Syllabus, 92.591 Linear Modeling and Regression Analysis

Spring 2006 with Professor Shelley Rasmussen

References:

- *Applied Regression Analysis, 3rd Edition*, by Draper and Smith (Wiley)

Topics covered:

Simple linear correlation

- Simple linear regression: method of least squares; least squares line versus standard deviation line; regression fallacy concerning "regression toward the mean"

Simple linear regression:

- Model and assumptions; testing hypotheses; estimation of parameters and associated standard errors; correlations between parameter estimates; standard error of predicted response values; inverse prediction (using the regression line in reverse); regression through the origin

Checking for lack of fit:

- Examining residual plots, checking for outliers; examining runs in a time sequence of residuals

Multiple regression:

- Matrix approach; extra sum of squares principle as used in model building; partial F-tests and sequential F-tests

Orthogonal columns in the design matrix:

- An example is the balanced factorial analysis of variance design

The effect of bias in least squares analysis

Selecting the "best" regression equation, classical approaches:

- All possible regressions; backward elimination; forward selection; stepwise regression

Transformations of variables and stabilizing variances

More complicated models:

- Intrinsically linear versus intrinsically nonlinear models

Indicator (dummy) variables in regression

Effect of linear "correlation" between "independent" variables

Some consequences of the disposition of the data points

Possible causes of poor fits:

- Identification and interpretation of outliers; remote points

Software:

- Minitab 14; [www.minitab.com](http://www.minitab.com); see special deals for students.

- This package is easy to use and more than worth the money.

Grading:

- The course grade is based on homework, an examination, and a project (each 1/3 of grade).

All assignments and the project are due on the day (and time) assigned except in cases of real emergency. If for any reason you are unable to submit work on time, please let me know immediately.

Communication skills are important. Neatness and writing style contribute to the grade of each assignment. An oral and poster presentation of project results will be part of the project requirement.

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