Lab Week 7- Regression

Learning Outcomes

At the end of the session, you will be able to:

- Determine the regression equation for a set of data and interpret the equation.
- Explore and visualize a dataset using basic R code.

Activity 1 – Regression Exercise

A production manager collected data on production cost and the quantity produced for 10 consecutive days. These data are given in table below:

Day	Quantity ('000 units)	Cost (RM'000)
1	10	20
2	13	28
3	20	38
4	18	35
5	17	33
6	15	30
7	16	34
8	14	29
9	11	23
10	12	25

1. Find the regression equation using the least squares method.
2. Explain the meaning of equation.
3. Estimate the production cost when the production quantity is 25,000 units. How much was the fixed cost? Explain.
4. Find the product moment correlation coefficient.
5. Find the coefficient of determination.

Activity 2 – R code

Check whether the output is similar to your answer in Activity 1.

Activity 3 – R code (Simple linear regression)

1. Load the data file toydata.csv into R (store it in the data frame df) and plot the variable.
2. What do the estimated values of the intercept and regression coefficient tell you about the relationship between y and x?
3. Does the p-value for the regression coefficient suggest that it is a significantly associated with our target y?
4. Perform the predictions using predict () function.
5. How much has removing this data point changed the estimates, the p-value for the regression coefficient and the R_2 value? Does this support the belief that this data point may be an "outlier"?
6. Compute predictions for all 10 datapoints in your data frame 'df' using the model fitted without the outlier datapoint and plot them using the lines () function. How do the two fitted lines differ?

Week 7 Lab Submission

1. Submit “Activity 3” in PDF format through ULearn. One PDF should also include an R script file containing R code answers. Please make sure this is clearly commented so it is obvious which R statements are answering which questions, and the questions are answered in the order they appear in the activity.

Deadline: 24 Oct 2023