Homework1_24235815

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1 Introduction

The `mtcars` dataset comes built-in with R and contains fuel consumption and design specifications for 32 cars. It includes variables such as **miles per gallon (*mpg*), number of cylinders (*cyl*), horsepower (*hp*), weight (*wt*), and more.**

Some key variables in this dataset include:

- **mpg**: Miles/(US) gallon (fuel efficiency)
- **hp**: Gross horsepower (engine power)
- **wt**: Weight of the car (in 1000 lbs)

2 Summary Statistics

Below is a summary of key variables — *mpg*, *hp*, and *wt* — presented in a neat table using `knitr::kable()`.This gives us more idea about the dataset and then we can perform further Analysis.

Table 1: Summary Statistics of mpg, hp, and wt in mtcars

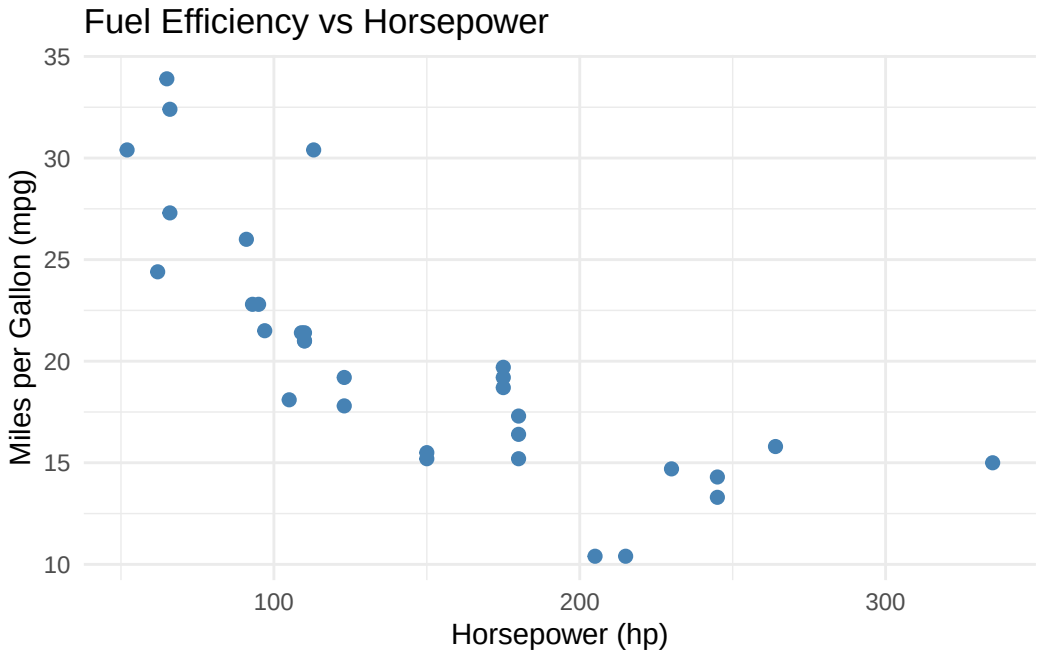
mpg	hp	wt
Min. :10.40	Min. : 52.0	Min. :1.513
1st Qu.:15.43	1st Qu.: 96.5	1st Qu.:2.581
Median :19.20	Median :123.0	Median :3.325
Mean :20.09	Mean :146.7	Mean :3.217
3rd Qu.:22.80	3rd Qu.:180.0	3rd Qu.:3.610
Max. :33.90	Max. :335.0	Max. :5.424

2.1 From the summary:

- **Fuel efficiency (mpg)** ranges from **10.4 to 33.9**, with a mean of around **20 mpg**. This indicates a wide variation in car mileage among different models.
- **Horsepower (hp)** varies significantly, from as low as **52** to as high as **335**, suggesting some cars are much more powerful than others.
- The **weight (wt)** of the cars ranges from about **1.5 to 5.4 (in 1000 lbs)**, which can also affect fuel efficiency and power.

Since there is a variation in the fuel effiency(mpg) and Horsepower lets find out how it is related to each other

3 MPG vs Horsepower



- The scatterplot shows a ***negative relationship*** between ***horsepower and fuel efficiency***:
  - Cars with ***higher horsepower tend to have lower mpg***.
  - This is ***expected as powerful engines consume more fuel***.
  - The pattern suggests that there is a ***trade-off between performance (hp) and fuel economy (mpg)***.