SUMMARY

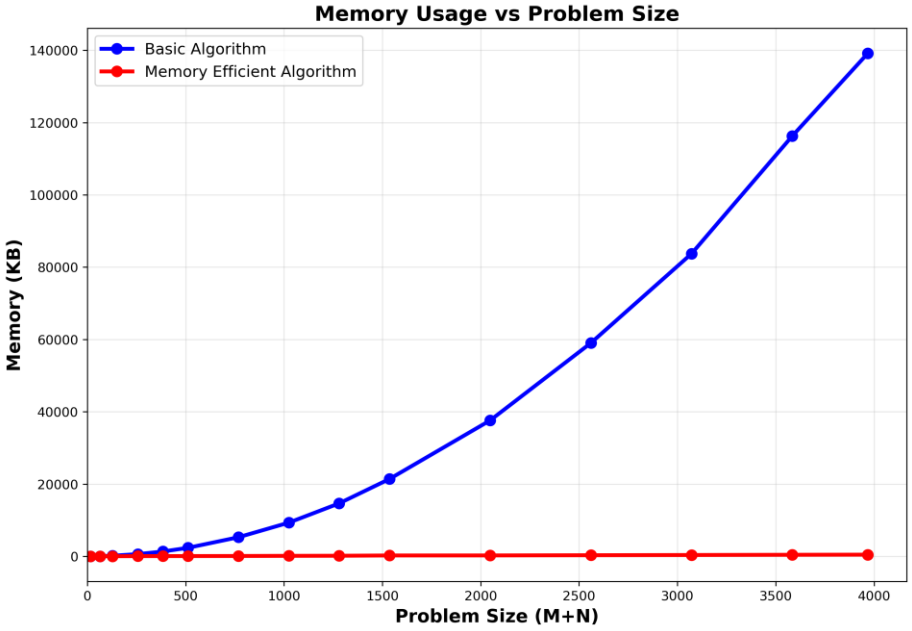
USC ID: 8515-8601-49

Datapoints

M+N	Time in MS (Basic)	Time in MS (Efficient)	Memory in KB (Basic)	Memory in KB (Efficient)
16	0	0	3.344	7.233
64	1.997	4.999	41.049	15.95
128	9.864	18.324	158.52	26.097
256	46.391	67.826	612.354	56.255
384	128.681	141.923	1333.158	68.908
512	158.856	248.72	2359.247	73.809
768	458.245	704.202	5280.092	94.89
1024	970.832	1239.49	9310.564	133.447
1280	1632.049	2036.071	14643.204	158.902
1536	2503.811	2924.965	21388.424	240.121
2048	4615.888	5392.698	37604.954	248.99
2560	6873.785	9054.185	59006.494	306.975
3072	10283.872	12240.323	83719.088	363.148
3584	14005.418	17000.04	116259.903	423.122
3968	19507.469	20642.022	139135.115	461.468

Insights

Graph1 – Memory vs Problem Size (M+N)



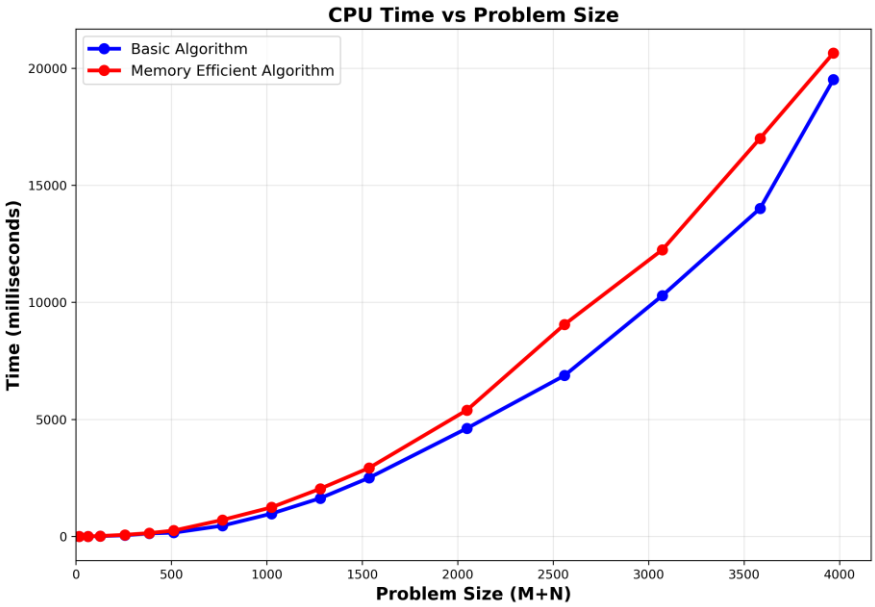
Nature of the Graph (Logarithmic/ Linear/ Polynomial/ Exponential)

Basic: Polynomial

Efficient: Linear

Explanation: The basic algorithm shows quadratic memory growth due to its O(m×n) space complexity, while the memory-efficient algorithm maintains linear growth with O(min(m,n)) space usage.

Graph2 – Time vs Problem Size (M+N)



Nature of the Graph (Logarithmic/ Linear/ Polynomial/ Exponential)

Basic: Polynomial

Efficient: Polynomial

Explanation:

Both algorithms exhibit quadratic time complexity O(m×n), though the memory-efficient algorithm shows slightly higher execution times due to recursive overhead from the divide-and-conquer approach.

Contribution

Project

Note: To run python (3) files and write into output files, I have made use of the following command lines. (When I use “python3” in my command line, I encounter an error and hence used just “python” to run the files. Thank you.

chmod +x basic.sh

chmod +x efficient.sh

./basic.sh datapoints/in1.txt outputs/result1.txt

./efficient.sh datapoints/in1.txt outputs/result1.txt

./basic.sh test_cases/input1.txt outputs/test1.txt

./efficient.sh test_cases/input1.txt outputs/test1.txt