Data Science

9. Exercise / Practical

Theoretical Exercises

Excercise 9.1: (Theoretical) Simple linear regression

The following table contains the annual sales and advertising expenses in milion Euro of six different companies

sales	100	120	100	60	140	80
expenses	7	10	9	6.5	9.5	6

Set up the advertising expenditure as the dependent variable Y of a simple linear regression model with the annual sales as the explanatory variable X.

a) Determine the least squares estimates for the parameter β_0 and β_1.

b) Calculate the coefficient of determination. How do you asses the goodness of fit of the model?

c) Draw the observations and the estimated regression line in a coordinate system. Also create a residual plot. Interpret the results.

Practical Exercises

Excercise 9.2: (Practical) Simple linear regression

Consider the Ames Housing data set given in one of the previous exercises.

a) Take *SalesPrice* as dependent variable and *Lot Area* as explanatory variable. Perform a least square estimation and plot the regression line and data points. Furthermore, compute the measure of determination. Is the data well-fitted?

b) Consider different metric variables as explanatory variables. For which variable do you observe a linear correlation?