German cars data Analysis

by Cleon Lopes

PRESENTATION

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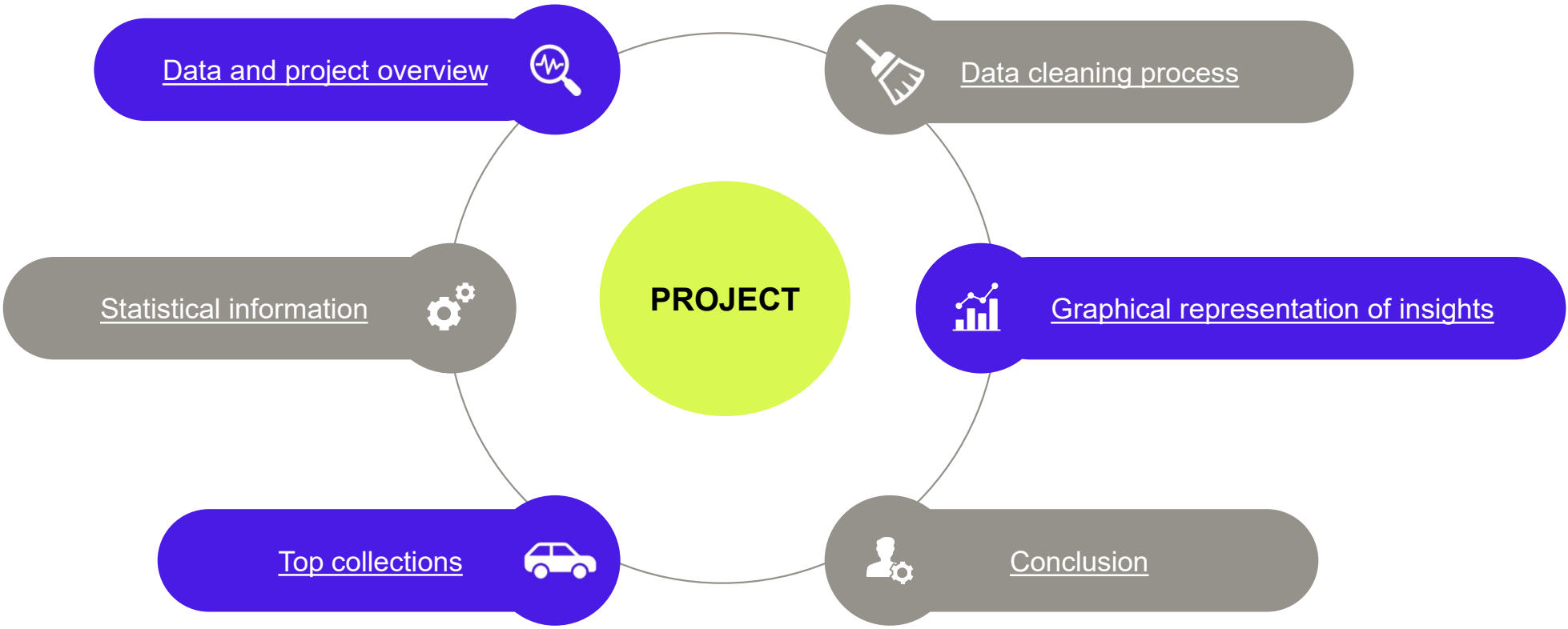


Data description

Source dataset contain data from one of the largest Europe's car market AutoScaut24 from 2011 to 2021.

Original dataset consists of 46405 rows and 9 columns

Fields contain information about make, model, price, offer type, mileage, fuel, gear type, horsepower and production year.

Data was downloaded from Kaggle.com
Collection method – scraping.

Link: https://www.kaggle.com/datasets/ander289386/cars-germany

Project objectives

Data cleaning

Our project will start by revealing gaps and inaccuracies in the data that can interfere with the analysis and then eliminating them.

Data Analysis

Use Pandas, NumPy, and other Python libraries for investigating our data and searching for interesting information and insights.

Statistical Analysis

Using Pandas functions to obtain statistical information about data and identify relationships between variables.

Discovering insights

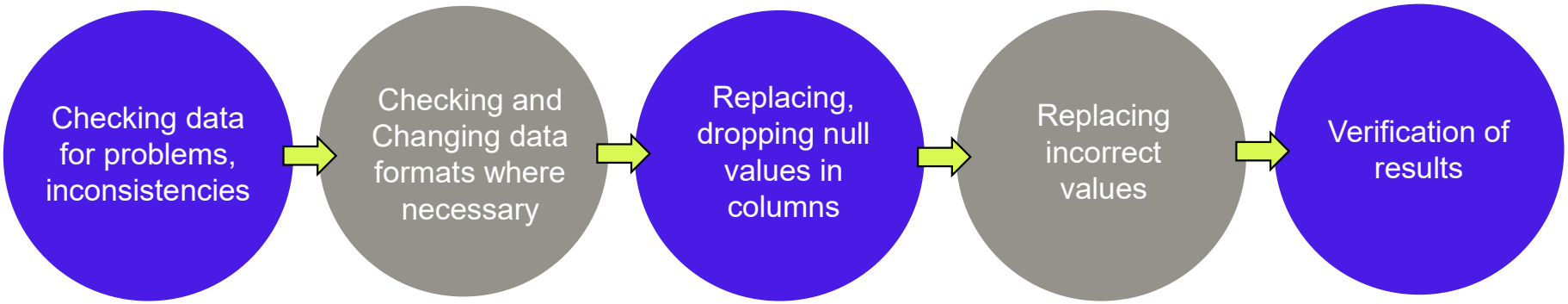
Discovery of interesting points that are worth paying attention to and on which it is possible to conduct further research.

Graphical representation

Using the Python Matplotlib library to represent findings using various types of visualization

Data cleaning

Different Pandas functions were used to **clean** and **prepare** the data for analysis. Process followed the **scheme**:



More details can be found in my GitHub portfolio and the attached Jupiter notebook.

Dataset stats

Correlation coefficients

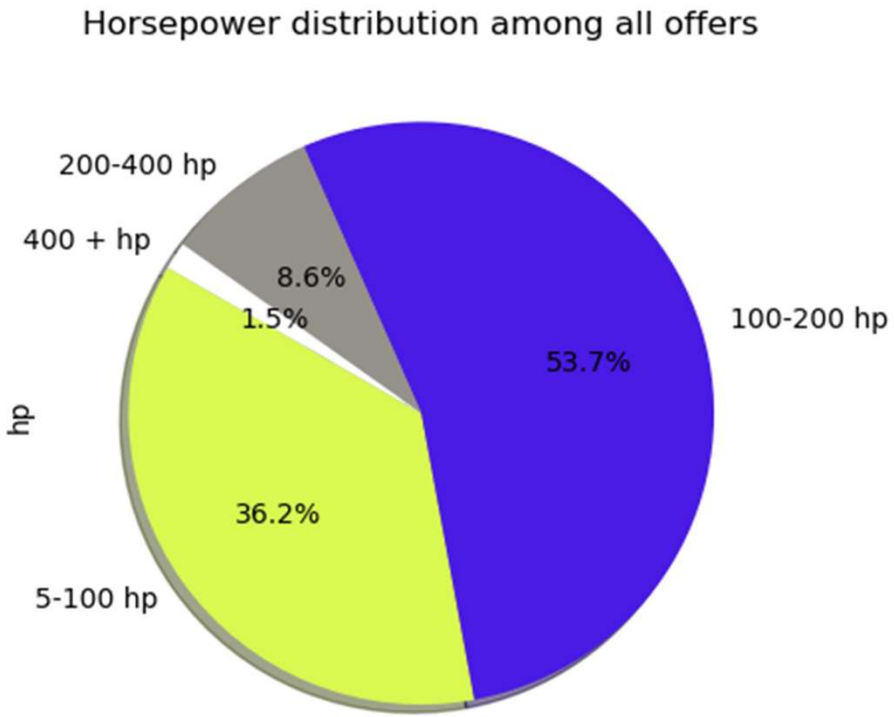
	mileage	price	hp	year
mileage	1.00	-0.30	-0.01	-0.68
price	-0.30	1.00	0.75	0.41
hp	-0.01	0.75	1.00	0.17
year	-0.68	0.41	0.17	1.00

Price has a strong positive correlation with **HP**.
Mileage was **inversely** related to year.
Gear type is also correlated with the price.

Descriptive statistics

	mileage	price	hp
count	46262.00	46262.00	46262.00
mean	71259.64	16544.75	132.89
std	62635.20	19253.64	75.01
min	0.00	1100.00	5.00
25%	19900.00	7490.00	86.00
50%	60000.00	10999.00	116.00
75%	105000.00	19483.75	150.00
max	1111111.00	1199900.00	850.00

Horsepower



The **lowest** value of horsepower – **5 hp**. Microcar(Due, M.Go, M8), Renault Twizy, Ligier JS 50, Estrima Biro

Mercedes-benz G63 AMG has the **highest 850** horsepower value

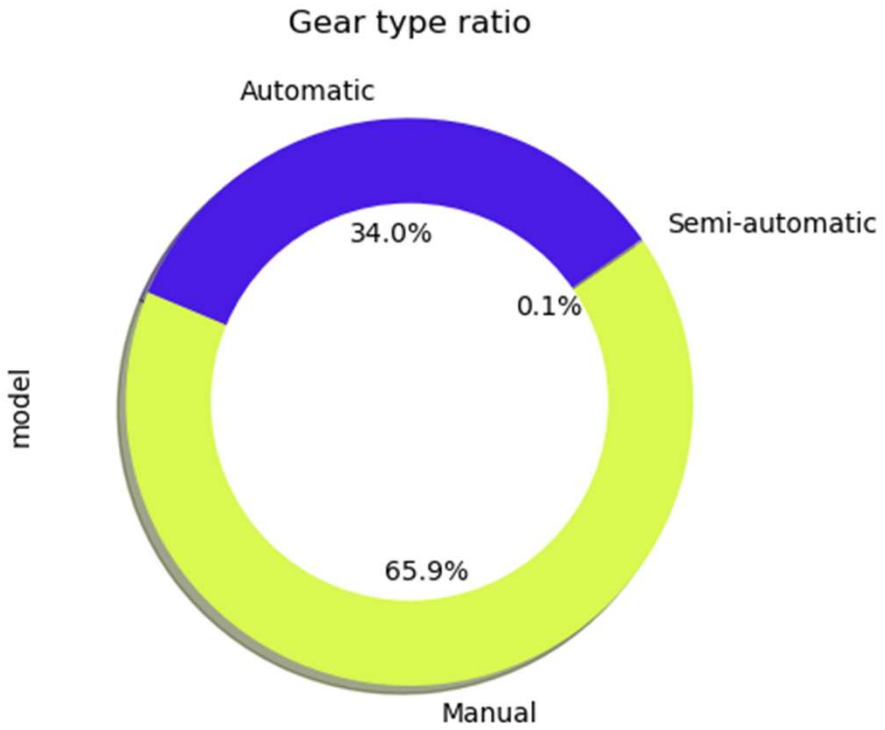
Almost **90 %** of all offers have **less** than **200** horsepower

Transmission

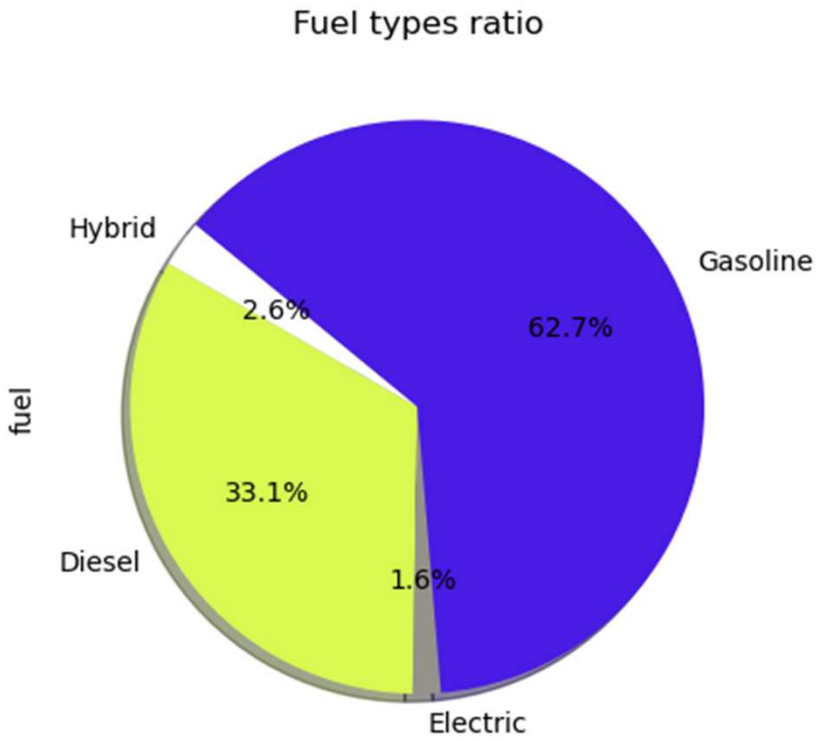
Most of the offers have Manual gear type – almost **30.500** cars

15.714 cars on Autoscaut24 have **Automatic** transmission

Only **56** offers have **Semi-automatic** gearbox



Fuel types



The most of cars – **28.869** use **Gasoline** fuel type

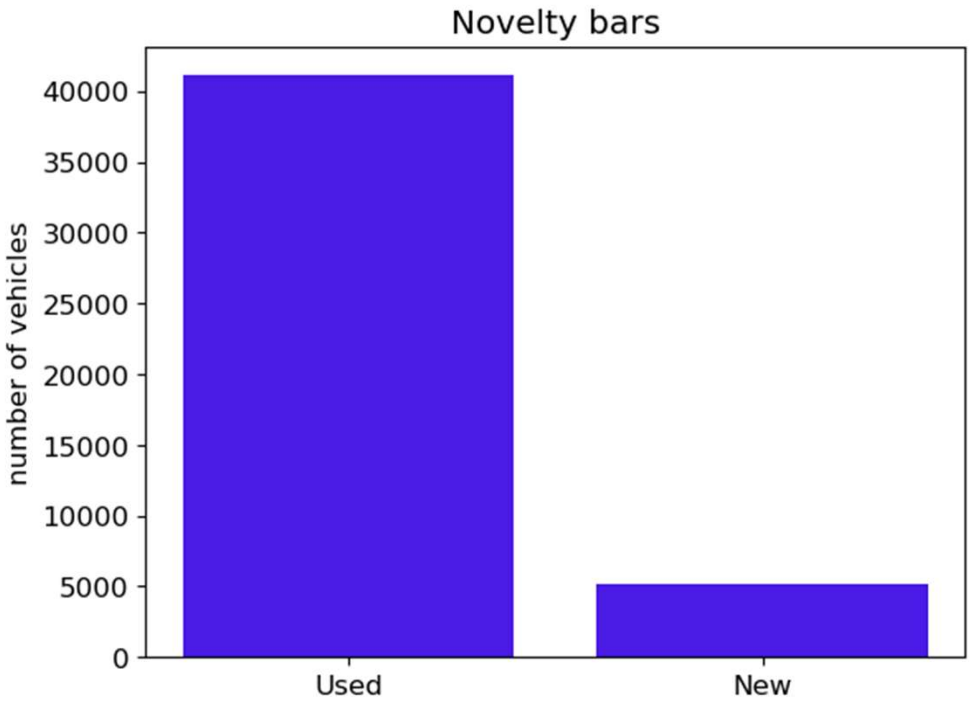
Diesel – **15.220**, Hybrid – **1.203**, Electric – **725** cars.

Gas vehicles are the **least** represented - **0.5%** of the total number or **245** vehicles

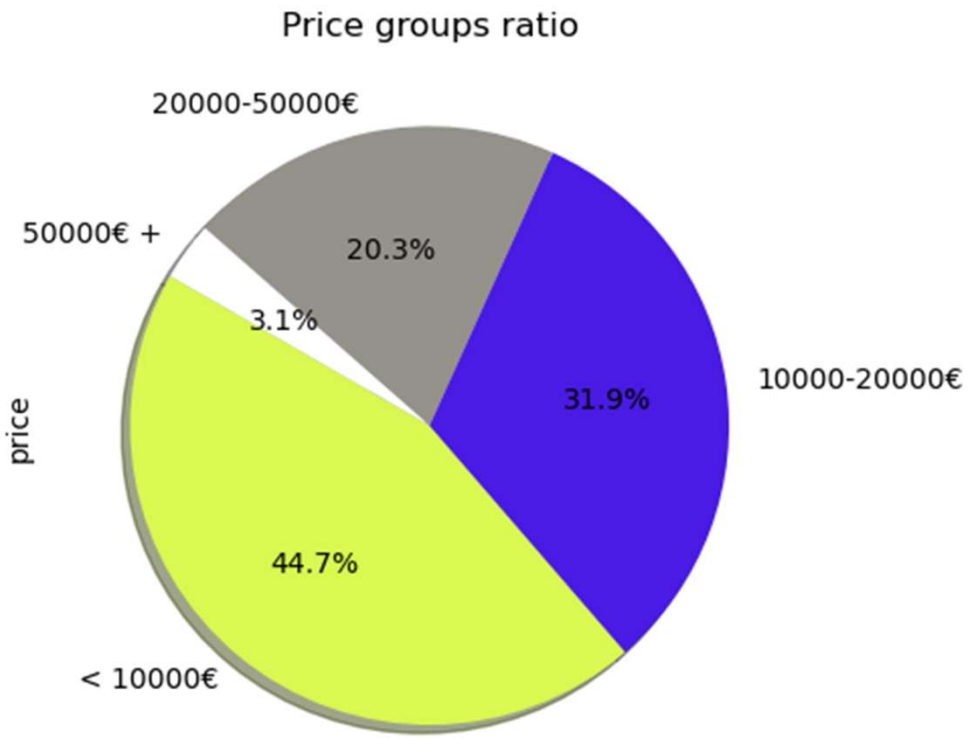
New or used?

The dataset includes five different types of offers: pre-registered, used, demonstration, employee's car, and new.

Most of the vehicles (41.116) represented on the website are used. 5.146 of the cars are new.



Price categories



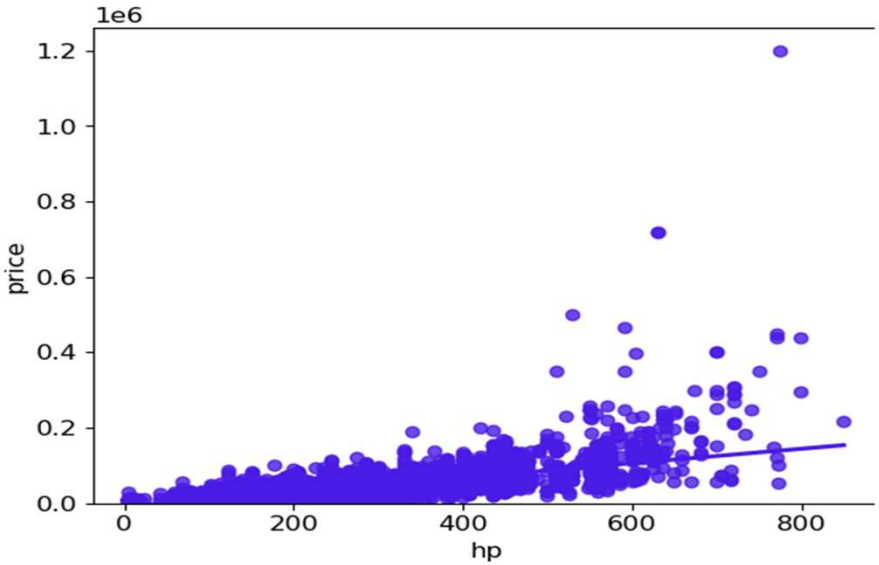
The **most** of cars – 20.664 are cheaper than **10.000€**.

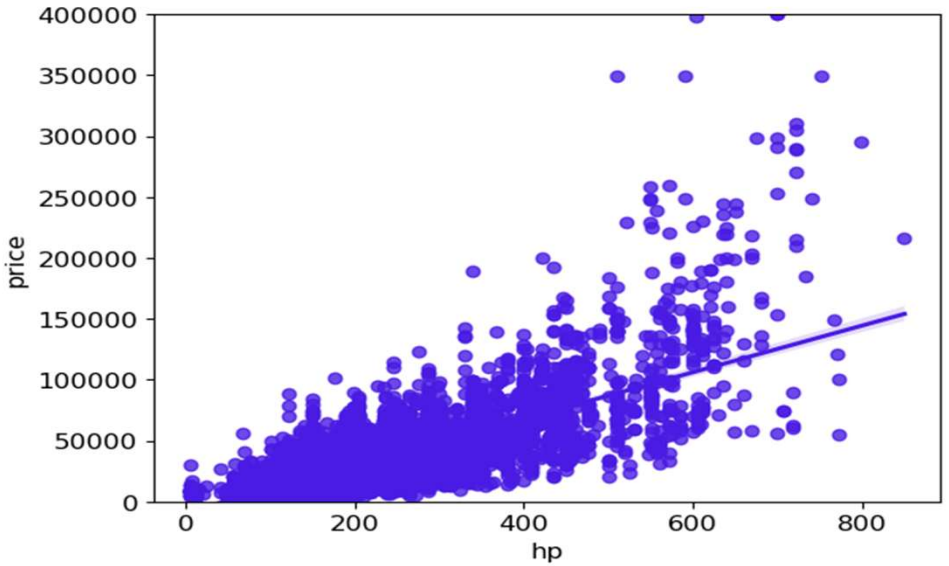
76.6%, or 35.434 offers, have price less than **20.000€**, and 96.9% or 44805 are priced under **50.000€**.

1.457 vehicles cost more than **€50.000**, with the **most** expensive costing **1.199.900€**.

The **cheapest** car priced at **1.100€**.

Price vs. Horsepower



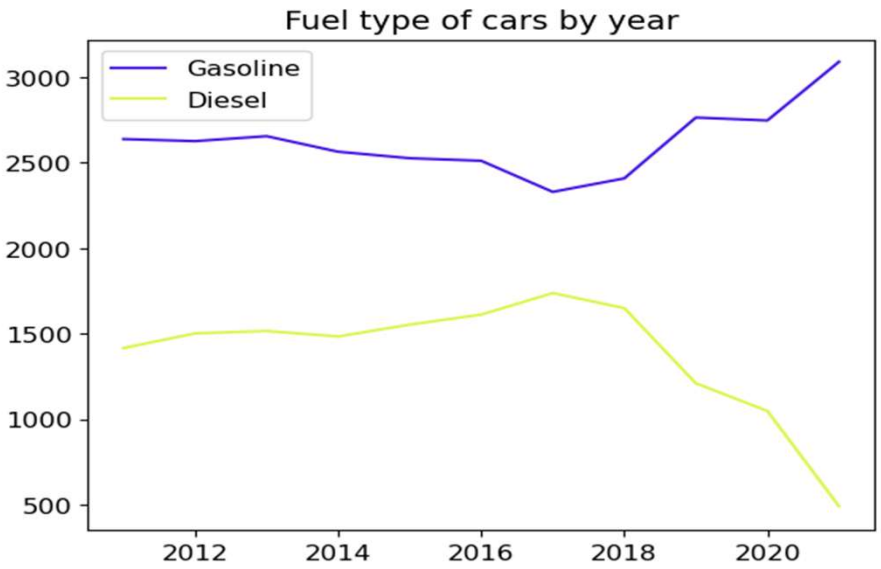


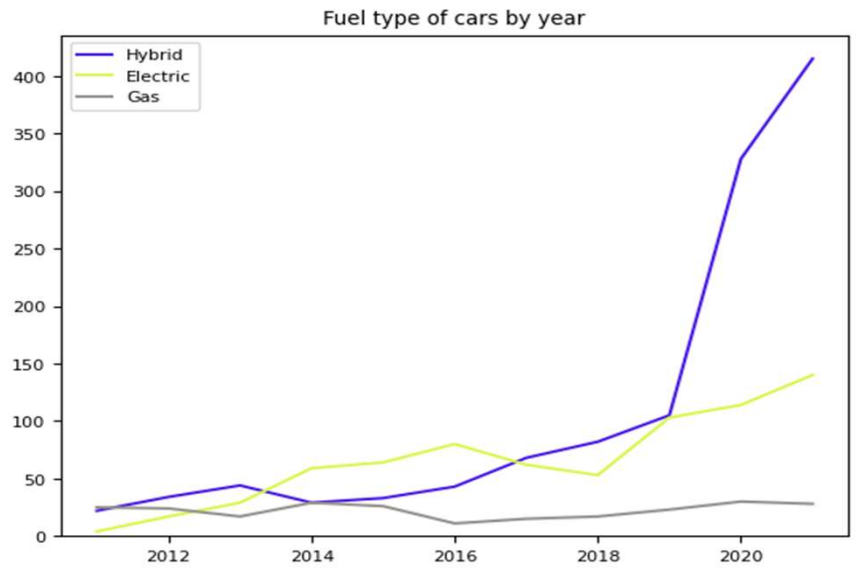
Price of the vehicle has strong positive correlation with **horsepower**

When the horsepower value of the car is **higher** than 400, the **probability** of huge price outliers **increases**.

Correlation between variables is **stronger** when HP value is **lower** than 450.

Fuel types by year



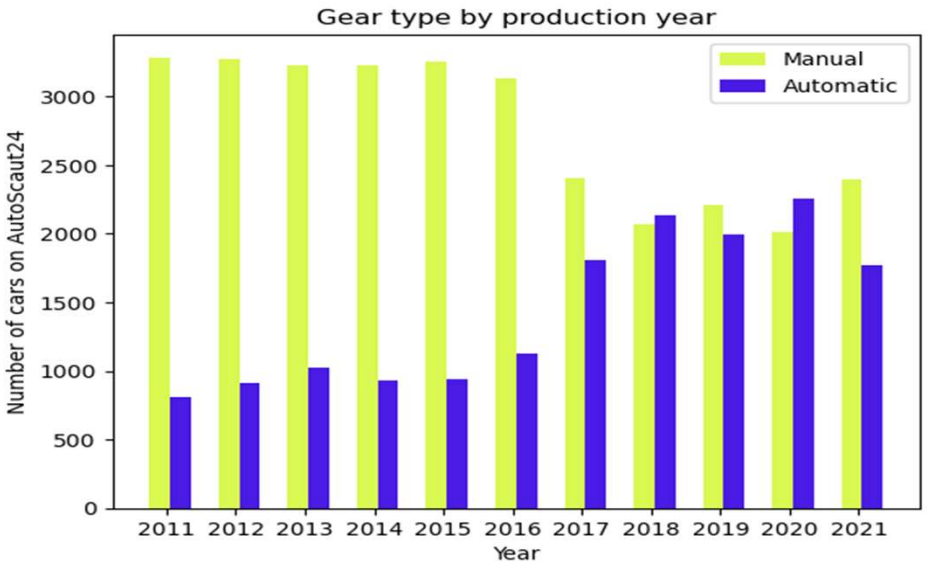


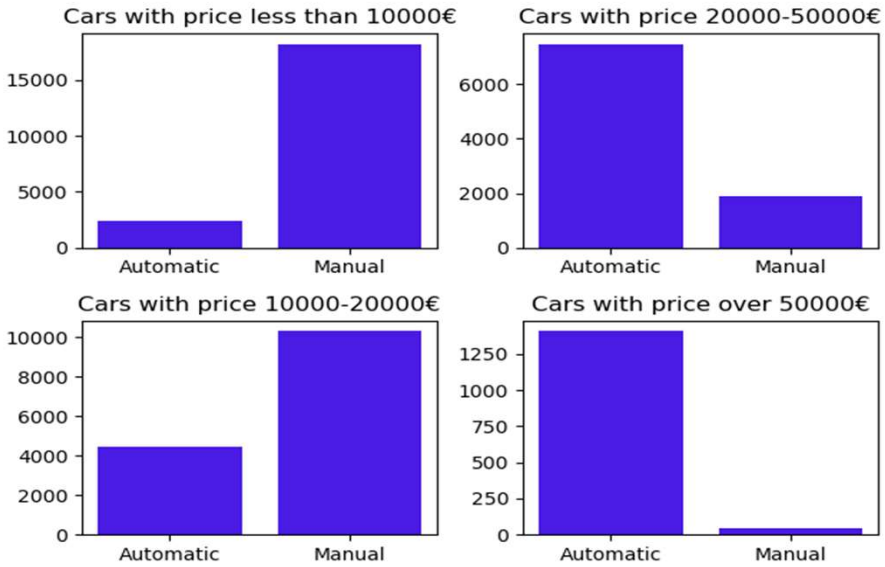
The **number** of electric and hybrid vehicles represented increases with the production **year**.

An anomaly was detected in the quantity of cars, produced in 2017: gasoline had the lowest value and diesel had its **peak** at the same time. The trend begins to reverse in 2018.

Gas cars by year have **no** pronounced **trend**. The chart is in flat.

Gear trends

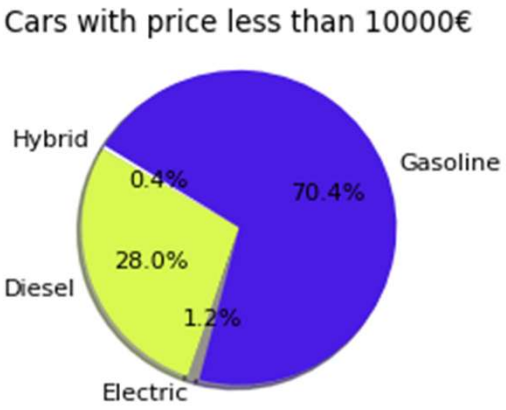


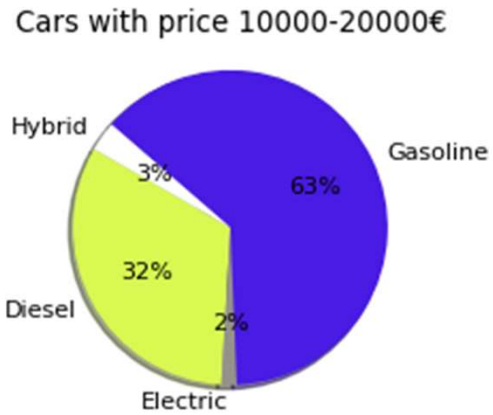


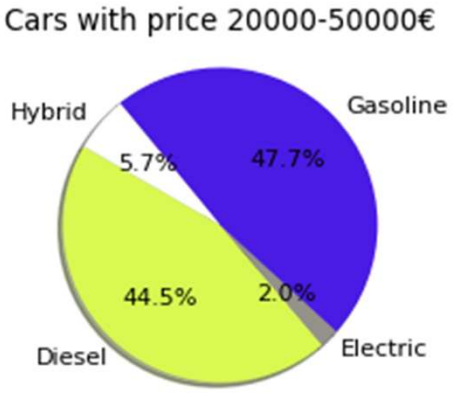
In **2017** and later, the number of cars represented with **automatic** transmission has tend to increase, and in 2018, it **surpassed** the number of cars with manual transmission.

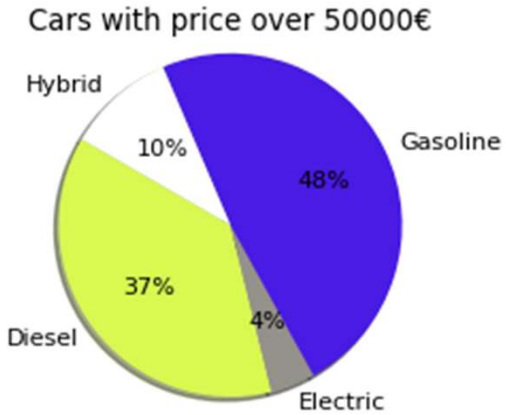
The quantity of vehicles with **manual** gear types tends to decrease with growing prices in each price group. The automatic car ratio tends to **grow** in each price group.

Fuel types in price categories ratio







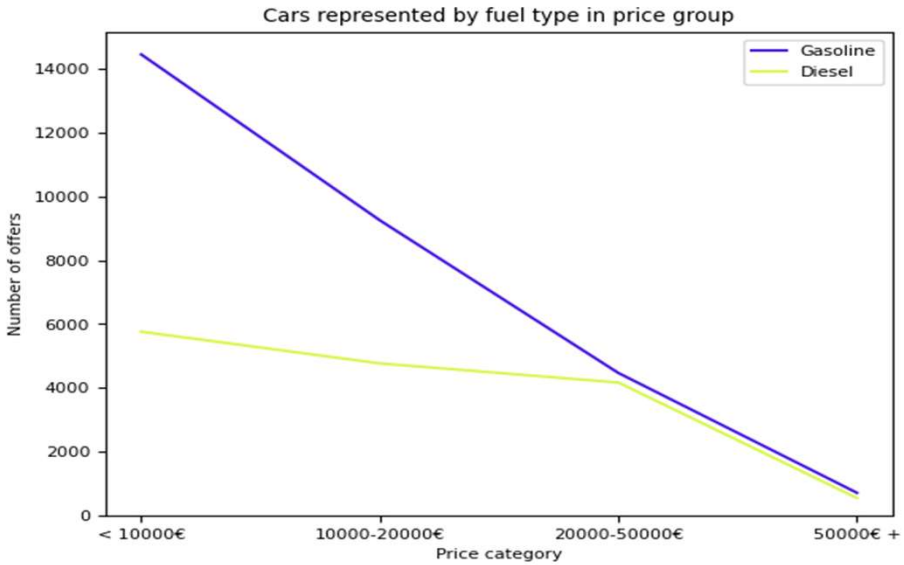


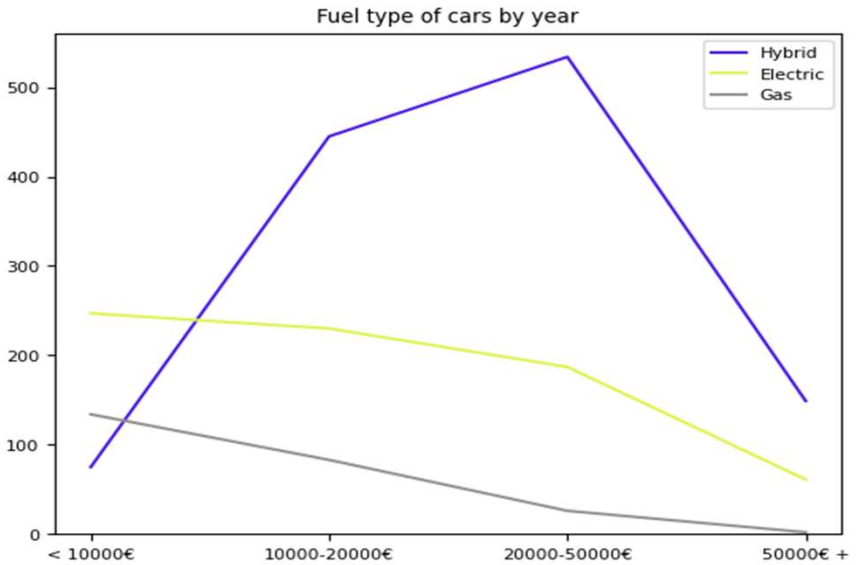
Gasoline cars are widely represented among cars with **prices lower** than **€10.000**. This ratio falls (7.4%) in the next group and falls **below half** in the next two groups.

Hybrid and electric vehicles' share of the total tends to **grow** with price in each price group.

The proportion of diesel vehicles **increases** with price in the first three groups while **decreasing** in the fourth.

Real price categories by fuel types





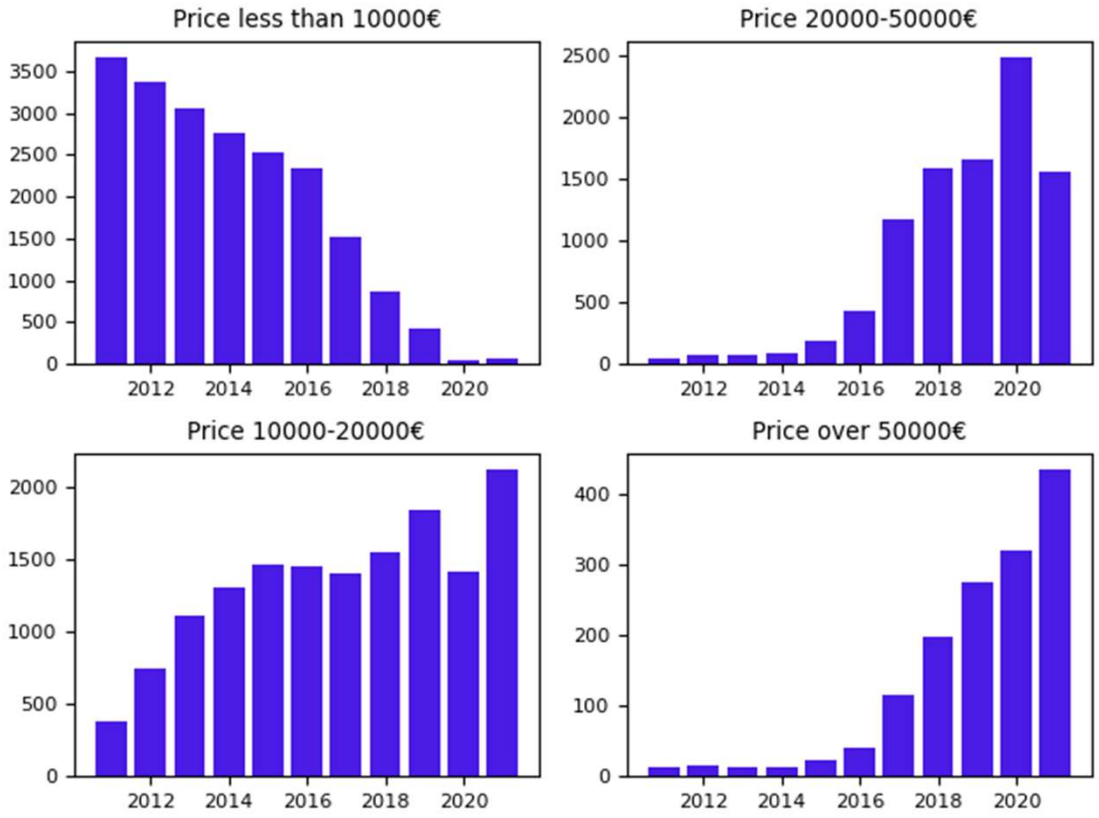
The total quantity of gasoline, diesel, electric, and gas cars represented **tends to decrease** when prices increase.

The number of hybrid vehicles **increases** in the first three price categories while **decreasing** in the fourth.

Price category trends

Cars with a price **lower** than **10.000€** tend to be **less** represented when production year increases

Vehicles with a price **higher** than **10.000€** tend to be **more** represented when production year increases



Top 10 popular brands

Brand	Average price, €	Cars represented	Average mileage
Volkswagen	16060.09	6921.00	80881.04
Opel	10428.03	4801.00	78416.94
Ford	13793.37	4441.00	69201.89
Skoda	13715.19	2877.00	70644.23
Renault	11287.90	2828.00	57111.05
Audi	30000.23	2681.00	76796.27
BMW	23431.07	2400.00	97489.55
Mercedes-Benz	28379.92	2347.00	96164.90
SEAT	12847.43	1924.00	66158.88
Hyundai	12852.69	1886.00	52792.60

Top 10 popular models

Brand	Model	Average price, €	Model represented	Average mileage
Volkswagen	Golf	13540.55	1492.00	91738.14
Opel	Corsa	8959.63	1491.00	55012.01
Ford	Fiesta	9864.22	1289.00	52437.59
Opel	Astra	9574.46	1191.00	101118.97
Ford	Focus	12428.89	985.00	83752.35
Volkswagen	up!	7622.25	945.00	55040.93
Skoda	Fabia	10170.06	917.00	55746.15
Volkswagen	Polo	10053.58	893.00	68183.68
smart	forTwo	7878.90	725.00	55304.53
Fiat	500	11022.25	666.00	25588.98

Top 10 expensive cars

Brand	Model	Price, €	Horsepower	Mileage
Ferrari	F12	1199900	775.00	431
Mercedes-Benz	S 650	717078	630.00	90
Maybach	Pullman	717078	630.00	90
Maybach	Pullman	499800	530.00	3400
Mercedes-Benz	SLS	465000	591.00	350
Lamborghini	Aventador	449900	770.00	3600
Ferrari	812	439900	799.00	6500
Lamborghini	Aventador	439900	770.00	14090
Lamborghini	Aventador	399999	700.00	1200
Porsche	991	399911	700.00	4624

Top 10 cheapest cars

Brand	Model	Price,€	HP	Average mileage
Citroen	C1	1100	68.00	204000
Lada	Priora	1190	98.00	100611
Toyota	Aygo	1250	68.00	153000
Peugeot	206	1299	68.00	222000
Opel	Corsa	1300	69.00	133000
Volkswagen	Touran	1396	140.00	233567
Brilliance	BS4	1500	101.00	100524
SEAT	Ibiza	1500	69.00	170000
smart	forTwo	1500	54.00	140000
Fiat	Panda	1500	69.00	157000

Top 10 powerful

Brand	Model	Price	Horsepower	Mileage
Mercedes-Benz	G 63 AMG	216619	850.00	9234
Audi	R8	295000	799.00	11000
Ferrari	812	439900	799.00	6500
Ferrari	F12	1199900	775.00	431
Tesla	Model S	54450	772.00	71099
Tesla	Model X	99999	772.00	63205
Ford	Mustang	121000	771.00	50
Lamborghini	Aventador	439900	770.00	14090
Lamborghini	Aventador	449900	770.00	3600
Corvette	Z06	148600	767.00	9790

Top 10 least horsepower

Brand	Model	AVG Price	HP
Ligier	JS 50	9570.00	5.00
Estrima	Birò	13090.00	5.00
Microcar	M.Go	8262.86	5.86
Microcar	M8	6149.50	6.00
Aixam	City	12935.00	6.50
Microcar	Due	6745.00	7.50
Piaggio	Ape	7849.75	10.25
Renault	Twizy	5413.43	10.74
Tazzari	EV Zero Classic	6500.00	20.00
Zhidou	D2S	12500.00	24.00

Conclusion

In this project, an analysis of data on German cars from the Autoscaut24 website was carried out. Relationships, interesting trends between variables were identified.

An **anomaly** was discovered in 2017. Gasoline cars are the **least** represented in this year's production, while diesel cars are the most widely represented. Also this year and after, there is a **downward** trend in the number of cars with a **manual** transmission and an increase in the number of **automatic** ones.

The analysis was done using **Python** in Jupiter notebooks. See my **GitHub** portfolio https://github.com/CleonLopes07


Thank You
for attention!