SUMMARY

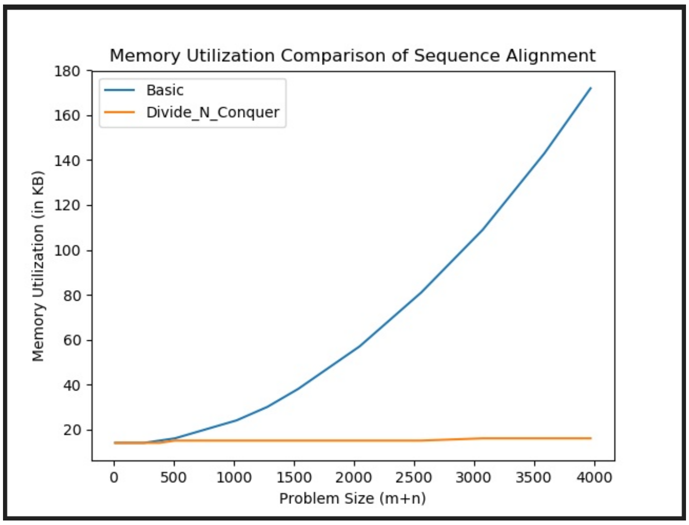
USC ID/s: 2143749103, 4727109268, 4371197245

Datapoints

M+N	Time in MS (Basic)	Time in MS (Efficient)	Memory in KB (Basic)	Memory in KB (Efficient)
16	0	0	14172	14532
64	1.997232	1.997709	14176	14396
128	2.997637	8.998394	14196	14412
256	19.0022	29.97828	14620	14444
384	33.00333	236.9974	15500	14564
512	166.9965	143.0094	16892	15016
768	168.0019	387.995	20296	15420
1024	299.0015	599.0002	24844	15692
1280	566.9997	1035.977	30940	15612
1536	1076.993	1415.993	38280	15780
2048	1292.026	2401.023	57204	15344
2560	1947.02	4241.996	81940	15764
3072	3743.002	5636.973	109924	16184
3584	4435.03	6697.997	143408	16688
3968	4987.977	12795.978	172488	16368

Insights

Graph1 – Memory vs Problem Size (M+N)



Nature of the Graph (Logarithmic/ Linear/ Exponential)

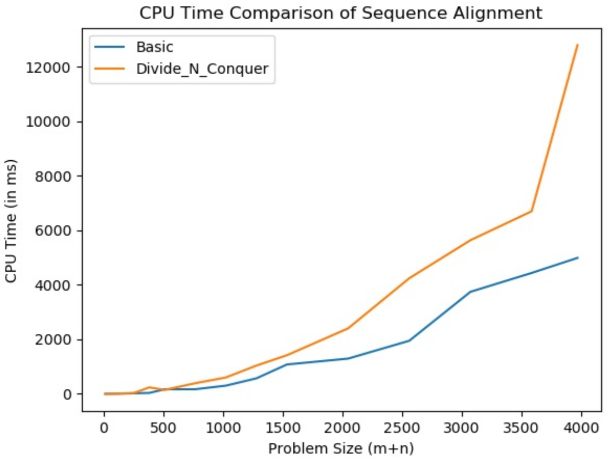
Basic: Polynomial

Efficient: Linear

Explanation:

As we can see from the graph, the basic dynamic programming algorithm takes polynomially more memory as the problem size is increased because it requires to create a memorization table of size m*n whereas the efficient algorithm which uses a divide and conquer approach with dynamic programming, we will use only 2 * max(m,n) space which explains the linear memory growth.

Graph2 – Time vs Problem Size (M+N)



Nature of the Graph (Logarithmic/ Linear/ Exponential)

Basic: Polynomial

Efficient: Polynomial

Explanation:

We can see from the graph that the time taken for the both the basic and space efficient algorithms show a polynomial increasing time as the input size is increased. Both algorithms take O(m*n) time but the divide and conquer approach actually takes 2*(m*n) time whereas the basic implementation takes m*n time. Therefore, the space efficient implementation should twice the time taken by the basic implementation. This can be seen in the graph above.

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>

2143749103	Equal Contribution
4727109268	Equal Contribution
4371197245	Equal Contribution