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CS 415 – Spring 2017

PA4 – Matrix Multiplication: Sequential

Introduction

The matrix multiplication strategy is very simple. It is essentially just three nested for loops that calculate the resulting matrix of multiplying two square matrices of the same dimension. The resultant elements of the result matrix is the sum of the corresponding row times the corresponding column elements of each matrix.

Sequential Implementation

The sequential implementation is very simple as stated above. After analyzing increasing amounts of input by increasing the matrix dimensions each time, the resulting table is below.

Matrix size (height x width)	Run Time (seconds)
100	0.002395
200	0.020385
300	0.056793
400	0.154752
500	0.343779
600	1.42091
700	3.25677
800	4.97485
900	8.26488
1000	12.4145
1100	17.6882
1200	24.0056
1300	31.3612
1400	40.5937
1500	50.6562
1600	62.0621
1700	78.1686
1800	89.8436
1900	108.333
2000	125.683
2100	146.232
2200	169.109
2300	215.312
2400	225.431
2500	256.299
2600	288.627

Here is this table graphed to a surface plot using Excel.

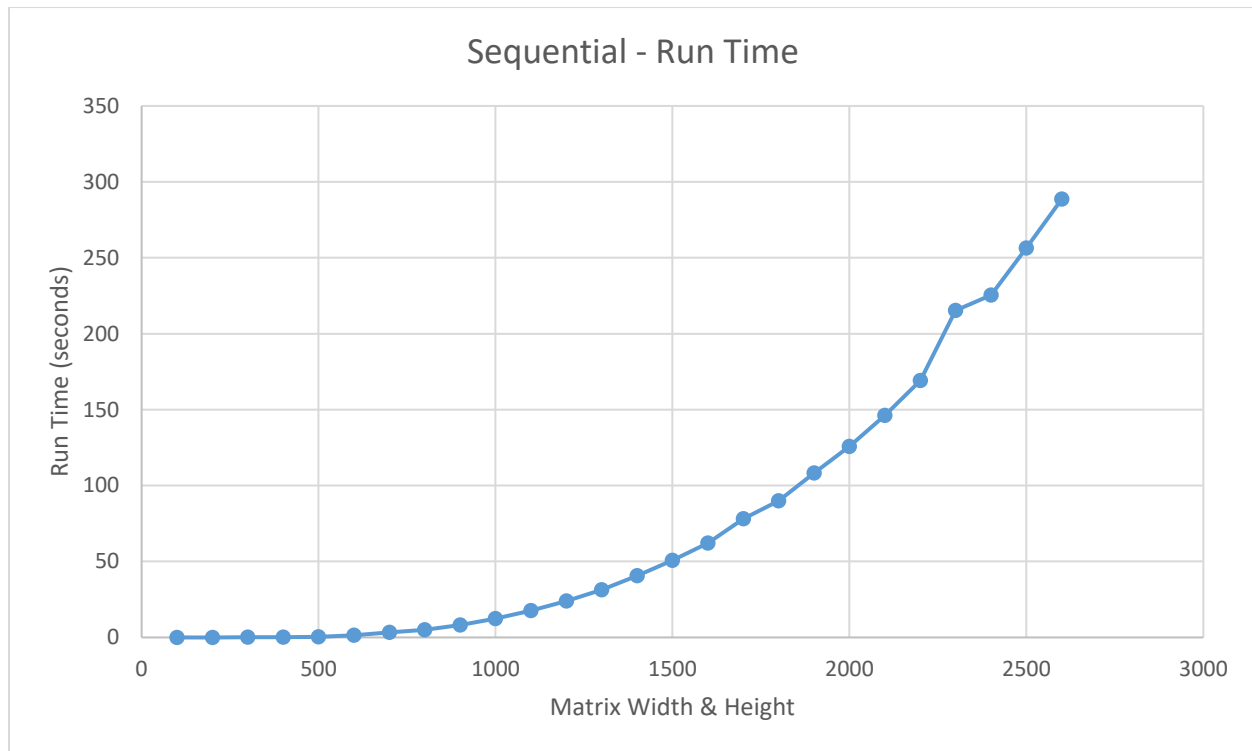


Figure 1- Sequential Run Time

It is evident by the surface plot (Fig. 1) that the time complexity of the sequential matrix multiplication strategy is polynomial.

Issues

I forgot to initialize the resulting matrix elements to 0 before summing elements from the two other matrices. This gave a strange output but was an easy fix.

Conclusion

This program gave me very little trouble and was quick to complete. The time complexity is polynomial. There were few issues when implementing.