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CS 3010.01

Extra Credit Programming Project 1

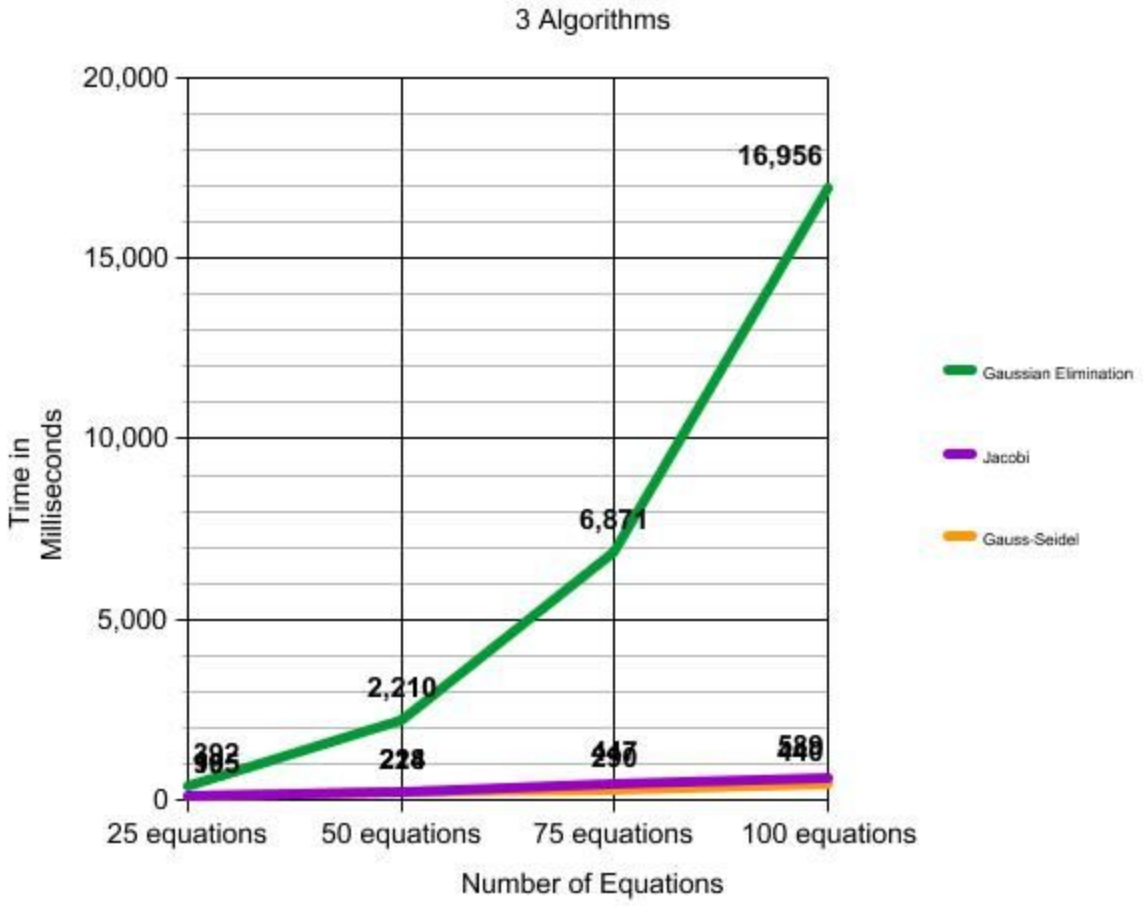
For this project, I programmed the 3 algorithms for solving n equations with n variables. Gaussian Elimination turned out to be the slowest of them all, followed by the Jacobi method, and the Gauss-Seidel method. The Gauss-Seidel method is the fastest because it uses the values of the x column vector as it is getting them. This turns out in a faster convergence to a value, and is more time efficient. The Jacobi method simply uses the values of the x column vector only after a full iteration is completed, and is less efficient because of this. The Gaussian Elimination method using partial scaled pivoting is the slowest method of these three algorithms. The Gaussian Elimination method is slowed down because of the many pivoting operations that it must take. I used my programmed algorithms for these three to collect data on how many milliseconds each operation took for 25 equations with n variables, 50 equations, 75 equations, and 100 equations.

Below is my collected data and the graphs of the curves for comparison on the three algorithms.

Data

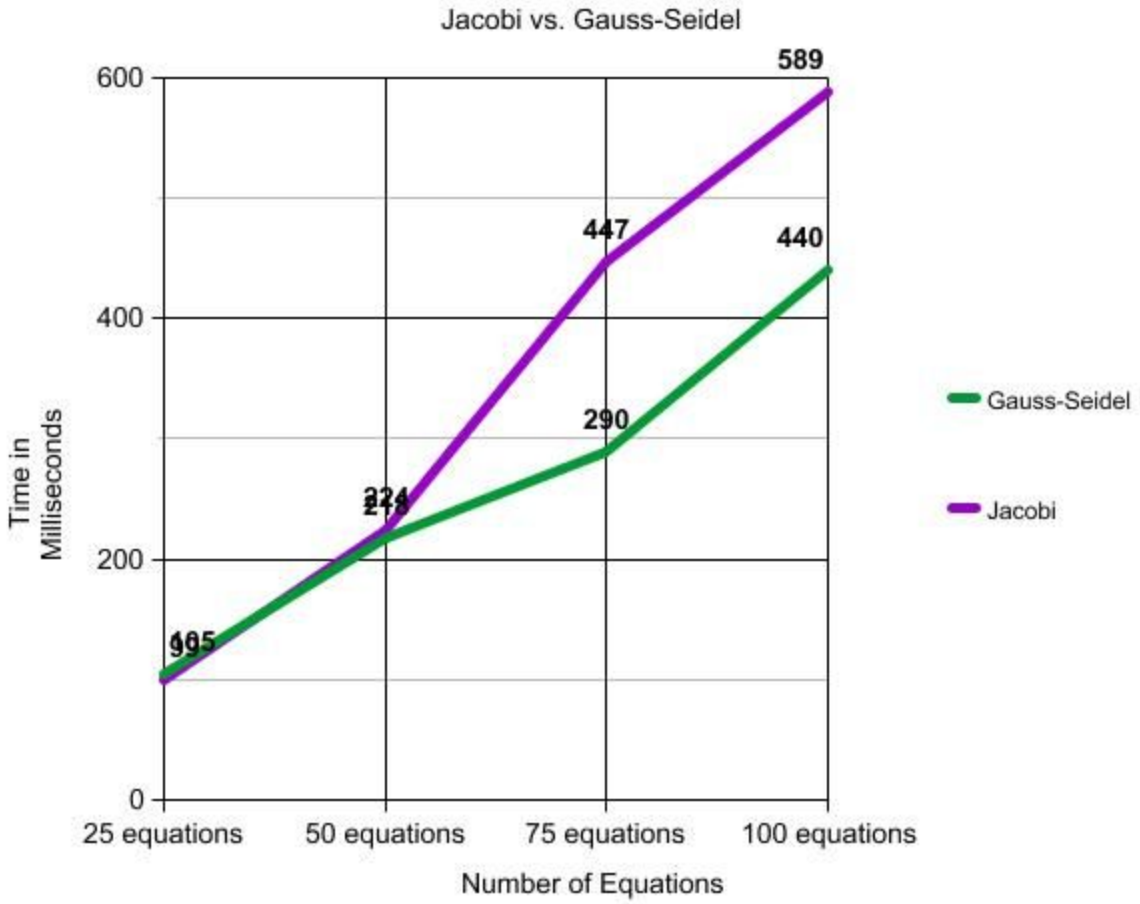
	25 equations	50 equations	75 equations	100 equations
Gaussian Elimination	392 ms	2210 ms	6871 ms	16956 ms
Jacobi	99 ms	224 ms	447 ms	589 ms
Gauss-Seidel	105 ms	218 ms	290 ms	440 ms

Graphs



As you can see, Gaussian Elimination is the slowest of the three algorithms, followed by the Jacobi method and Gauss-Seidel method.

This next graph shows the comparison between Jacobi and Gauss-Seidel.



Jacobi and Gauss-Seidel may start off with comparable execution times, but as the number of equations increase, it becomes very clear that Gauss-Seidel is the faster and more efficient algorithm.

Thank you,

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