SUMMARY

USC ID/s: 9485847172, 3990700221

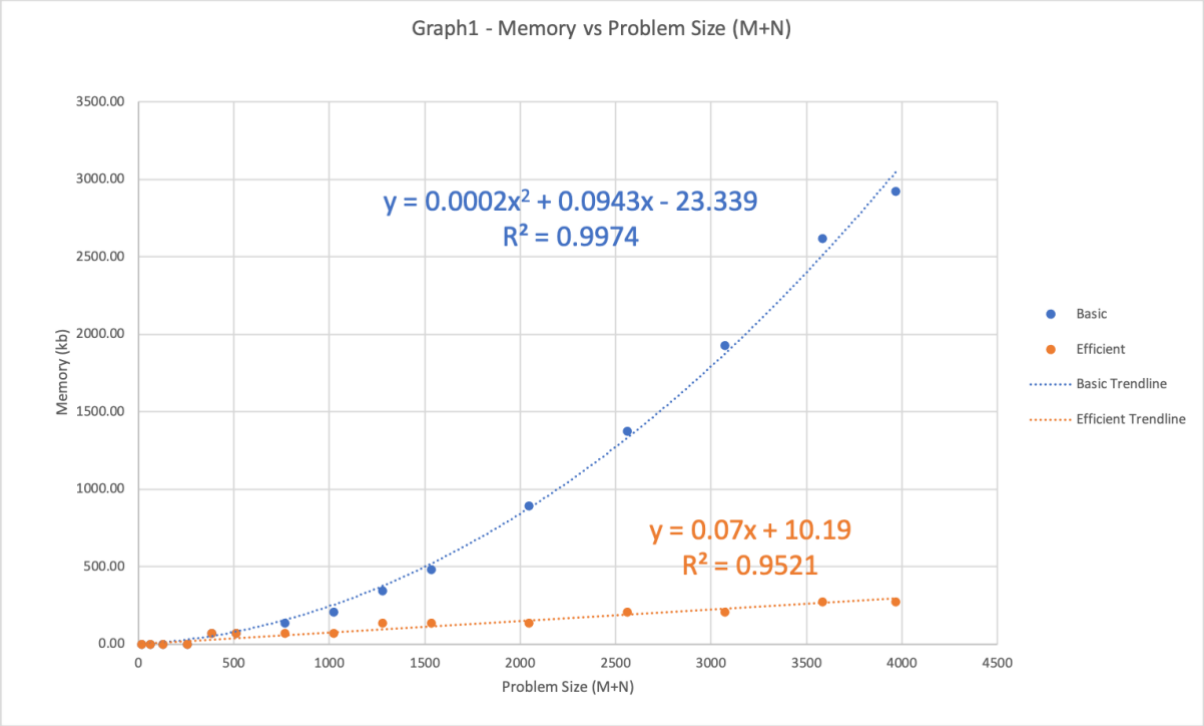
Datapoints

M+N	Time in MS (Basic)	Time in MS (Efficient)	Memory in KB (Basic)	Memory in KB (Efficient)
16	0.01	0.04	0.00	0.00
64	0.18	0.26	0.00	0.00
128	0.22	0.63	0.00	0.00
256	0.82	3.43	0.00	0.00
384	4.81	7.72	68.24	68.16
512	6.14	9.82	68.26	68.16
768	5.70	25.16	136.63	68.16
1024	10.39	17.89	205.09	68.16
1280	8.89	17.86	342.08	136.31
1536	10.40	28.77	479.26	136.32
2048	13.12	48.10	891.39	136.51
2560	16.95	45.24	1373.42	204.48
3072	22.36	46.05	1925.66	204.78
3584	26.08	45.21	2617.29	272.63
3968	26.66	61.09	2921.62	272.63

M+N	Time Ratio (Efficient / Basic)
16	3.677747791
64	1.444133723
128	2.848318213
256	4.197054508
384	1.602646729
512	1.599431738
768	4.410484835
1024	1.721761939
1280	2.009923117
1536	2.765024826
2048	3.665099369
2560	2.669260869
3072	2.058991329
3584	1.73344102
3968	2.2914755
Average	2.579653034

Insights

Graph1 – Memory vs Problem Size (M+N)



Nature of the Graph (Logarithmic/ Linear/ Exponential)

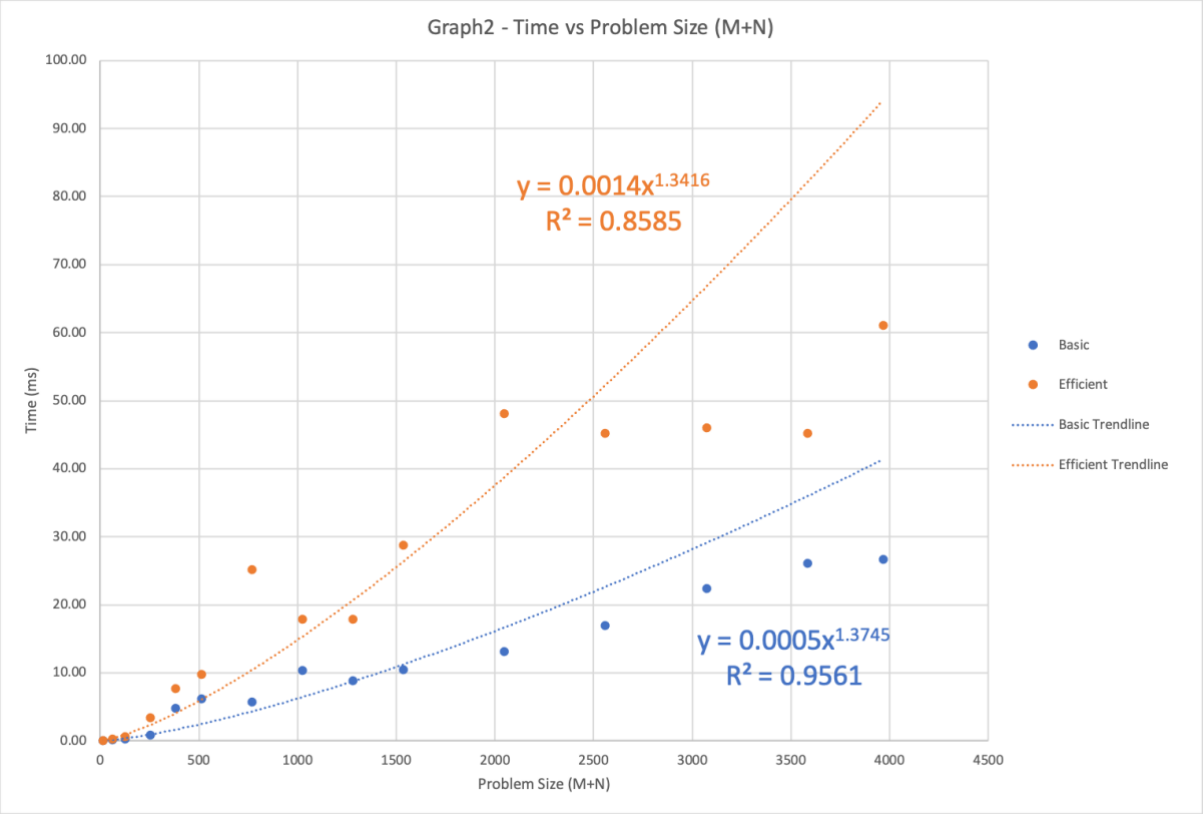
Basic: Polynomial (Order: 2)

Efficient: Linear

Explanation:

The R-Squared of the basic trendline is 0.9974 which means the basic method indeed takes O(M*N) space. Also, ignoring the trivial cases when the problem size is small, the R-Squared of the efficient trendline is high enough which means the efficient method indeed takes O(M + N) space. The above result is in line with our expectation that efficient method can save up an order of memory.

Graph2 – Time vs Problem Size (M+N)



Nature of the Graph (Logarithmic/ Linear/ Exponential)

Basic: Polynomial O(M*N)

Efficient: Polynomial O(2*M*N)

Explanation:

The time ratios of efficient to basic fall between 1.5 to 4.4, and their average is 2.5. The above result is in line with our expectation that efficient method takes twice as much time as the basic method in order to save memory usage.

Contribution

(Please mention what each member did if you think everyone in the group does not have an equal contribution, otherwise, write “Equal Contribution”)

< 9485847172>: <Equal Contribution>

< 3990700221>: <Equal Contribution>