ACS234
Maths and Data Modelling

Tutorial 3
Wednesday 1pm LT04

https://github.com/ineskris/ACS234/tree/master/Tutorial3

Done in Lecture (week 4 - week 5)

- Simple Linear Regression - Least Squares
- Multiple Linear Regression

Simple Linear Regression

Simple linear regression allows us to study the relationship between only two variables.

Model $y = a_0 + a_1 x + e$

Prediction $\hat{y} = \hat{a}_0 + \hat{a}_1 x$

Coefficient of determination $R^2 = 1 - \frac{S_r}{S_t}$

Sum of squared deviations $S_t = \sum_{i=1}^{n} (y_i - \bar{y})^2$

Sum of squares of the errors $S_r = \sum_{i=1}^{n} (y_i - \hat{y}_i)^2$

Standard Error of Estimate $S_{y/x} = \sqrt{\frac{S_r}{n - (m+1)}}$

For a simple linear regression $m = 1$

Linear coefficients to minimise the MSE

$$\hat{\alpha} = \bar{y} - \hat{\beta}\bar{x}$$

$$\hat{\beta} = \frac{\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})}{\sum_{i=1}^{n} (x_i - \bar{x})^2}$$

Multiple Linear Regression

Multiple regression is like linear regression, but with more than one independent value, meaning that we try to predict a value based on **two or more** variables.

$$y = a_0 + a_1x_1 + a_2x_2 + \ldots + a_mx_m + e$$

Response

Coefficients

Variables

Exercice 3 - Can you use a regression model to predict the housing price in Boston ?