COLBY COLLEGE
Department of Mathematics
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Fall 1998

Assignment 11: Data modeling

Reading: Handout on least-squares
Due: Tuesday 8 December

Collect data

1. Using the code from the last assignment, collect timings of the DFT and FFT for a range of problem sizes including at least 32, 64 and 128, and preferably more. You can probably get more FFT data in a reasonably amount of time.

Fit models

1. Following the examples from class and the handout, fit three models to each dataset, linear, quadratic and log:

$$t = \alpha + \beta s \tag{1}$$

$$t = \alpha + \beta s^2 \tag{2}$$

$$t = \alpha + \beta s \log s \tag{3}$$

   where t is the run time, s is the problem size, and α and β are the parameters you are going to estimate.

   You can use either the matrix form or the summation form to do the computation.

2. For each model, calculate the errors and the R^2 values. Which model seems to fit the data best?

Make predictions

1. One of the best ways to evaluate a model is to use it to make a prediction. For each of the three models, generate a prediction of the run time for a problem size twice as big as the biggest data point, then run the experiment and see which model was most accurate.