

Computer Science & Information Systems

## Machine Learning - Lab sheet - Module 2

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### EXERCISE 2 - SIMPLE LINEAR REGRESSION WITH LEAST SQUARES

#### 1 Objective

The objective is to

- implement simple linear regression using least squares on a given dataset.

#### 2 Steps to be performed

**Tool** Python3

**Libraries required** numpy, matplotlib, pandas, sklearn

**Input** salary\_data.csv

**Machine Learning Model** Simple Linear Regression

**Implementation** ML\_Lab 4 LinearRegression\_LeastSquare.ipynb

**Steps** .

- Understand the problem.
- Import required Python libraries.
- Import the dataset and convert to as dataframe.
- Preprocess the data. Extract columns as  $X$  and  $y$ .
- Visualize the dataset.
- Compute the parameters  $\theta_0$  and  $\theta_1$  using Least square estimates.

$$\theta_1 = \frac{\sum_{i=1}^n (x^i - \bar{x})(y^i - \bar{y})}{\sum_{i=1}^n (x^i - \bar{x})^2}$$

$$\theta_0 = \bar{y} - \theta_1 \bar{x}$$

- Predict the values for testing set using the model.

$$y = \theta_1 x + \theta_0$$

- Visualize the model and the results.
- Measure the performance of the model.

### 3 Results

- A line is fitted for the given dataset.



### 4 Observation

- A linear regression model can be fitted using least squares method.