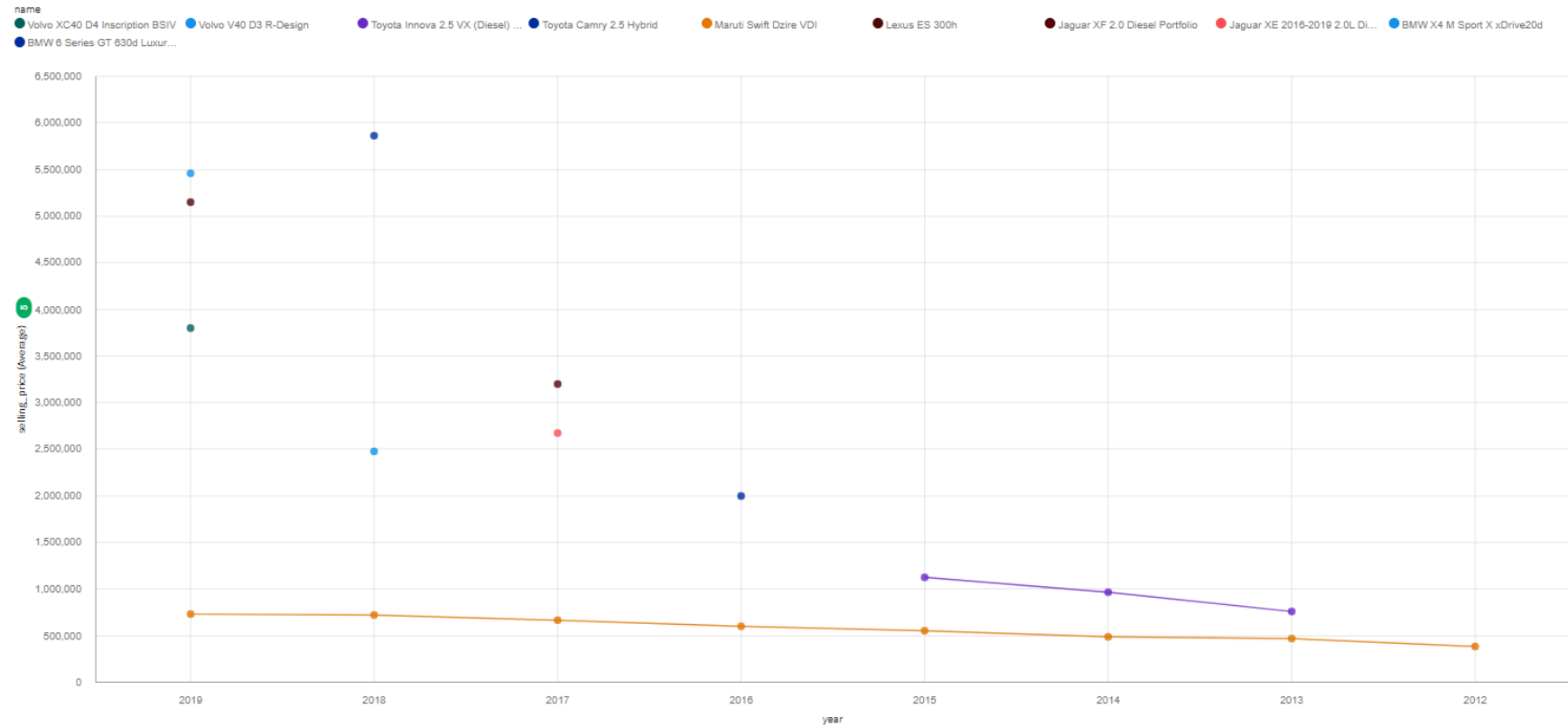
The value of **km_driven** is unusually low when **year** is 2018.

The sum of **km_driven** for all values of **year** and **mileage** is 79,533,963.

The summed values of **km_driven** over all combinations of the inputs range from a minimum of 20,000 to a maximum of 5,050,368.

The value of **km_driven** is unusually high when the combinations of **year** and **mileage** are 2013 + 12.99 kmpl, 2011 + 12.8 kmpl, 2012 + 15.1 kmpl, 2014 + 15.1 kmpl, 2010 + 12.8 kmpl and more.

selling_price by year colored by name

name
● Volvo XC40 D4 Inscription BSIV ● Volvo V40 D3 R-Design ● Toyota Innova 2.5 VX (Diesel) ... ● Toyota Camry 2.5 Hybrid ● Maruti Swift Dzire VDI ● Lexus ES 300h ● Jaguar XF 2.0 Diesel Portfolio ● Jaguar XE 2016-2019 2.0L Di... ● BMW X4 M Sport X xDrive20d
● BMW 6 Series GT 630d Luxur...

Details

2019 is the most frequently occurring category of **year** with a count of 135 items (31.3 % of the total).

Maruti Swift Dzire VDI is the most frequently occurring category of **name** with a count of 129 items (29.9 % of the total).

year strongly drives **selling_price** (71%).

The value of **selling_price** is most unusual when the values of **year** are 2019, 2014 and 2012.

name strongly drives **selling_price** (100%).

The value of **selling_price** is unusually high when the values of **name** are BMW 6 Series GT 630d Luxury Line, BMW X4 M Sport X xDrive20d and Lexus ES 300h.

The average of **selling_price** for all values of **year** and **name** is 2,554,060.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 381,667 to a maximum of 5,860,000.
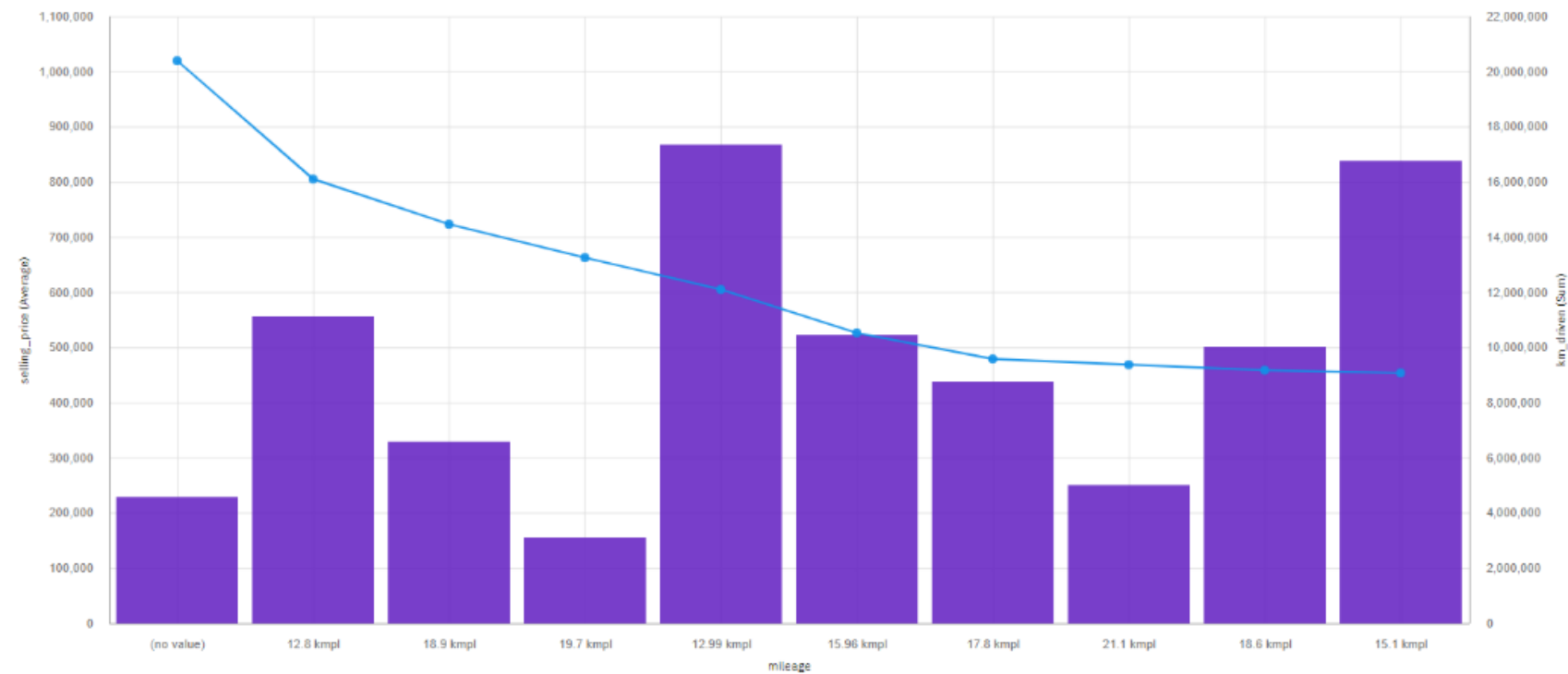
year and **name** strongly drive **selling_price** (100%).

The value of **selling_price** is unusually high when the combination of **year** and **name** is 2018 + BMW 6 Series GT 630d Luxury Line.

km_driven and selling_price by mileage

Column
● selling_price (Average)

Line
● km_driven (Sum)

Details

The average of **selling_price** for all values of **mileage** is 412,194.

The average values of **selling_price** range from a minimum of 156,234 (when **mileage** is 19.7 kmpl) to a maximum of 868,105 (when **mileage** is 12.99 kmpl).

mileage moderately drives **selling_price** (50%).

The value of **selling_price** is unusually high when the values of **mileage** are 12.99 kmpl and 15.1 kmpl.

18.9 kmpl (15.5 %) and (no value) (15.2 %) are the most frequently occurring categories of **mileage** with a combined count of 446 items (30.7 % of the total).

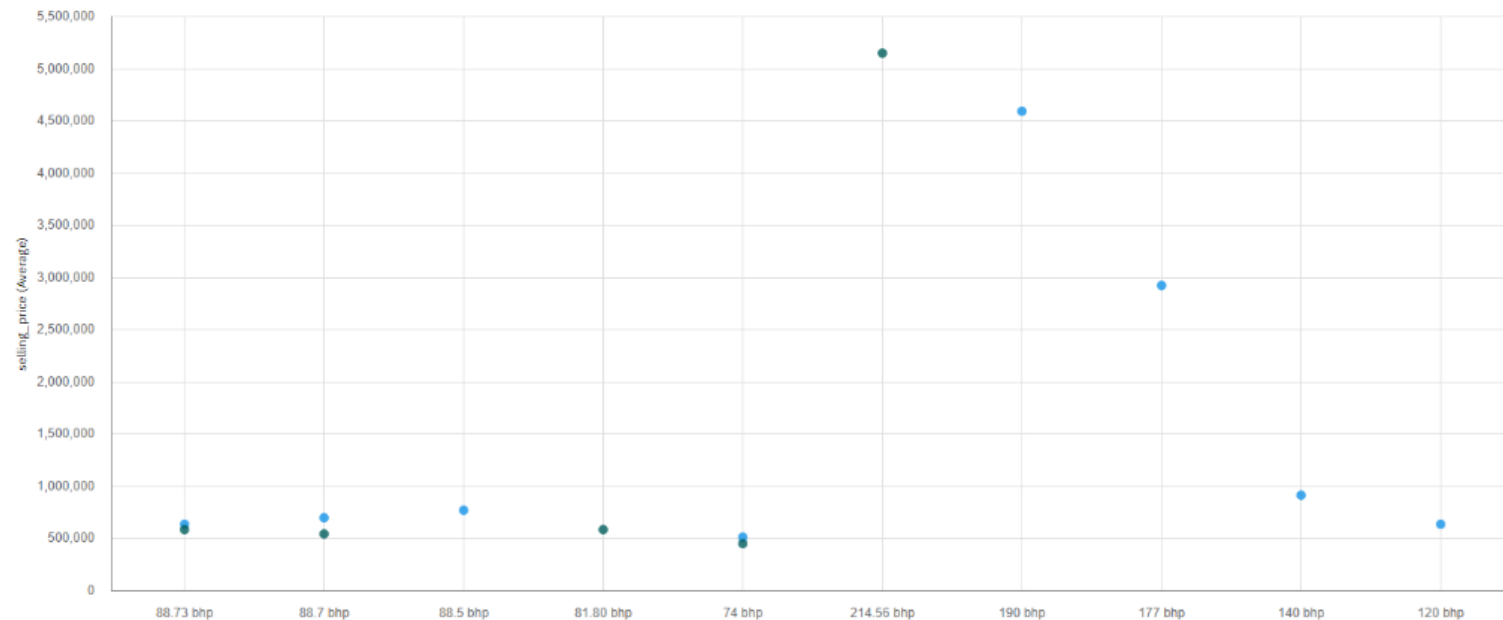The sum of **km_driven** for all values of **mileage** is 123,989,440.

The summed values of **km_driven** range from a minimum of 9,068,798 (when **mileage** is 15.1 kmpl) to a maximum of 20,387,440 (when **mileage** is (no value)).

The value of **km_driven** is unusually high when **mileage** is (no value).

selling_price by max_power colored by fuel

fuel
● Diesel ● Petrol

Details

74 bhp is the most frequently occurring category of **max_power** with a count of 377 items (24.3 % of the total).

max_power strongly drives **selling_price** (92%).

The value of **selling_price** is unusually high when the values of **max_power** are 214.56 bhp and 190 bhp.

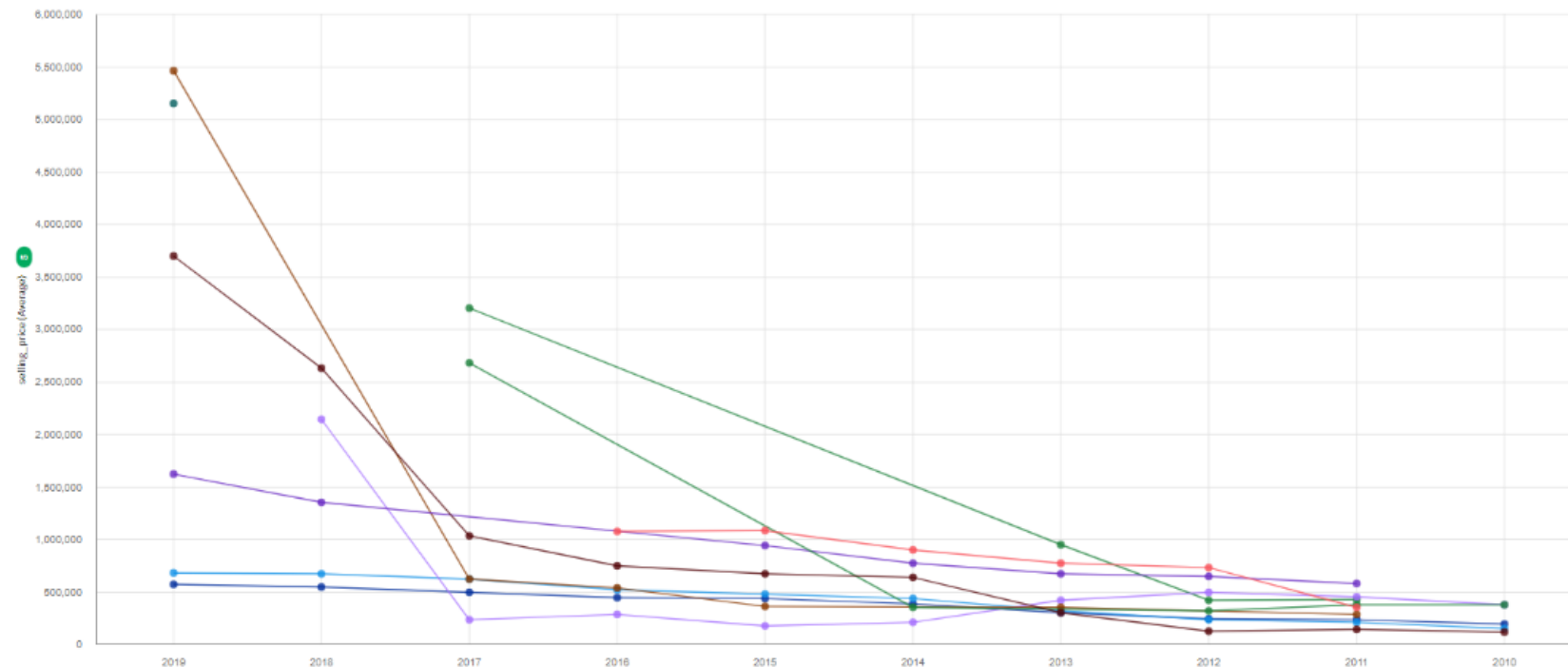The average of **selling_price** for all values of **max_power** and **fuel** is 1,112,463.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 451,556 to a maximum of 5,150,000.

The value of **selling_price** is unusually high when the combinations of **max_power** and **fuel** are 214.56 bhp + Petrol and 190 bhp + Diesel.

Diesel is the most frequently occurring category of **fuel** with a count of 1146 items (74 % of the total).

selling_price by year colored by mileage

mileage
● 22.37 kmpl ● 19.33 kmpl ● 18.9 kmpl ● 18.6 kmpl ● 18.0 kmpl ● 16.8 kmpl ● 16.78 kmpl ● 15.1 kmpl ● 13.6 kmpl ● 12.99 kmpl

Details

18.6 kmpl (18.4 %) and 18.9 kmpl (18.4 %) are the most frequently occurring categories of **mileage** with a combined count of 324 items (36.8 % of the total).

mileage moderately drives **selling_price** (61%).

The value of **selling_price** is unusually high when **mileage** is 22.37 kmpl.

2019 (18.4 %) and 2017 (18 %) are the most frequently occurring categories of **year** with a combined count of 320 items (36.4 % of the total).

year moderately drives **selling_price** (63%).

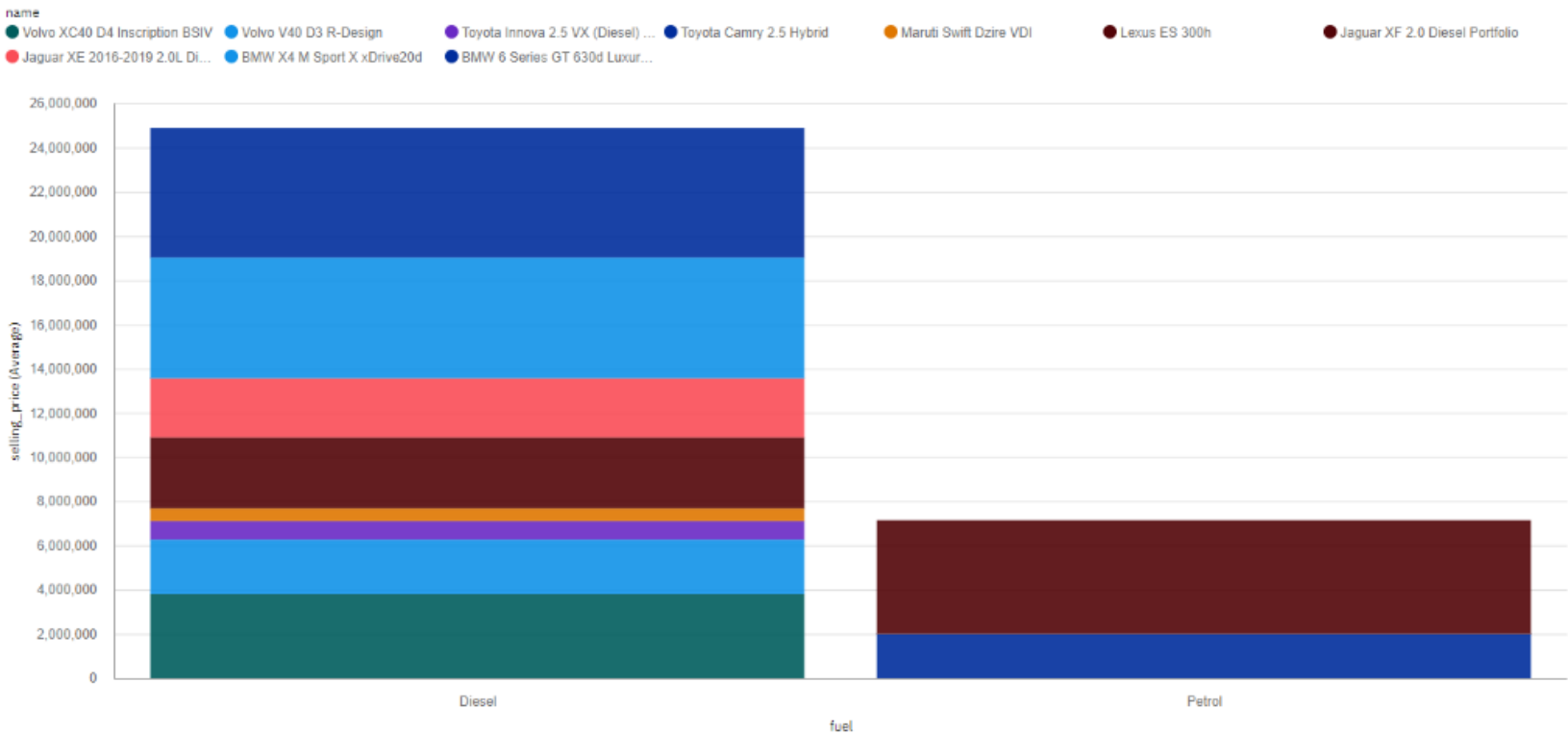The value of **selling_price** is unusually high when **year** is 2019.

The average of **selling_price** for all values of **year** and **mileage** is 1,447,497.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 116,100 to a maximum of 5,461,290.

year and **mileage** strongly drive **selling_price** (98%).

The value of **selling_price** is unusually high when the combinations of **year** and **mileage** are 2019 + 16.78 kmpl and 2019 + 22.37 kmpl.

selling_price by fuel colored by name

name

● Volvo XC40 D4 Inscription BSIV ● Volvo V40 D3 R-Design ● Toyota Innova 2.5 VX (Diesel) ... ● Toyota Camry 2.5 Hybrid ● Maruti Swift Dzire VDI ● Lexus ES 300h ● Jaguar XF 2.0 Diesel Portfolio
● Jaguar XE 2016-2019 2.0L Di... ● BMW X4 M Sport X xDrive20d ● BMW 6 Series GT 630d Luxur...

Details

Diesel is the most frequently occurring category of **fuel** with a count of 364 items (84.5 % of the total).

Maruti Swift Dzire VDI is the most frequently occurring category of **name** with a count of 129 items (29.9 % of the total).

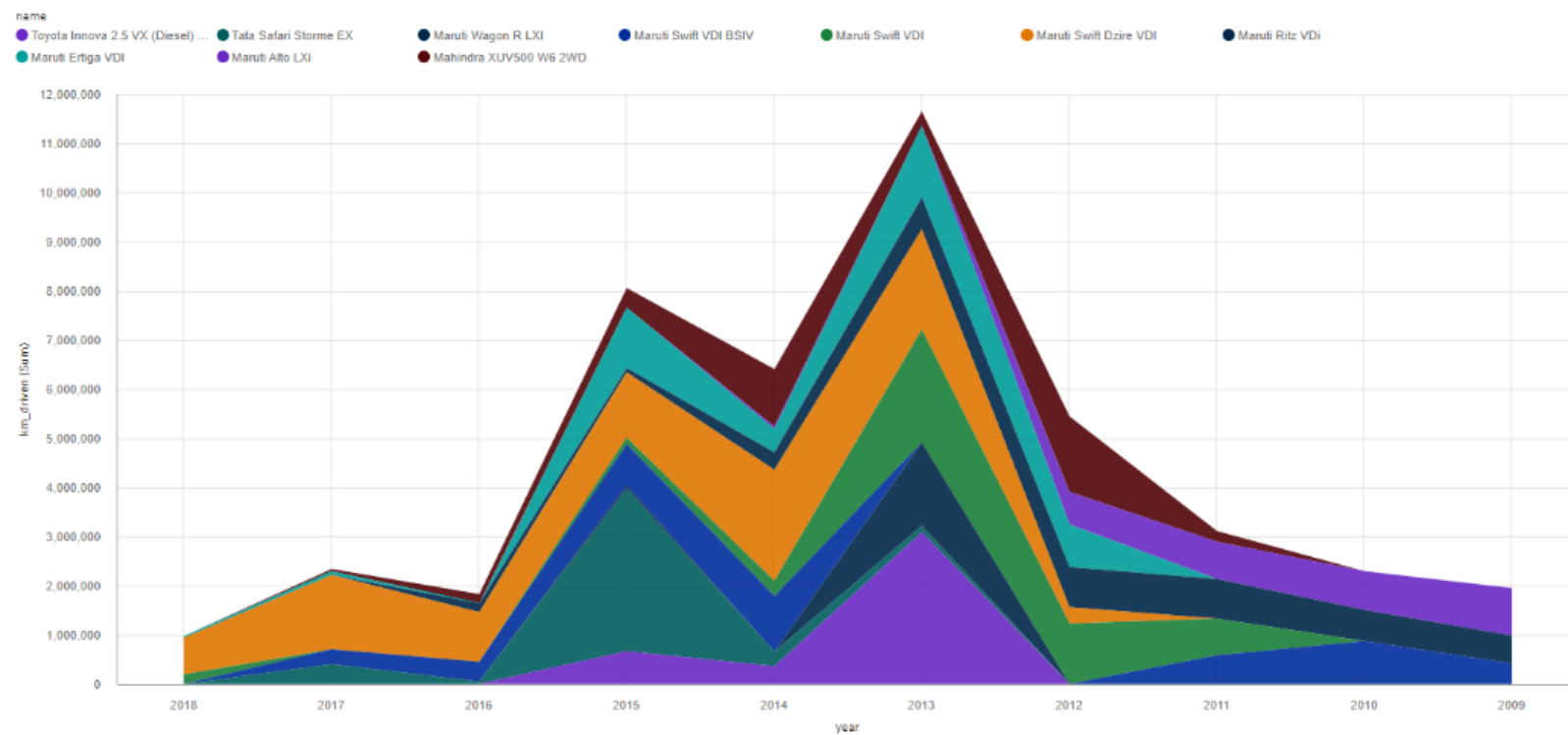**name** strongly drives **selling_price** (100%).

The value of **selling_price** is unusually high when the values of **name** are BMW 6 Series GT 630d Luxury Line, BMW X4 M Sport X xDrive20d and Lexus ES 300h.

The average of **selling_price** for all values of **fuel** and **name** is 2,554,060.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 578,659 to a maximum of 5,860,000.

The value of **selling_price** is unusually high when the combinations of **fuel** and **name** are Diesel + BMW 6 Series GT 630d Luxury Line, Diesel + BMW X4 M Sport X xDrive20d and Petrol + Lexus ES 300h.

km_driven by year colored by name

name
- Toyota Innova 2.5 VX (Diesel) ...
- Tata Safari Storme EX
- Maruti Wagon R LXI
- Maruti Swift VDI BSIV
- Maruti Swift VDI
- Maruti Swift Dzire VDI
- Maruti Ritz VDi
- Maruti Ertiga VDI
- Maruti Alto LXI
- Mahindra XUV500 W6 2WD

Details

For **km_driven**, 2013 is the most important category of **year** with a total value of 11,657,840 (26.4 % of the total).

The value of **km_driven** is unusually high when **year** is 2013.

For **km_driven**, Maruti Swift Dzire VDI is the most important category of **name** with a total value of 9,228,691 (20.9 % of the total).
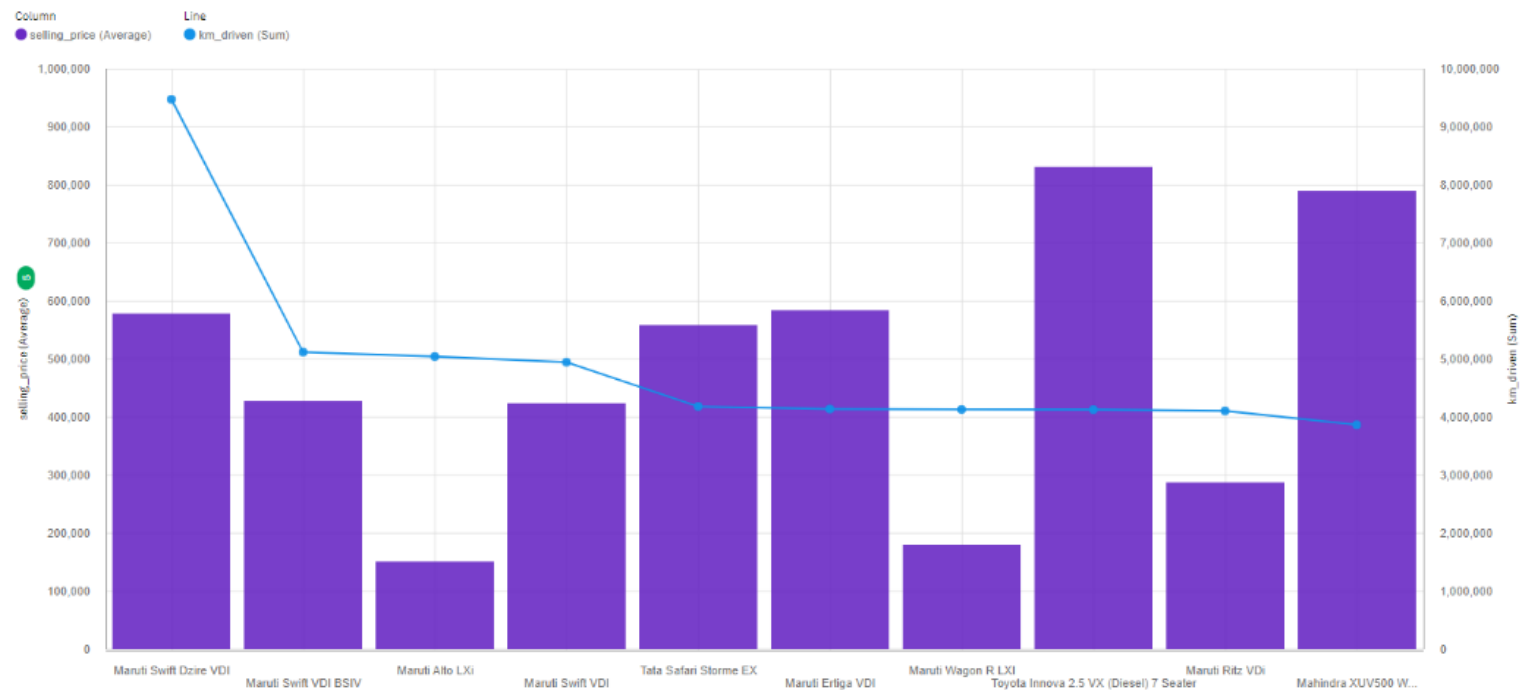
The value of **km_driven** is most unusual when the values of **name** are Maruti Swift Dzire VDI and Maruti Wagon R LXI.

The sum of **km_driven** for all values of **year** and **name** is 44,084,374.

The summed values of **km_driven** over all combinations of the inputs range from a minimum of 35,000 to a maximum of 3,300,000.

The value of **km_driven** is unusually high when the combinations of **year** and **name** are 2015 + Tata Safari Storme EX, 2013 + Toyota Innova 2.5 VX (Diesel) 7 Seater, 2013 + Maruti Swift VDI, 2014 + Maruti Swift Dzire VDI and 2013 + Maruti Swift Dzire VDI.

km_driven and selling_price by name

Column
● selling_price (Average)

Line
● km_driven (Sum)

Details

Maruti Swift Dzire VDI is the most frequently occurring category of **name** with a count of 129 items (22.6 % of the total).

The average of **selling_price** for all values of **name** is 463,111.

The average values of **selling_price** range from a minimum of 150,430 (when **name** is Maruti Alto LXi) to a maximum of 830,000 (when **name** is Toyota Innova 2.5 VX (Diesel) 7 Seater).

name strongly drives **selling_price** (77%).

The value of **selling_price** is most unusual when the values of **name** are Toyota Innova 2.5 VX (Diesel) 7 Seater, Mahindra XUV500 W6 2WD and Maruti Alto LXi.

The sum of **km_driven** for all values of **name** is 49,074,670.

The summed values of **km_driven** range from a minimum of 3,860,236 (when **name** is Mahindra XUV500 W6 2WD) to a maximum of 9,470,391 (when **name** is Maruti Swift Dzire VDI).

The value of **km_driven** is unusually high when **name** is Maruti Swift Dzire VDI.

seats by name colored by year

year
● 2019 ● 2018 ● 2017 ● 2016 ● 2015 ● 2014 ● 2013 ● 2012 ● 2011 ● 2010
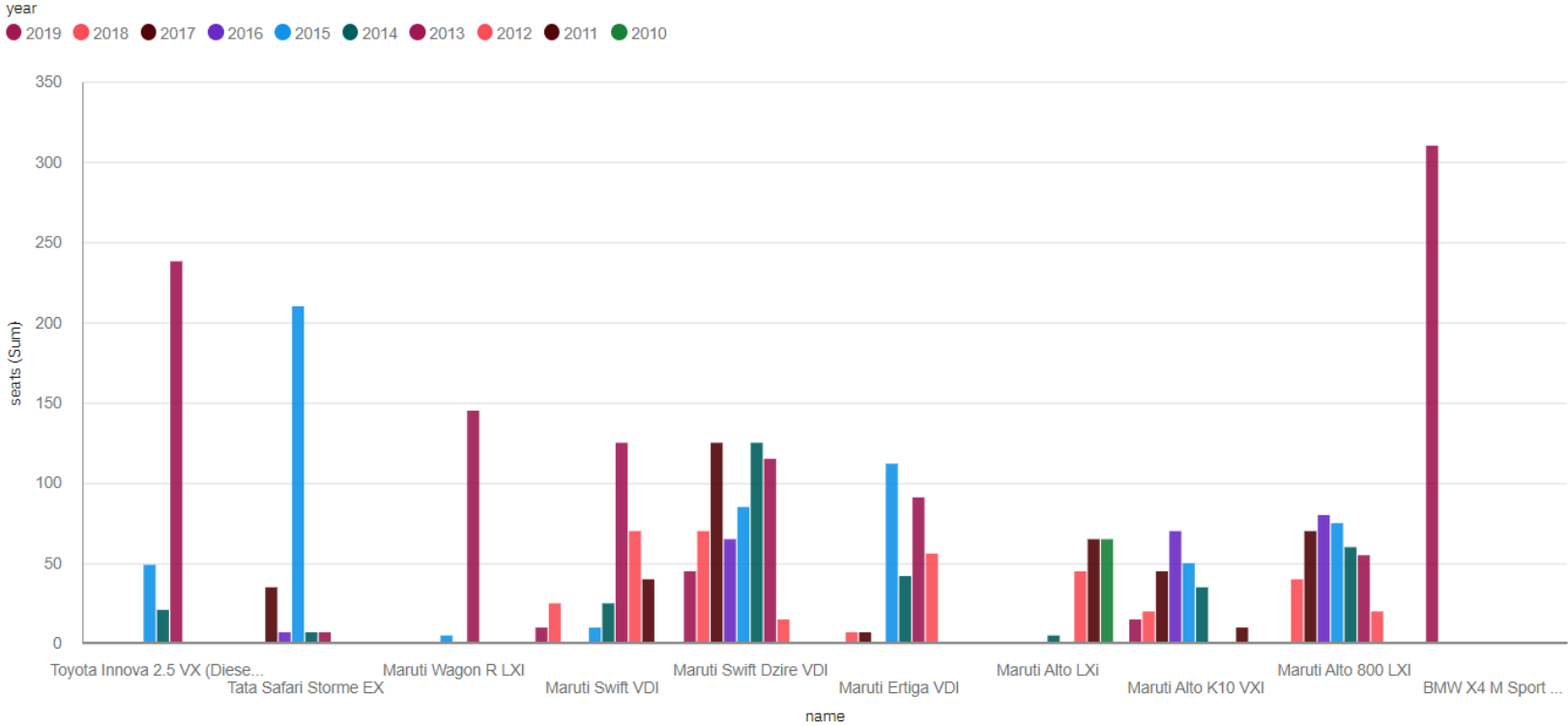
Details

For **seats**, 2013 and 2015 are the most important categories of **year** with a total value of 1372 (43.9 % of the total).

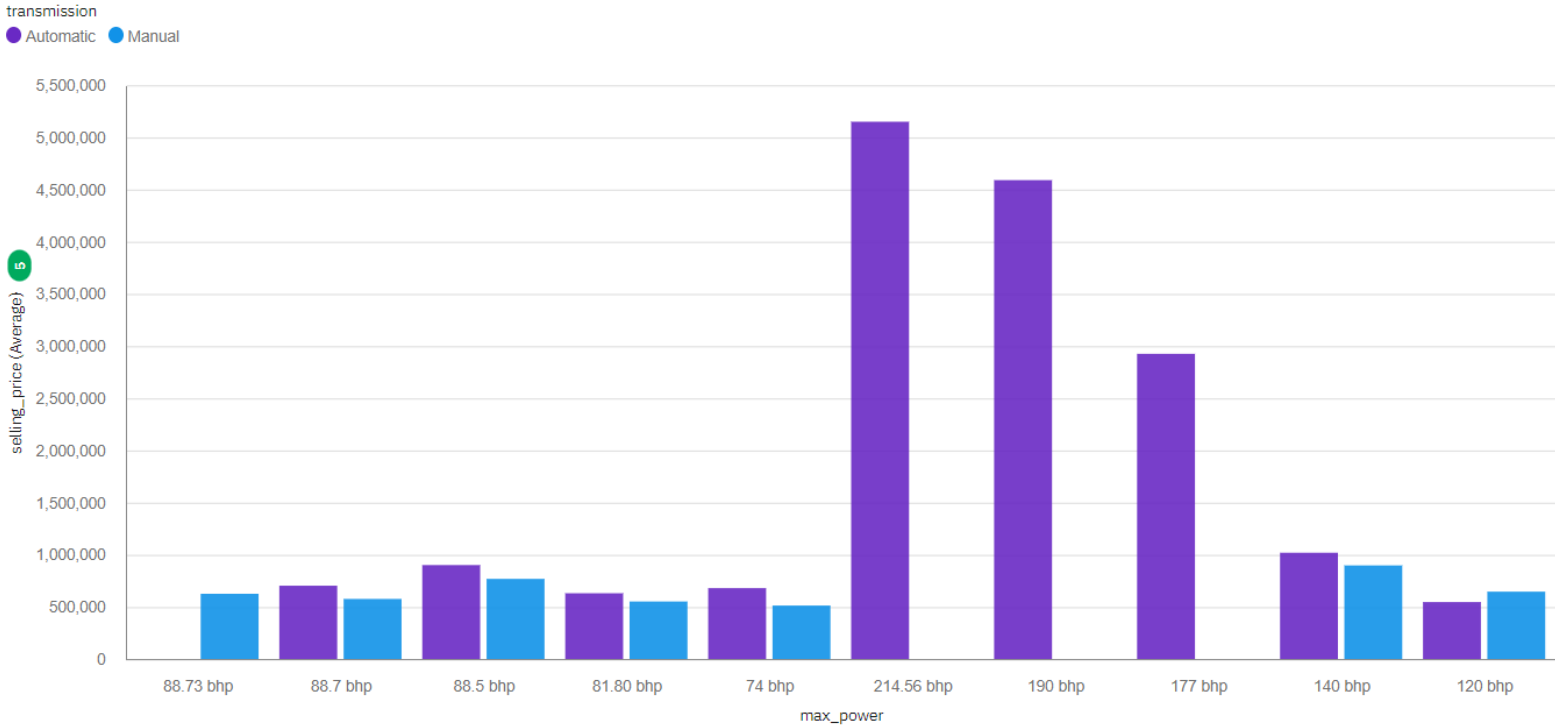The value of **seats** is unusually high when **year** is 2013.

For **seats**, Maruti Swift Dzire VDI is the most important category of **name** with a total value of 645 (20.6 % of the total).

The value of **seats** is most unusual when the values of **name** are Maruti Swift Dzire VDI, Maruti Wagon R LXI and Maruti Alto LXi.

The sum of **seats** for all values of **name** and **year** is 3124.

The summed values of **seats** over all combinations of the inputs range from a minimum of 5 to a maximum of 310.

selling_price by max_power colored by transmission

transmission
● Automatic ● Manual

km_driven and selling_price by max_power

Column
- ● selling_price (Average)

Line
- ● km_driven (Sum)

Details

74 bhp is the most frequently occurring category of **max_power** with a count of 377 items (22.1 % of the total).

The average of **selling_price** for all values of **max_power** is 474,324.

The average values of **selling_price** range from a minimum of 132,885 (when **max_power** is 46.3 bhp) to a maximum of 913,062 (when **max_power** is 140 bhp).

max_power moderately drives **selling_price** (60%).

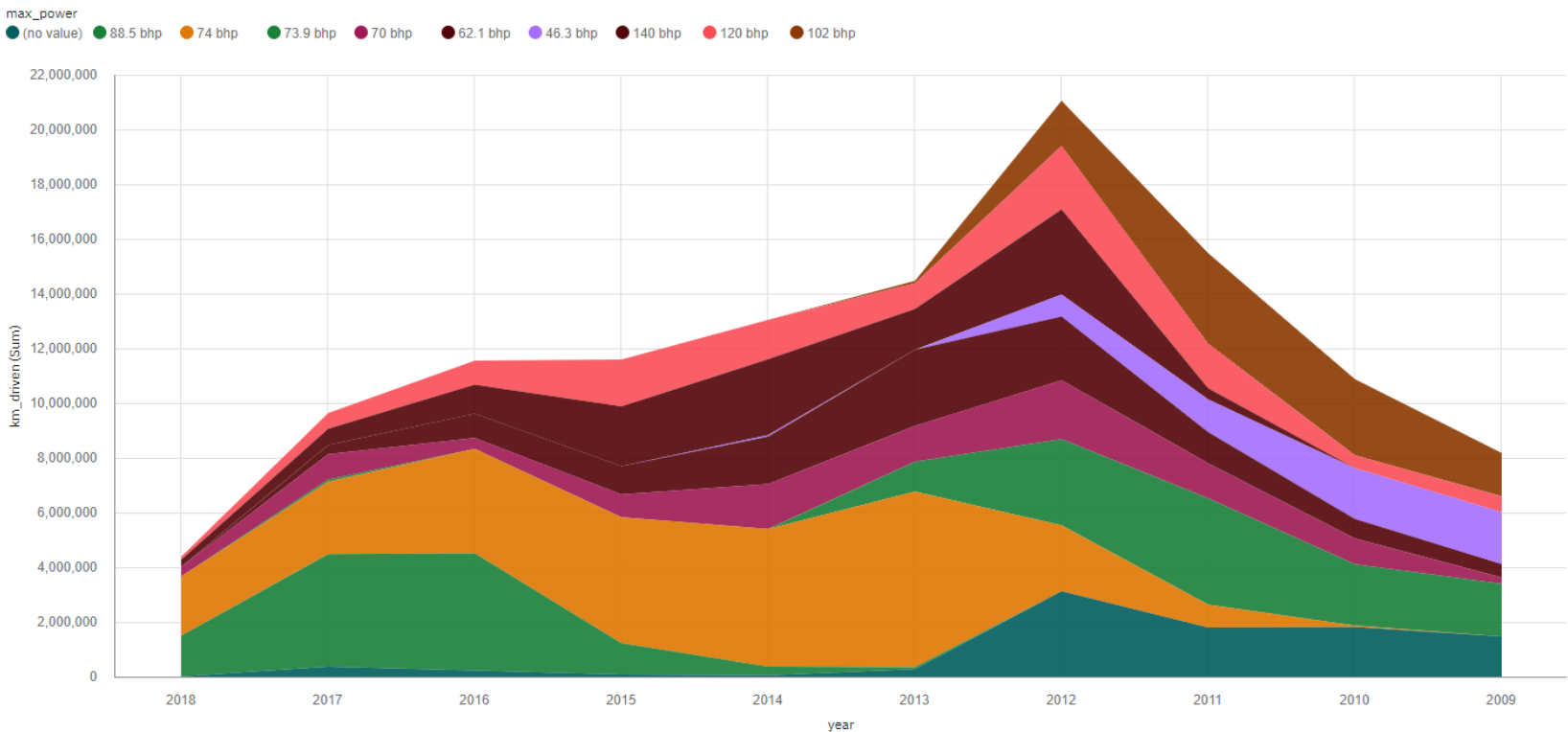The value of **selling_price** is unusually high when **max_power** is 140 bhp.

The sum of **km_driven** for all values of **max_power** is 150,137,738.

The summed values of **km_driven** range from a minimum of 11,778,249 (when **max_power** is 88.5 bhp) to a maximum of 28,189,927 (when **max_power** is 74 bhp).

The value of **km_driven** is unusually high when the values of **max_power** are 74 bhp and (no value).

km_driven by year colored by max_power

max_power
● (no value) ● 88.5 bhp ● 74 bhp ● 73.9 bhp ● 70 bhp ● 62.1 bhp ● 46.3 bhp ● 140 bhp ● 120 bhp ● 102 bhp

Details

For **km_driven**, 2012 is the most important category of **year** with a total value of 21,047,591 (17.5 % of the total).

The value of **km_driven** is most unusual when the values of **year** are 2012 and 2018.

The sum of **km_driven** for all values of **year** and **max_power** is 120,257,018.

For **km_driven**, 74 bhp is the most important category of **max_power** with a total value of 27,952,047 (23.2 % of the total).

The summed values of **km_driven** over all combinations of the inputs range from a minimum of 14,681 to a maximum of 6,415,771.

The value of **km_driven** is unusually high when the combination of **year** and **max_power** is 2013 + 74 bhp.

The value of **km_driven** is most unusual when the values of **max_power** are 74 bhp and 46.3 bhp.

selling_price by year colored by name
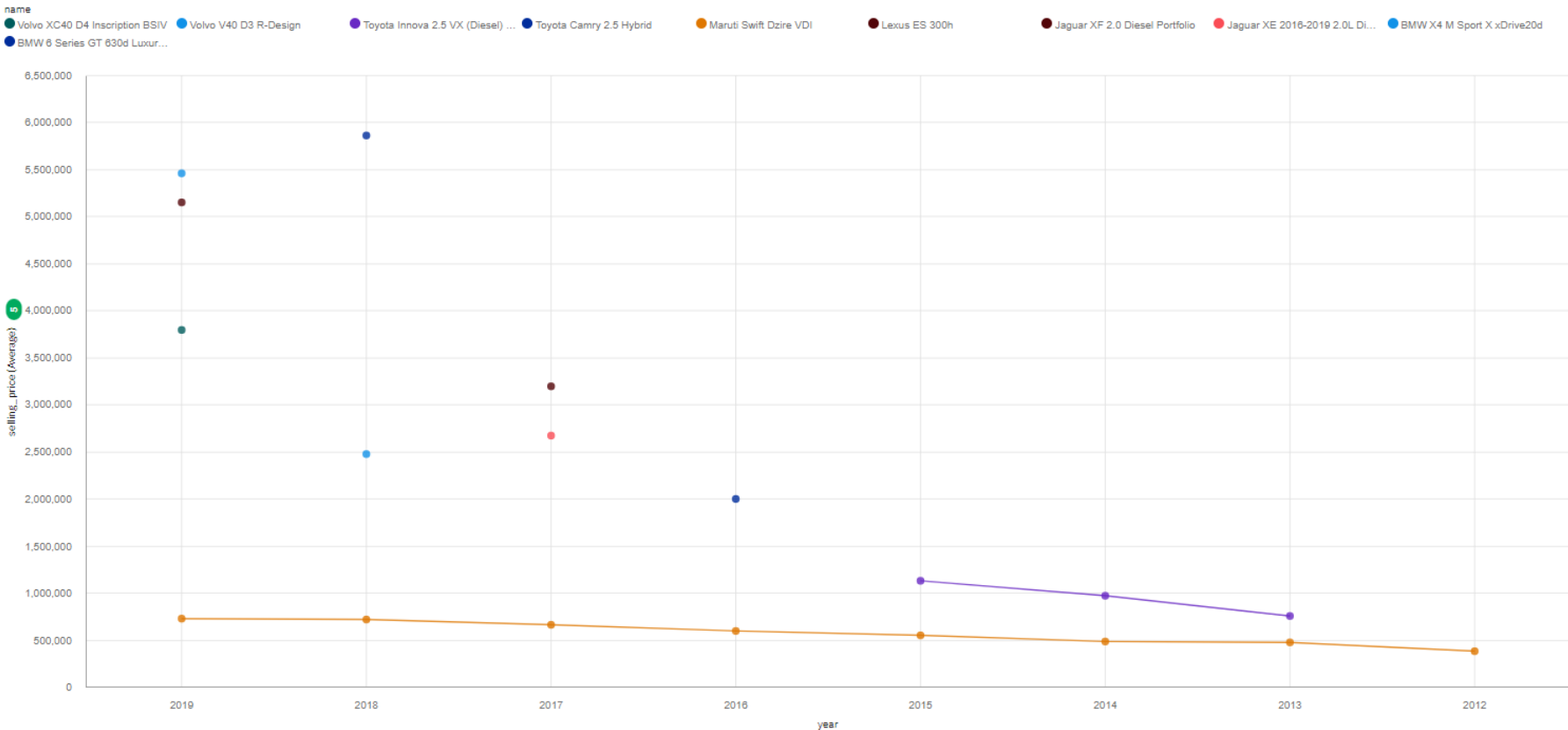
name
● Volvo XC40 D4 Inscription BSIV ● Volvo V40 D3 R-Design ● Toyota Innova 2.5 VX (Diesel) ... ● Toyota Camry 2.5 Hybrid ● Maruti Swift Dzire VDI ● Lexus ES 300h ● Jaguar XF 2.0 Diesel Portfolio ● Jaguar XE 2016-2019 2.0L Di... ● BMW X4 M Sport X xDrive20d
● BMW 6 Series GT 630d Luxur...

Details

Maruti Swift Dzire VDI is the most frequently occurring category of **name** with a count of 129 items (29.9 % of the total).

name strongly drives **selling_price** (100%).

The value of **selling_price** is unusually high when the values of **name** are BMW 6 Series GT 630d Luxury Line, BMW X4 M Sport X xDrive20d and Lexus ES 300h.

2019 is the most frequently occurring category of **year** with a count of 135 items (31.3 % of the total).

year strongly drives **selling_price** (71%).

The value of **selling_price** is most unusual when the values of **year** are 2019, 2014 and 2012.

The average of **selling_price** for all values of **year** and **name** is 2,554,060.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 381,667 to a maximum of 5,860,000.

year and **name** strongly drive **selling_price** (100%).

The value of **selling_price** is unusually high when the combination of **year** and **name** is 2018 + BMW 6 Series GT 630d Luxury Line.

selling_price by year colored by max_power

max_power
● 88.73 bhp ● 88.7 bhp ● 88.5 bhp ● 81.80 bhp ● 74 bhp ● 214.56 bhp ● 190 bhp ● 177 bhp ● 140 bhp ● 120 bhp

2017 is the most frequently occurring category of **year** with a count of 314 items (21 % of the total).

74 bhp is the most frequently occurring category of **max_power** with a count of 376 items (25.2 % of the total).

year moderately drives **selling_price** (43%).

The value of **selling_price** is unusually high when **year** is 2019.

max_power strongly drives **selling_price** (93%).

The value of **selling_price** is unusually high when the values of **max_power** are 214.56 bhp and 190 bhp.
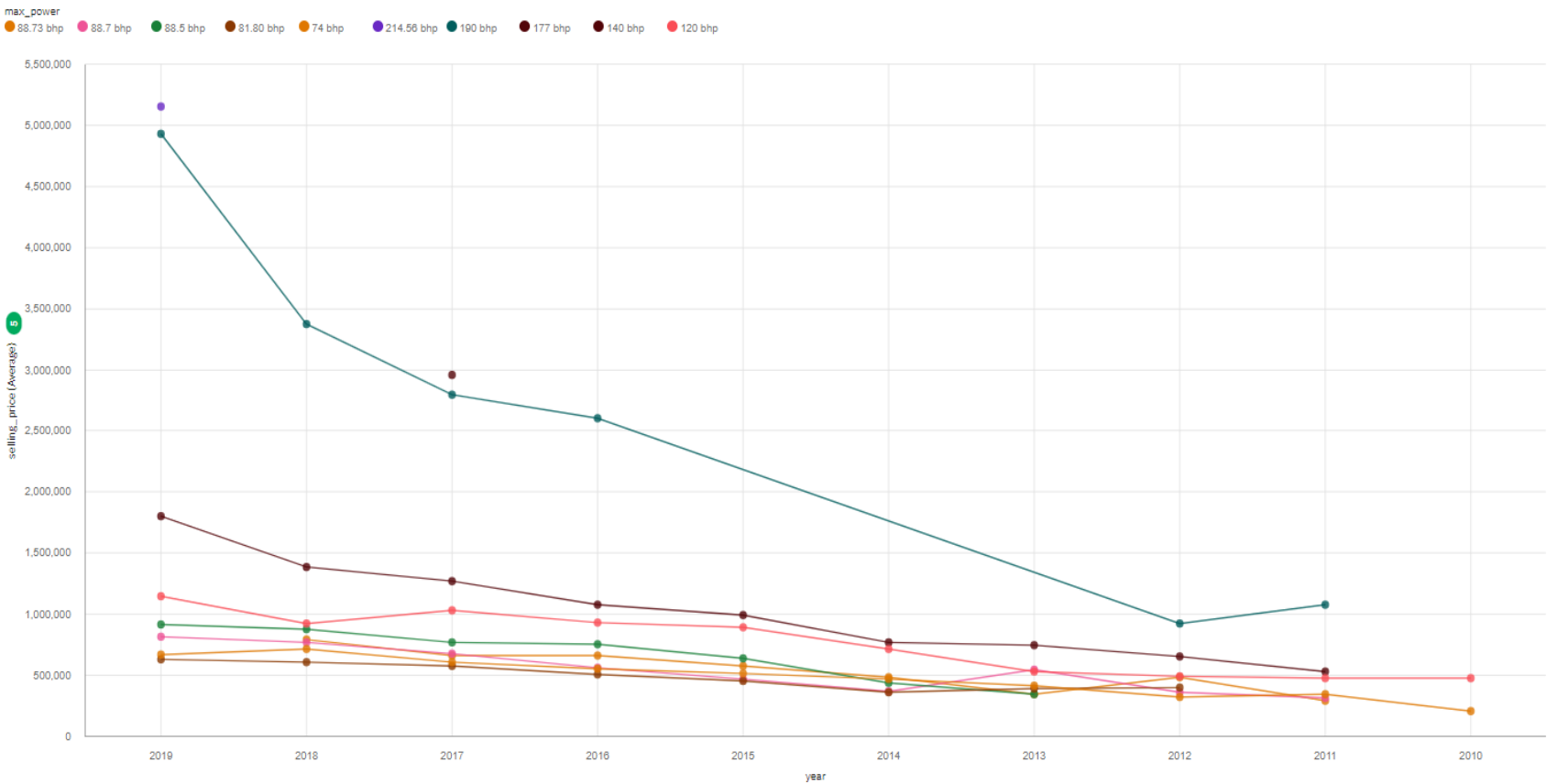
The average of **selling_price** for all values of **year** and **max_power** is 1,136,475.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 210,000 to a maximum of 5,150,000.

year and **max_power** strongly drive **selling_price** (97%).

The value of **selling_price** is unusually high when the combinations of **year** and **max_power** are 2019 + 214.56 bhp and 2019 + 190 bhp.

km_driven and selling_price by name

Column
- selling_price (Average)

Line
- km_driven (Sum)

Categories (x-axis): Maruti Swift Dzire VDI, Maruti Swift VDI BSIV, Maruti Alto LXi, Maruti Swift VDI, Tata Safari Storme EX, Maruti Ertiga VDI, Maruti Wagon R LXI, Toyota Innova 2.5 VX (Diesel) 7 Seater, Maruti Ritz VDi, Mahindra XUV500 W...

Left axis: selling_price (Average) — 0 to 1,000,000

Right axis: km_driven (Sum) — 0 to 10,000,000

Details

Maruti Swift Dzire VDI is the most frequently occurring category of **name** with a count of 129 items (22.6 % of the total).

The average of **selling_price** for all values of **name** is 463,111.

The average values of **selling_price** range from a minimum of 150,430 (when **name** is Maruti Alto LXi) to a maximum of 830,000 (when **name** is Toyota Innova 2.5 VX (Diesel) 7 Seater).

**name** strongly drives **selling_price** (77%).

The value of **selling_price** is most unusual when the values of **name** are Toyota Innova 2.5 VX (Diesel) 7 Seater, Mahindra XUV500 W6 2WD and Maruti Alto LXi.

The sum of **km_driven** for all values of **name** is 49,074,670.

The summed values of **km_driven** range from a minimum of 3,860,236 (when **name** is Mahindra XUV500 W6 2WD) to a maximum of 9,470,391 (when **name** is Maruti Swift Dzire VDI).

The value of **km_driven** is unusually high when **name** is Maruti Swift Dzire VDI.

selling_price by max_power colored by seller_type
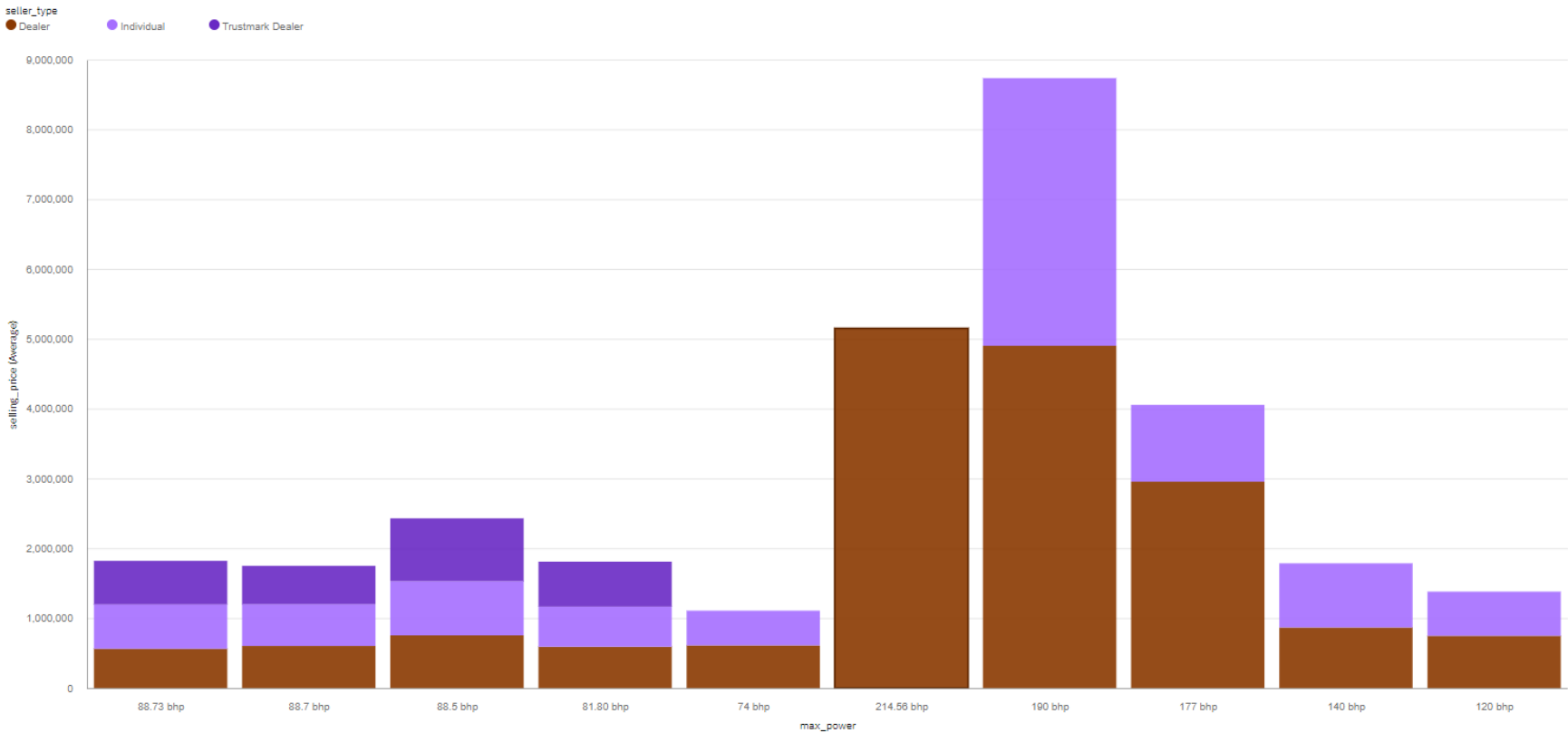
seller_type
● Dealer ● Individual ● Trustmark Dealer

Details

74 bhp is the most frequently occurring category of **max_power** with a count of 377 items (24.3 % of the total).

Individual is the most frequently occurring category of **seller_type** with a count of 1064 items (68.7 % of the total).

seller_type slightly drives **selling_price** (27%).

The value of **selling_price** is unusually high when **seller_type** is Dealer.

max_power strongly drives **selling_price** (92%).

The value of **selling_price** is unusually high when the values of **max_power** are 214.56 bhp and 190 bhp.
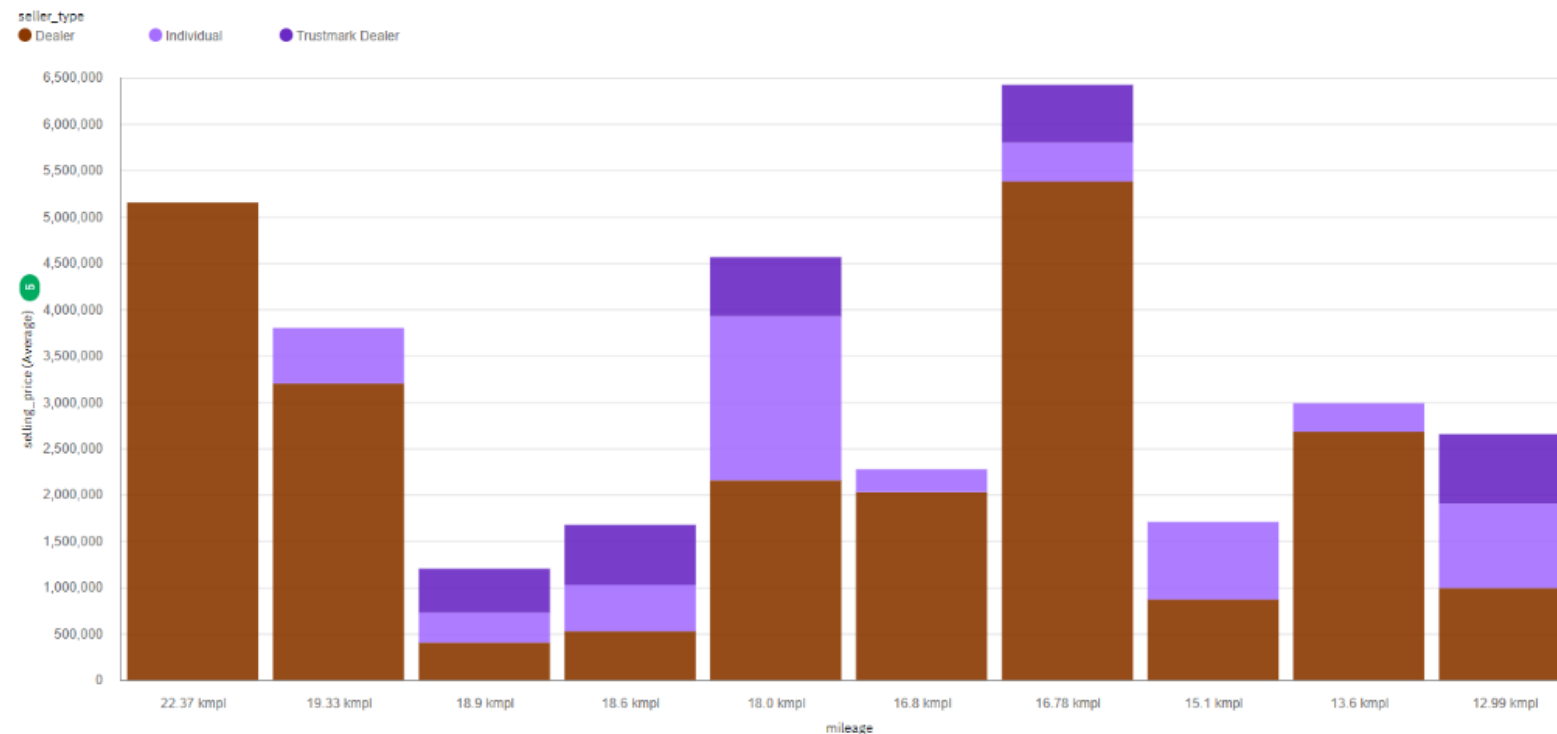
The average of **selling_price** for all values of **max_power** and **seller_type** is 1,112,463.

The average values of **selling_price** over all combinations of the inputs range from a minimum of 498,123 to a maximum of 5,150,000.

max_power and **seller_type** strongly drive **selling_price** (93%).

The value of **selling_price** is unusually high when the combinations of **max_power** and **seller_type** are 214.56 bhp + Dealer, 190 bhp + Dealer, 190 bhp + Individual and 177 bhp + Dealer.

selling_price by mileage colored by seller_type

seller_type
● Dealer ● Individual ● Trustmark Dealer

x-axis: mileage
y-axis: selling_price (Average)

Categories: 22.37 kmpl, 19.33 kmpl, 18.9 kmpl, 18.6 kmpl, 18.0 kmpl, 16.8 kmpl, 16.78 kmpl, 15.1 kmpl, 13.6 kmpl, 12.99 kmpl

Details

Individual is the most frequently occurring category of **seller_type** with a count of 695 items (68.9 % of the total).

seller_type moderately drives **selling_price** (50%).

The value of **selling_price** is unusually high when **seller_type** is Dealer.

The average of **selling_price** for all values of **mileage** and **seller_type** is 1,284,126.
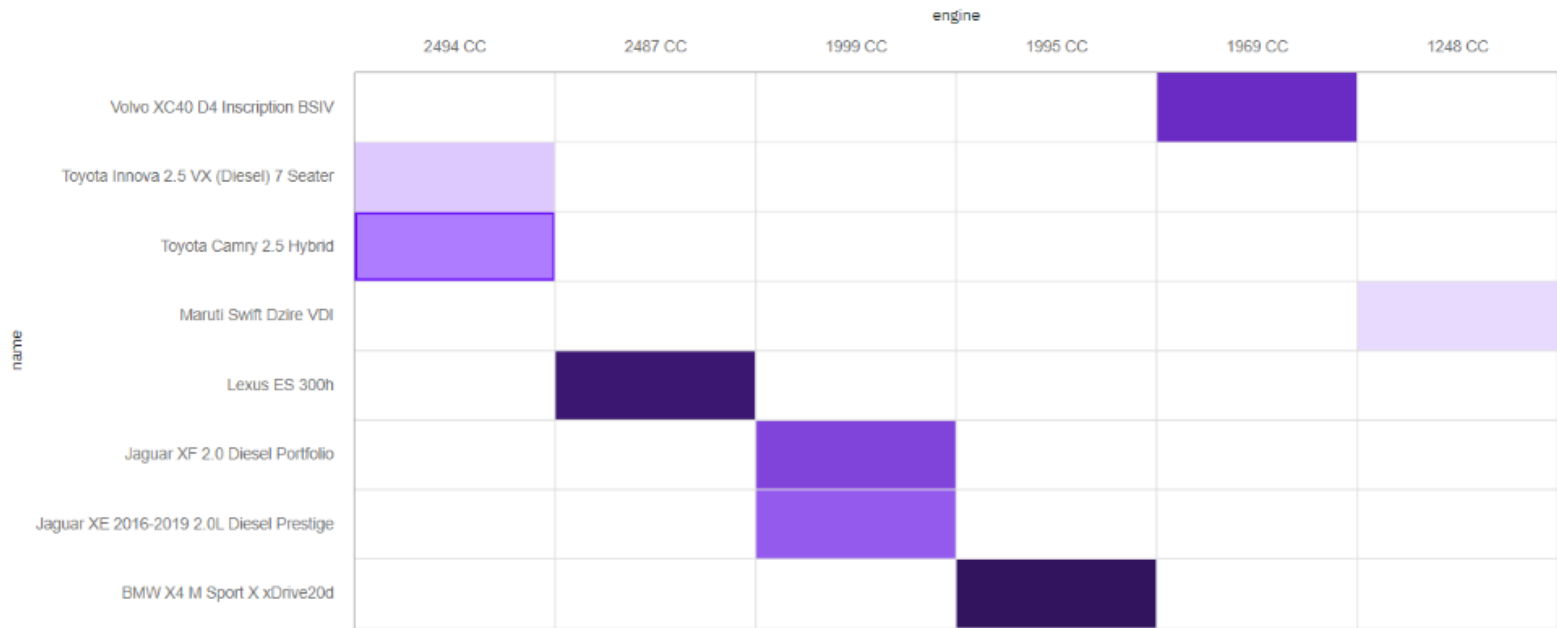
The average values of **selling_price** over all combinations of the inputs range from a minimum of 246,586 to a maximum of 5,379,127.

mileage and **seller_type** strongly drive **selling_price** (87%).

The value of **selling_price** is unusually high when the combinations of **mileage** and **seller_type** are 16.78 kmpl + Dealer and 22.37 kmpl + Dealer.

18.9 kmpl is the most frequently occurring category of **mileage** with a count of 225 items (22.3 % of the total).

selling_price by name and engine ⑤

selling_price (Ave...

578,658.88 — 5,461,290.32

	2494 CC	2487 CC	1999 CC	1995 CC	1969 CC	1248 CC
Volvo XC40 D4 Inscription BSIV					■	
Toyota Innova 2.5 VX (Diesel) 7 Seater	■					
Toyota Camry 2.5 Hybrid	■					
Maruti Swift Dzire VDI						■
Lexus ES 300h		■				
Jaguar XF 2.0 Diesel Portfolio			■			
Jaguar XE 2016-2019 2.0L Diesel Prestige			■			
BMW X4 M Sport X xDrive20d				■		

Details

are BMW X4 M Sport X xDrive20d + 1995 CC, Lexus ES 300h + 2487 CC, Maruti Swift Dzire VDI + 1248 CC, Toyota Innova 2.5 VX (Diesel) 7 Seater + 2494 CC, Volvo XC40 D4 Inscription BSIV + 1969 CC and more.

Maruti Swift Dzire VDI is the most frequently occurring category of **name** with a count of 129 items (32.6 % of the total).

The value of **selling_price** is unusually high when the values of **name** are BMW X4 M Sport X xDrive20d and Lexus ES 300h.

1248 CC is the most frequently occurring category of **engine** with a count of 129 items (32.6 % of the total).

engine strongly drives **selling_price** (98%).

The value of **selling_price** is unusually high when the values of **engine** are 1995 CC and 2487 CC.

Both **name** and **engine** are equally good at explaining **selling_price**. There is no complex relationship involving **name**, **engine**, and **selling_price**.