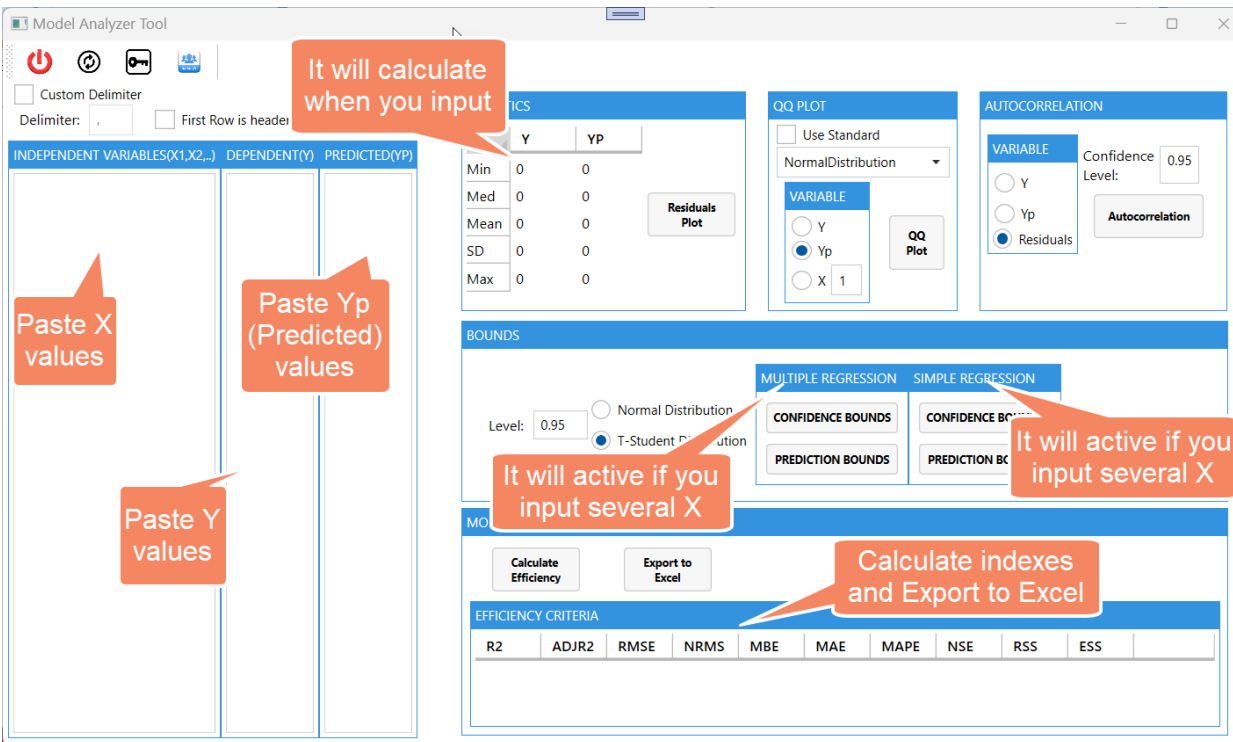## Model Analyzer Tool

The Model Analyzer Tool is a compact and user-friendly Windows software designed for the analysis of modeling results. With this tool, you can generate QQ-Plots, Residual Plots, and Confidence and Prediction Bounds. It also provides automatic calculation of efficiency indices.

1- Input Data

You can effortlessly input data by copying and pasting it from Excel, text, or CSV files. If you are copying data from Excel, there's no need to specify a 'Custom Delimiter.' However, for other file formats, you should enter the delimiter as required.

If you input multiple independent variables, the tool will display multiple X variables in the top bar. Additionally, when you enter the dependent variable (Y) and predicted values (Yp), the tool will automatically calculate various statistics.

Fig1 – Model Analyzer Tool

2- <u>Statistics</u>

In the 'Statistics' section, you will find various statistical options. Additionally,

you can click the 'Residuals' button to generate plots based on the residuals.

It's a straightforward process, and you can easily export plots to Excel for

further editing.

We utilized the OxyPlot library to create histograms, with automatic bin

selection by OxyPlot. However, please note that when exporting the

histogram to Excel, the bin settings may be altered.

Fig1 – Residuals Plot

3- QQ Plot

In QQ-Plot section you can select the distributions and any variables between dependent, independent, and predicted variable. When you check the 'Use Standard' checkbox, the tool will employ a standard distribution format rather than fitting a custom distribution to your data. For example, in the case of a Normal distribution, the tool will adopt a standard Normal distribution with a mean of 0 and a standard deviation of 1.

4- Autocorrelation

The examination of autocorrelation in model residuals serves as a valuable method for identifying and addressing any lingering patterns or dependencies not captured by the model. The presence of autocorrelation within the residuals indicates potential inadequacies in the model's handling of temporal dependencies in time series data. This insight can be instrumental in refining and enhancing the model.

If the chart falls within the upper and lower bounds, it signifies effective model performance. The first autocorrelation item should be 1, representing the correlation of a variable with itself.

Simply choose a variable, input the desired confidence level, and click the button to generate the chart.

5- Confidence and Prediction Bounds

Confidence and prediction bounds are important concepts in modeling, particularly in the context of regression analysis. These bounds provide a range of uncertainty for the model's predictions and are used to assess the reliability and accuracy of the model.

If you enter only one independent variable, the 'Simple Regression' block will be activated. However, if you enter multiple independent variables, the 'Multiple Regression' block will become active.

You can input decimal values between 0 and 1 as your confidence level. Additionally, you have the option to choose between two distributions: Normal and T-Student distribution. In summary, the choice between the Normal distribution and the Student's t-distribution depends on your specific data and the assumptions you can make. If you have a large sample size, the Normal distribution is often appropriate. However, when dealing with smaller samples or unknown population standard deviations, the Student's t-distribution is a more suitable choice. The t-distribution accommodates greater uncertainty and variability in such cases.

6- Model Efficiency

This section does not require further explanation. With just one click, you can obtain ten efficiency criteria. For additional details regarding the formulas, please refer to the 'Formulas.pdf' file.