Stat 401G Lab 4

Overview

In last week’s lab you were introduced to JMP’s **Fit Y by X** platform for simple linear regression analysis. For this lab you will be introduced to JMP’s **Fit Model** platform for doing the same analysis but with some added features.

Warm-up Exercise

JMP’s **Fit Model** is under **Modeling** on the JMP Starter or under the **Analyze** pull-down menu. Multiple Regression and some advanced SLR features are available only under Fit Model. This handout illustrates obtaining regression output from the Fit Model analysis platform.

In class we looked at the relationship between the annual global temperature (Y) and the CO₂ concentration, (X) for 20 years randomly selected from between 1943 and 2003. Last year, 2007, will be reserved to see if the simple linear regression line can predict the annual global temperature in that year.

<table>
<thead>
<tr>
<th>Year</th>
<th>CO₂ (ppmv), X</th>
<th>Global Temperature, Y</th>
</tr>
</thead>
<tbody>
<tr>
<td>1965</td>
<td>320.03</td>
<td>13.85</td>
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<tr>
<td>1966</td>
<td>321.37</td>
<td>13.92</td>
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<td>1968</td>
<td>323.05</td>
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<td>1970</td>
<td>325.68</td>
<td>14.04</td>
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<td>1971</td>
<td>326.32</td>
<td>13.90</td>
</tr>
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<td>1972</td>
<td>327.46</td>
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<td>1973</td>
<td>329.68</td>
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<td>1974</td>
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<td>1981</td>
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<td>1984</td>
<td>344.42</td>
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<td>1986</td>
<td>347.15</td>
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<td>1987</td>
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<td>1991</td>
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<td>2002</td>
<td>373.10</td>
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<tr>
<td>2007</td>
<td>382.43</td>
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</tbody>
</table>
Fit Model

1. You can use the same JMP data set from last week’s lab.
2. Go to Fit Model under Basic Statistics or select Analyze + Fit Model.
3. Select Temp as the Response (Y) in the Pick Role Variables box.
4. For the Construct Model Effects box, highlight CO2 and click the Add button.
5. The Personality should be Standard Least Squares (the default) and the Emphasis should be Minimal Report (you need to change this). Then click on Run Model.
6. The output should look very similar to the output of Fit Y by X – Fit Line. You should be able to identify the following items from the Linear Least Squares output:
   - The estimates of the Y-intercept and slope for the simple linear relationship between CO2 and Temperature. Note that the Fit Model output does not give you the prediction equation automatically for the fitted model like Fit Y by X does. You can go to the red triangle pull down next to Response Temp and select Estimates – Show Prediction Equation to get the right hand side of the fitted model.
   - \( R^2 = \text{RSquare} \)
   - \( s_{Y|X} = \text{Root Mean Square Error} \)
   - \( n \)
   - The test statistic for testing \( \beta_1 = 0 \) vs. \( \beta_1 \neq 0 \) and the associated two-sided P-value.
   - The test statistic for testing \( \beta_0 = 0 \) vs. \( \beta_0 \neq 0 \) and the associated two-sided P-value.
7. Right-click on the Parameter Estimates portion of the output. From the resulting contextual pop-up menu, select Lower 95% from the Columns menu item. Repeat this selecting Upper 95%. This adds two additional columns to this section of the output. These columns provide 95% confidence intervals for the intercept and the slope of the model: \( Y = \beta_0 + \beta_1 X + \epsilon \).
8. From the red triangle pull down menu next to Response Temp in the output go to Save Columns and Save: Predicted Values, Residuals, Mean Confidence Interval, and Indiv Confidence Interval. Note that even though 2007 with a CO2 value of 382.43 ppmv is not used in developing the least squares prediction equation, you will get a predicted value, confidence interval for the mean and prediction interval for the individual. The actual numerical values appear in the JMP data table. The Fit Y by X analysis platform was able to plot the confidence interval and prediction interval curves on the plot of the data but did not give the actual numerical values.