SUMMARY

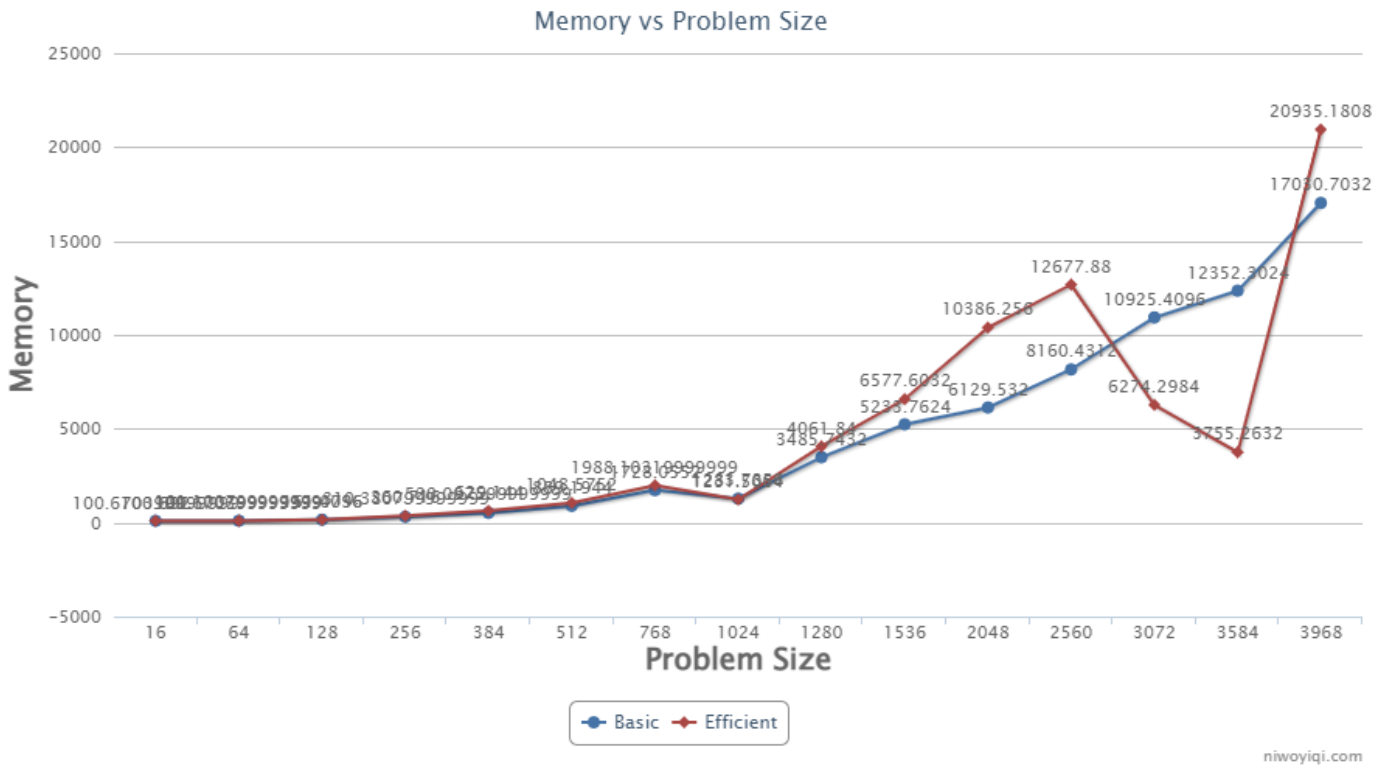
USC ID/s:

Datapoints

Insights

M+N	Time in MS (Basic)	Time in MS (Efficient)	Memory in KB (Basic)	Memory in KB (Efficient)
16	2.17129001021385	1.99169999361038	100.692000000000	100.670399999999
64	2.55921998620033	2.35508000850677	101.100799999999	100.670399999999
128	2.48590999841690	2.69299998879432	151.073600000000	151.409600000000
256	3.90959000587463	3.80607998371124	310.380799999999	360.716000000000
384	4.28055000305175	5.01157999038696	520.097599999999	629.144000000000
512	5.87906998395919	5.52884000539779	889.194400000000	1048.575200000000
768	7.35071998834609	6.96265000104904	1728.055200000000	1988.103199999990
1024	9.73131999373435	8.54398000240325	1283.785600000000	1231.506400000000
1280	11.43213000893590	10.36116999387740	3485.743200000000	4061.840000000000
1536	13.47890999913210	13.95177000761030	5233.762400000000	6577.603200000000
2048	18.49639999866480	20.62300997972480	6129.532000000000	10386.256000000000
2560	25.84049999713890	30.69225999712940	8160.431200000000	12677.880000000000
3072	36.04957002401350	39.81088998913760	10925.409600000000	6274.298400000000
3584	38.32191002368920	38.72176000475880	12352.302400000000	3755.263200000000
3968	51.79842001199720	46.27932998538010	17030.703200000000	20935.180800000000

Graph1 – Memory vs Problem Size (M+N)



Nature of the Graph (Logarithmic/ Linear/ Exponential)

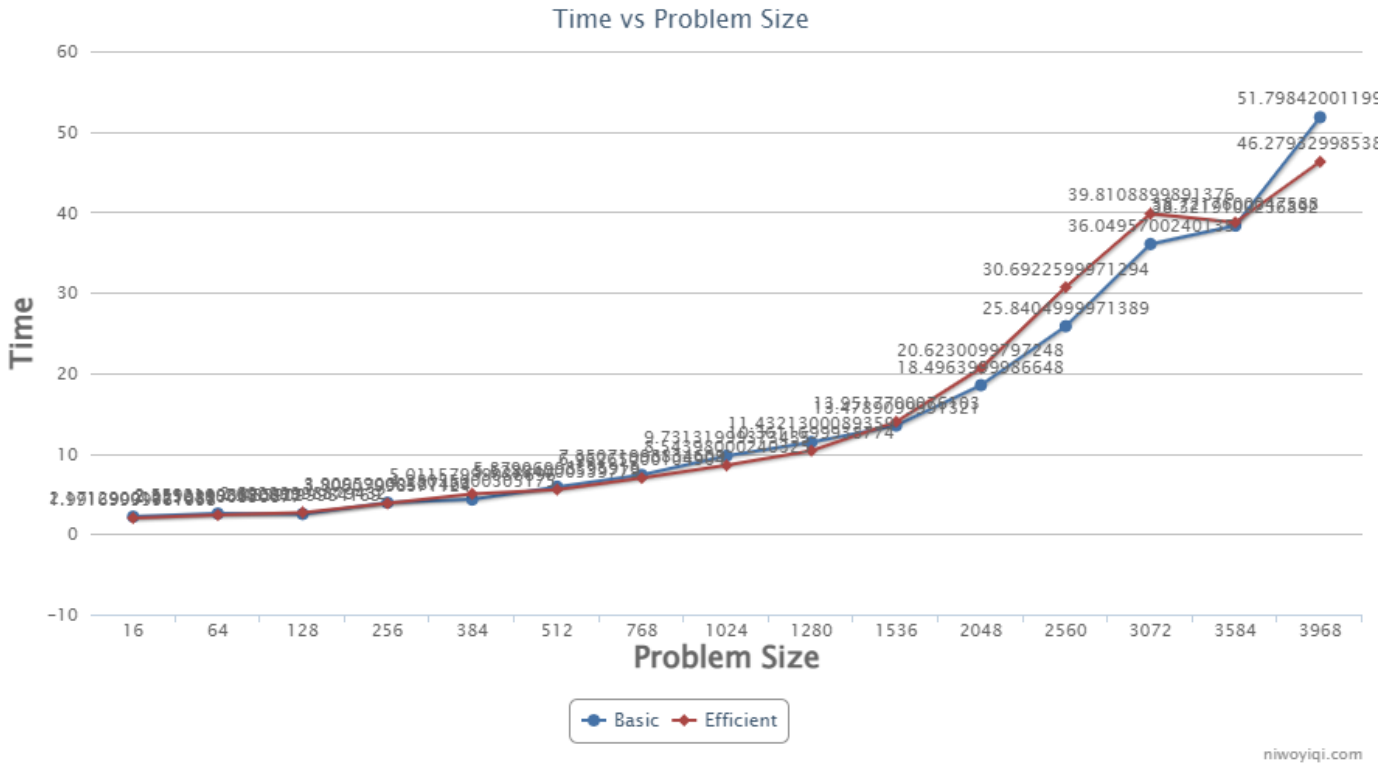
Basic: O(n^2)

Efficient: O(n)

Explanation:

The basic algorithm costs O(n^2) memory, while the efficient algorithm costs O(n) memory. However, at some datapoints, the efficient one costs more memory than the basic one. It probably has following reasons: (1) the minimum cost divide point is not ideal that one string is empty while the other string is very long, which costs the same memory as the basic algorithm; (2) the number of recursion call is unstable, which depends on the minimum cost divide point, and each recursion stack also costs memory; (3) the JVM memory architecture in JAVA; and (4) the operating system environment, etc. Anywhere, it's understandable, because O(n) algorithm doesn't guarantee that it runs faster than O(n^2) algorithm.

Graph2 – Time vs Problem Size (M+N)



Nature of the Graph (Logarithmic/ Linear/ Exponential)

Basic: O(n^2)

Efficient: O(n^2)

Explanation:

Even though both basic algorithm and efficient algorithm costs O(n^2), the efficient one takes a little bit more time than the basic one by exchanging less memory in used than the basic one.

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>