

## DNK Project work 1: Report

**Task 1:** ... *determine the proportion of each car type. Identify the most common car type.*

The most common car type is suv. The proportion of each car type (class): 2seater: 2.14%, compact: 20.1%, midsize: 17.5%, minivan: 4.7%, pickup: 14.1%, subcompact: 15.0%, suv: 26.5%

**Task 2:** *Describe any observable trend. Does a larger engine size generally correlate with lower fuel efficiency?*

The scatterplot of displ vs. hwy shows a negative correlation between engine size and fuel efficiency. It shows a downward trend as moving to larger values on the x-axis (engine displacement, displ.) This negative correlation means, that as engine displacement increases, highway fuel efficiency tends to decrease.

**Task 3:** *Compare the average highway fuel efficiency (hwy) across these subsets using mean() and sd(). Identify which drive type tends to have the highest and lowest fuel efficiency.*

Front-Wheel Drive (f) - Mean Highway Fuel Efficiency: 28.16038, Standard Deviation: 4.206881

Rear-Wheel Drive (r) - Mean Highway Fuel Efficiency: 21, Standard Deviation: 3.662877

Four-Wheel Drive (4) - Mean Highway Fuel Efficiency: 19.17476, Standard Deviation: 4.07870

Drive type with the highest fuel efficiency: front-wheel (f)

Drive type with the lowest fuel efficiency: 4wd (4)

**Task 4:** *Determine if there's a noticeable trend in fuel efficiency with increasing cylinder count.*

The boxplot of city fuel economy (cty) across cars with different numbers of cylinders (cyl) shows a downward trend as moving to larger values on the x-axis (different numbers of cylinders.) That means vehicles with fewer cylinders tend to have higher city fuel economy.

Vehicles with 4 cylinders show a wider range of fuel economy, with some outliers. The outliers in 4-cylinder category have exceptionally high fuel economy compared to the median, which suggests that certain 4-cylinder vehicles are more fuel-efficient than other numbers of cylinders. 5-cylinder vehicles have the narrowest range of city fuel economy values, which indicates that the fuel efficiency is fairly consistent within that group.

**Task 5:** *Investigate which variables might influence fuel efficiency (cty and hwy) the most. Summarize your findings and suggest possible reasons for the relationships observed.*

Task 5's first two scatterplots have similar trends. They show, that both **engine displacement** and **number of cylinders** influence city fuel efficiency and highway fuel efficiency. As engine displacement increases, city fuel efficiency generally decreases. This relationship indicates, that larger engines consume more fuel. Also vehicles with fewer cylinders tend to have higher fuel efficiency. If we compare the scatterplots, the fuel efficiency for smaller engines seems to reach higher values on fuel efficiency on the highway compared to city driving.

The boxplot shows that **car class** influences city and highway fuel efficiency significantly. 2seater and compact cars have highest fuel efficiency, when SUVs, pickups and minivans have the lowest fuel efficiency values in boxplots.

In summary, larger engines with more cylinders and bigger vehicle classes consume more fuel, reducing overall fuel efficiency. Smaller engines and compact vehicles, however, are optimized for fuel efficiency, especially on highways where consistent speeds can be maintained.