

Ay190 – Worksheet 9
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Date: February 11, 2014

1 Linear System of Equations

1.1 The data

I have written functions which load in a matrix and determines if it is a square invertable matrix. Even if it does not satisfy these conditoin the funciton returns the matrix, as well as printing its size. I also have written a function which loads in vectors, returns them as well as printing their size.

1.2 My Gauss Elimination

I found a Gauss Elimination script on the internet. I have modified it to take advantage of the numpy array functionality. This has provided a 55x speed up over the original implementation for the 1000x1000 matrix.

In order to gauge the time it took more accurately (accounting for other processes changing over time) I ran multiple runs; 5 trials for all except the smallest matrix which went so quickly that 500 runs were required to get an accurate measure. I found that the my Gauss elimination method took (0.00164, 0.138, 0.56, 18.148, 88.07) for each of the matricies (10, 100, 200, 1000, 2000) respectively.

1.3 Numpy Solver

The Numpy linalg uses the LAPACK routine `gesv` to compute the solution. When running the Numpy solver I found it was much quicker and thus required more trials to accurately measure its speed. I ran 1000 trials for the matricies of dimension 10, 100, and 200; 100 trials for the 1000 and 2000 row matrix. I found that it took ($9 * 10^{-5}$, $1.22 * 10^{-3}$, $5.82 * 10^{-3}$, .5007, 3.63) seconds to complete for the (10, 100, 200, 1000, 2000) matricies respectively.