## 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.

 $\mathbf{Model} \qquad \qquad \mathbf{y} = a_0 + a_1 \mathbf{x} + e$ 

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  $S_r = \sum_{i=1}^n (y_i - \hat{y}_i)^2$ 

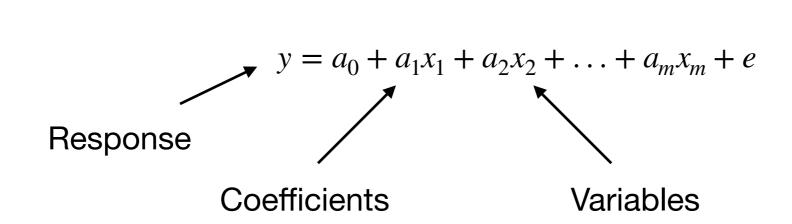
Standard Error of Estimate  $S_{y/x} = \sqrt{\frac{S_r}{n - (m+1)}}$  For a simple linear regression m=1

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.



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