Activity 3.2: Multiple Linear Regression

The dataset that accompanies Activity 3.2, **Dataset_3.2.xlxs** reflects the information taken from 17 hospitals at various locations around the world. The explanatory (Independent variables) are workload variables, that is, items that result in the need for personnel in a hospital installation. A brief description of the variables are as follows:

Response variable:

y = monthly labor hours

Explanatory variables:

x_1 = average daily patient load

x_2 = monthly X-ray exposures

x_3 = monthly occupied beds

x_4 = eligible population in the area

x_5 = average length of patient's stay, in days

Our goal is to produce the best model that will predict (or estimate) the personnel needs (monthly labor hours) for hospitals. The full multiple linear regression equation for the population is

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Step 1:

Import the dataset **Dataset_3.2.xlxs** into SPSS

Step 2:

In variable view, correct all variable properties that need to be corrected

Step 3:

Perform the Multiple Linear Regression

Go to **Analyze** → **Regression** → **Linear**.

In the Linear Regression dialog box, transfer the dependent variable to the dependent variable box, then transfer the independent variables to the independent variable box.

Step 4:

Click on the **Statistics** button and check all relevant options. Click **Continue**.

Step 5:

Click on the **Plots** button and check all relevant options. Click **Continue**. In the Linear regression box, click **OK**.

Step 6:

Examine the relevant charts and tables to verify that the Multiple Linear Regression assumptions are all met.

Step 7:

Examine all relevant tables to determine whether our model is significant, whether it would work well, and, finally, to determine the coefficients and variables that influence the model and those that don't. Find the final equation for the model that you will use to predict and estimate.

Step 8:

Use the equation to predict the y-value or labor hours for a hospital with

$x_1 = 120.76$

$x_2 = 11311$

$x_3 = 3511.15$

$x_4 = 110.6$

$x_5 = 4.99$

★ Please create a copy of the Excel file and use the duplicate to complete the activity. Ensure no changes are made to the shared file