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DAA-LAB 4

Question The objective of this assignment is to implement Strassen's Matrix Multiplication algorithm and analyse its performance compared to the standard matrix multiplication algorithm.
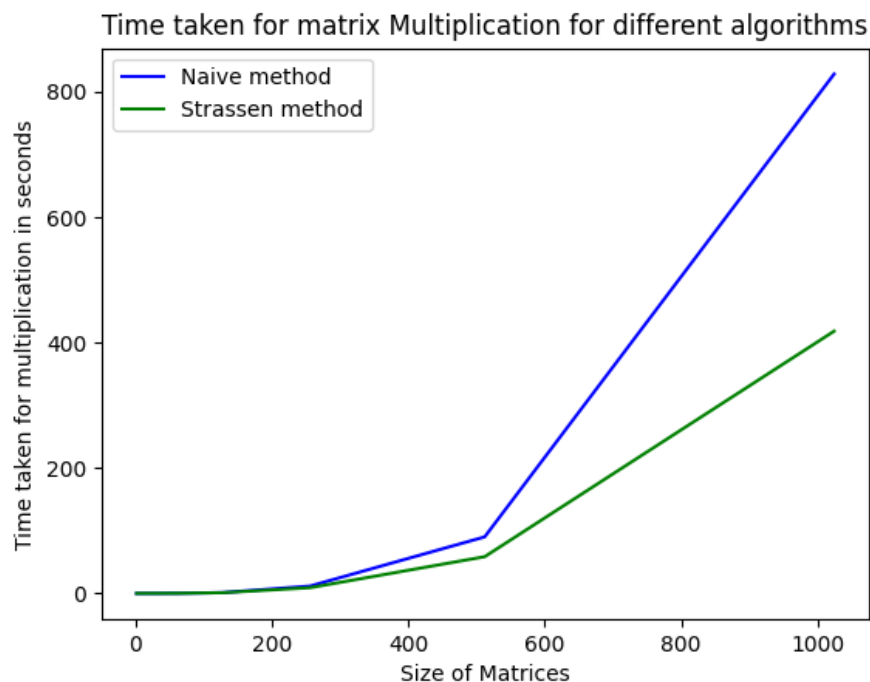
Libraries Used

- Numpy for easier matrix applications
- Time for time calculation
- Matplotlib.pyplot for visualization

Report

I have implemented straight-forward method (naïve method) and Strassen method in python3 used `time` library to calculate time taken by respective methods on randomly generated matrices.

The plot follows:

Naïve method

Matrix size	Time Taken (seconds)
2	2.4800014216452837e-05
4	4.4599990360438824e-05
8	0.0003384999872650951
16	0.002104800019878894
32	0.01954969999496825
64	0.17290309999953024
128	1.265953800000716
256	11.675154800002929
512	90.14681910001673
1024	828.4701506000129

Strassen Method

Matrix size	Time Taken (seconds)
2	1.5999976312741637e-05
4	0.00010229999315924942
8	0.00046779998228885233
16	0.0032801000052131712
32	0.024810199975036085
64	0.1606696999806445
128	1.1717945999989752
256	9.067763700004434
512	58.52060299998266
1024	418.2964409000124

Conclusion

- From the results and the results we can see that for small sized matrices naïve method is better compared to Strassen method
- For small sized matrices the excessive recursions become and hindrance but as size of matrix grows the efficiency of Strassen method shows resulting in blazing fast results.

Complexity of Naïve method : O(n^3)

Complexity of Strassen Method: O(n^2.81)