**SUMMARY**

## USC ID/s: 1733072222, 5549510111, 9084470206

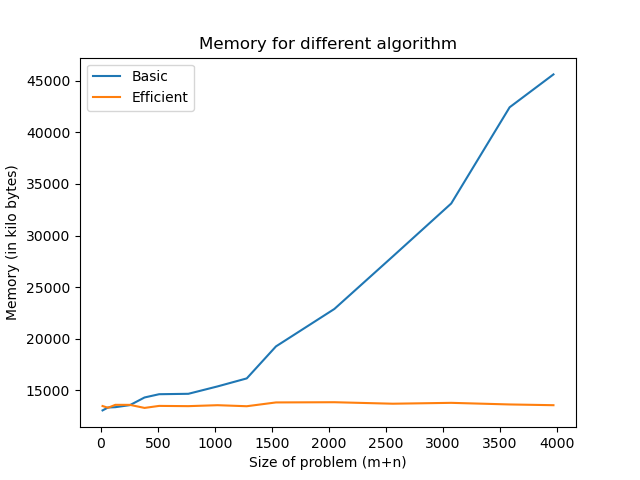
|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| M+N | Time in MS (Basic) | Time in MS (Efficient) | Memory in KB (Basic) | Memory in KB (Efficient) |
| 16 | 0.04887580871582031 | 0.1270771026611328 | 13068 | 13492 |
| 64 | 0.48542022705078125 | 1.0993480682373047 | 13348 | 13324 |
| 128 | 1.9197463989257812 | 3.9033889770507812 | 13380 | 13608 |
| 256 | 7.677793502807617 | 13.79537582397461 | 13580 | 13604 |
| 384 | 15.489339828491211 | 30.308008193969727 | 14320 | 13308 |
| 512 | 27.685880661010742 | 55.26399612426758 | 14636 | 13504 |
| 768 | 61.42687797546387 | 124.50313568115234 | 14676 | 13480 |
| 1024 | 116.17064476013184 | 219.82693672180176 | 15392 | 13572 |
| 1280 | 202.622652053833 | 331.03156089782715 | 16168 | 13472 |
| 1536 | 292.6208972930908 | 491.49489402770996 | 19268 | 13840 |
| 2048 | 568.9995288848877 | 876.6806125640869 | 22896 | 13860 |
| 2560 | 883.0194473266602 | 1404.207706451416 | 27984 | 13716 |
| 3072 | 1343.4312343597412 | 2109.680414199829 | 33112 | 13800 |
| 3584 | 1499.337911605835 | 2812.703847885132 | 42432 | 13644 |
| 3968 | 2161.1313819885254 | 3413.3551120758057 | 45616 | 13572 |

## Datapoints

## Insights

The memory differneces for the efficient vs basic can be clearly seen for bigger input sizes. Efficient takes more time to exceute than the basic though because of a bigger constant factor in the time complexity.

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



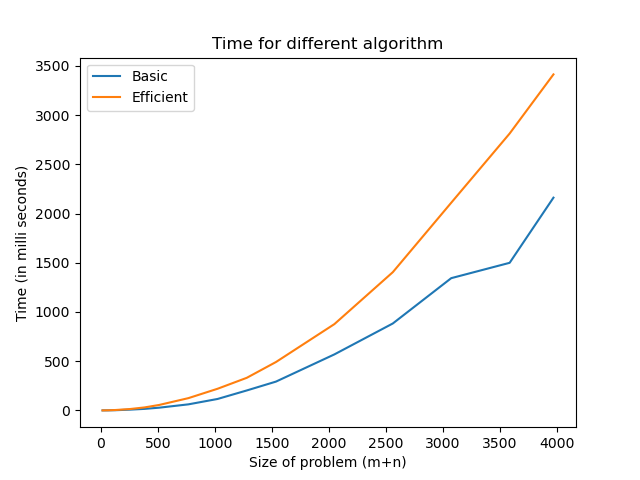
#### Nature of the Graph (Logarithmic/ Linear/ Polynomial/ Exponential)

Basic: O(mn) - Polynomial (Quadratic)

Efficient: O(m+n) - Linear

Explanation: The memory requirement is much lesser in the efficient algorithm as we no longer have to save the whole 2D array and start saving columns for the Divide and Conquer algorithm. The implications can be clearly seen for larger input sizes where the efficeimt algorithm is really close to the x-axis whereas the basic algorithm starts shooting up.

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



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

Basic: O(mn) - Polynomial (Quadratic)

Efficient: O(mn) - Polynomial (Quadratic)

#### Explanation:

Both algorithms have the same time complexities although the constant factor for seems to be a lot higher for the efficient algorithm leading to the efficient algorithm taking more 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”)

<USC ID/s>: <Equal Contribution>

## 1733072222: Equal Contribution

## 5549510111 : Equal Contribution

## 9084470206: Equal Contribution