ECEN321 : Hypothesis Testing
Lab 5 Submission

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1 Introduction

Regression is an approach to modelling the relationship between a dependent variable and one or more independent variables. The case of one explanatory variable is called simple linear regression. This is what this lab attempts to demonstrate when analysing the relationship between time and average local temperature.

2 Theory

The correlation coefficient between the variables, denoted r, is first computed.

$$r = \frac{1}{n-1}\sum_{i=1}^{n}\left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$$

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

Then the estimators for the slope (β_1) and y-intercept (β_0) can be computed:

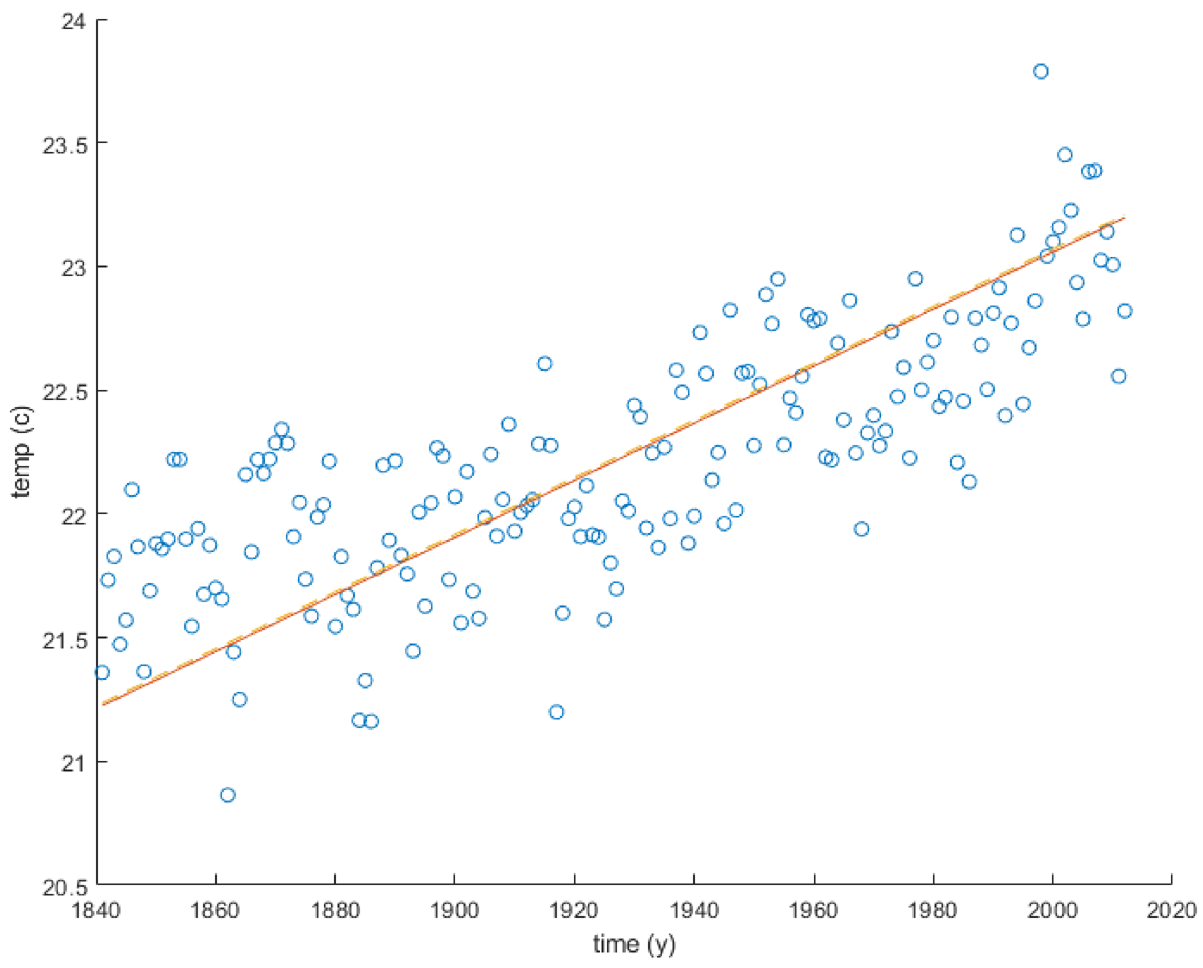
$$\beta_1 = \frac{\sum(y - \bar{y})(x - \bar{x})}{\sum(x - \bar{x})^2}$$
$$\beta_0 = \bar{y} - \beta_1\bar{x}$$

For Hypothesis testing, the p value can then be computed:

$$\frac{r\sqrt{n-2}}{1-r^2} \approx t^*(n-2)$$

3 Results

Regression was performed on data from Taipei,Taiwan see below in figure 1



For null or r = 0:
Computeed β_1 = 0.0115
95% interval = 0.01149,0.011558
R = 0.004715 t = 0.061472