**SUMMARY**

## USC ID/s:

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|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| M+N | Time in MS (Basic) | Time in MS (Efficient) | Memory in KB (Basic) | Memory in KB (Efficient) |
| 16 | 0 | 1 | 21608 | 21932 |
| 64 | 0 | 1 | 21608 | 21756 |
| 128 | 1 | 3 | 22020 | 22044 |
| 256 | 6 | 13 | 22292 | 22032 |
| 384 | 16 | 26 | 22592 | 21776 |
| 512 | 31 | 48 | 23116 | 21756 |
| 768 | 159 | 127 | 24628 | 22068 |
| 1024 | 137 | 212 | 25028 | 22272 |
| 1280 | 237 | 360 | 25104 | 22136 |
| 1536 | 319 | 507 | 24792 | 21932 |
| 2048 | 626 | 1063 | 25276 | 22264 |
| 2560 | 1554 | 1549 | 25724 | 22268 |
| 3072 | 2360 | 2574 | 26268 | 22140 |
| 3584 | 3077 | 2888 | 26556 | 22036 |
| 3968 | 2315 | 4562 | 26984 | 22144 |

## Datapoints

## Insights

### Graph1 – Memory vs Problem Size (M+N)

A graph showing a loss of memory

Description automatically generated

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

Basic: Polynomial

Efficient: Linear

#### Explanation: The memory of the basic algorithm increases much more than the efficient algorithm for increasing problem sizes. This is because the basic algorithm creates a n x m matrix for the memoization, while the efficient algorithm only has to create a n x 2 matrix because it divides the problem into smaller subproblems during the Divide and Conquer algorithm.

### Graph2 – Time vs Problem Size (M+N)

A graph with a line graph and a line graph

Description automatically generated

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

Basic: Polynomial

Efficient: Polynomial

#### Explanation: Both the basic and efficient algorithm increase at a similar rate in time with respect to the problem size (with one outlier). Overall, the programs have to do a similar amount of processes to fill in the O(mn) cells, so both of the algorithms run in polynomial time.

## Contribution

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

8034102693: Equal Contribution

2123697013: Equal Contribution