

# Regression Analysis MATLAB GUI Documentation

## INTRODUCTION

The Regression Analysis GUI was designed to help a student better understand regression analysis. An important part of this is understanding how erroneous data points can influence the regression process, so the adding and removing of data points will be explored in order to optimize the curve-fitting process. This GUI allows the user to input measured data (up to 20 data points), or use the canned data sets included in the program. The user can then fit up to a fourth-order polynomial to the data. For this curve fit, the  $R^2$  value and a y-variance envelope are calculated in order to help the user evaluate the goodness of fit and potentially reject invalid data points. Points may then be de-selected so that they are not included in the curve fit.

This document includes instruction on the operation of the GUI. Another document is available which includes more detail on regression analysis and the use of a y-variance envelope.

## FILES NEEDED TO RUN REGRESSION ANALYSIS GUI

regression.fig  
regression.p  
user\_data.m

Place these three files in the same directory, and make it the working directory in MATLAB.

## RUNNING THE REGRESSION ANALYSIS GUI

With the proper working directory selected, type 'regression' in the MATLAB command window.

Fig. 1 shows the appearance of the GUI when it is first opened.

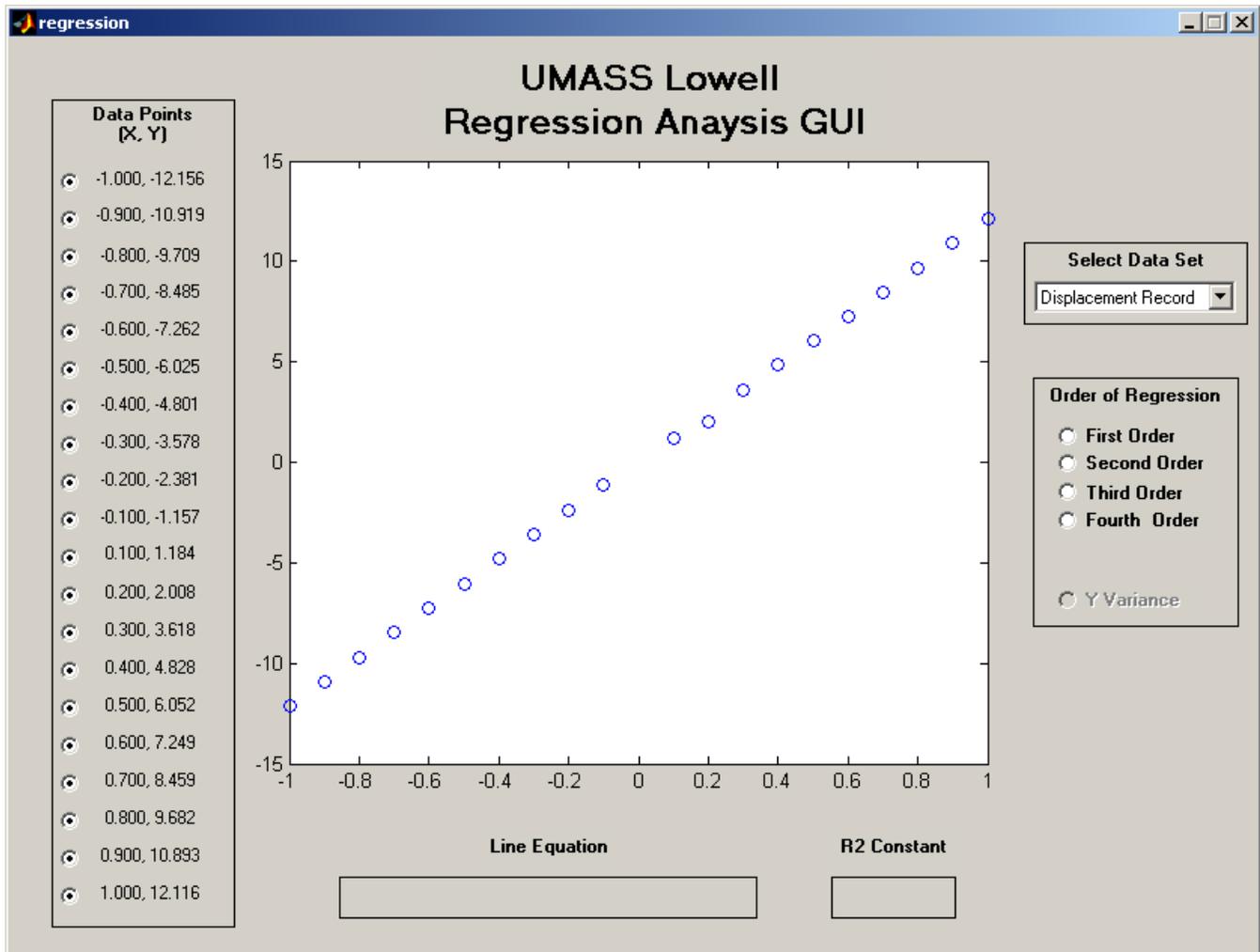


Fig. 1. Regression Analysis GUI.

There is an initial data set selected, with all of its points included for regression. The inclusion or removal of points can be performed by selecting the proper radio button on the left side of the window. Rejected data points will be red in the figure, while the included points will be blue. The order of the line to be fit can be selected by clicking the proper radio button on the right side of the window, using the controls shown in Fig. 2.

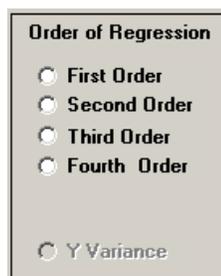


Fig. 2. Selection of order of regression and y-variance calculation.

Once a fit has been selected, the variance envelope for the dependent variable (y) can be shown on the plot by clicking the y-variance radio button.

Different data sets can be selected by clicking on the SELECT DATA SET pop-up menu. The canned data included is from a calibration of a Linear Variable Differential Transformer (LVDT), a Stress vs. Strain measurement, and the stiffness of a shock system from an automobile. Five user data sets can also be included by inputting data into the user\_data.m m-file. The data must not be larger than 20 data points and must be placed within the brackets.

With the order of the polynomial selected, an equation of the line used to fit the data will be displayed, along with its regression constant, in the fields at the bottom of the window, as shown in Fig. 3.

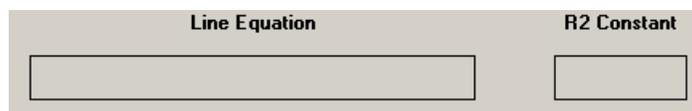


Fig. 3. Display of regression line and  $R^2$  value.