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06 April 2025 22:25

Matrix chain multiplication: A and B can be multiplied when number of row in A= number of column in B

$$A = \begin{bmatrix} a_{11} & a_{12} & a_{13} \\ a_{21} & a_{22} & a_{23} \end{bmatrix}_{2\times 3} \qquad B = \begin{bmatrix} b_{11} & b_{12} \\ b_{21} & b_{22} \\ b_{31} & b_{32} \end{bmatrix}_{3\times 2}$$

$$A\times B = \begin{bmatrix} a_{11}b_{11} + a_{12}b_{21} + a_{13}b_{31} & a_{11}b_{12} + a_{12}b_{22} + a_{13}b_{32} \\ a_{21}b_{11} + a_{22}b_{21} + a_{23}b_{31} & a_{21}b_{12} + a_{22}b_{22} + a_{23}b_{32} \end{bmatrix}_{2\times 2}$$

No. of multiplications = 12 (By observation).

$= 2\times 3\times 2 = 12$. (by formulae).

$A_1 = 2\times 3 \quad A_2 = 3\times 4 \quad A_3 = 4\times 2$.

Minimum multiplication to find A1A2A3.

$A_1 = 2\times 3 \quad A_2 = 3\times 4 \quad A_3 = 4\times 2$.

Minimum multiplication to find A1A2A3.

(A1.A2).A3

$(A_1 A_2)\cdot A_3$

Dimensions $2\times 4 \quad 4\times 2$.

Cost- $2*3*4 = 24$

Resulting Dimension 2×4

Cost = $2*4*2 = 16$

∴ Total cost operations $= 24+16 = 40$

A1 (A2.A3).

$A_1 \cdot (A_2 \cdot A_3)$

Dimensions 3×2

Cost $3*4*2 = 24$

Dimension 3×2

Dimension 2×3

Cost = $2*3*2 = 12$

∴ Total cost = $24+12 = 36$.

c[1,3] =

A

$A_1 = 2\times 3 \quad A_2 = 3\times 4 \quad A_3 = 4\times 2$.

Minimum multiplication to find A1A2A3.

$c[1,1] = 0 \mid c[2,2] = c[3,3] = 0$

$A_1 \quad A_2 \quad A_3$.

$c[1,2] = c[1,1] + c[2,2] + 2*3*4$

$= 0+0+24 = 24$

$A_1 A_2$

A_1

	1	2	3
1	0	24	
2		0	24
3			0

$c[2,3] = c[2,2] + c[3,3] + 3*4*2$

$= 24$

$A_2 \quad A_3$

$A_2 \quad A_3$

	1	2	3
1	0	24	36
2		0	24
3			0

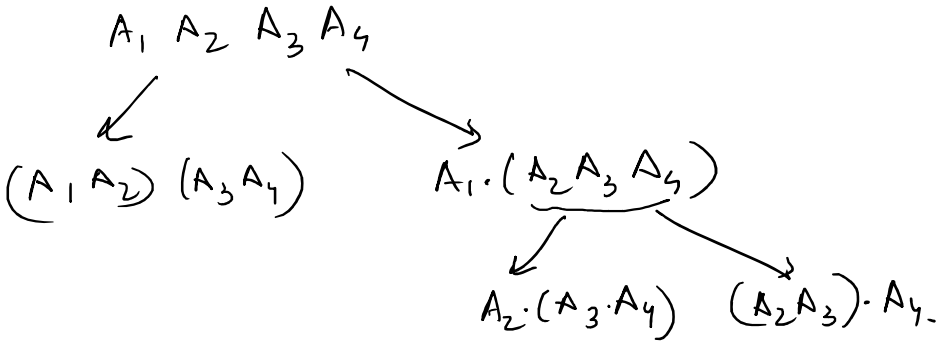
$A_1 = 2\times 3 \quad A_2 = 3\times 4 \quad A_3 = 4\times 2$.

Minimum multiplication to find A1A2A3.

$c[1,3] = c[1,1] + c[2,3] + 2*3*2 = 0+24+12$

$= 36$.

$A_1 A_2 A_3$



Topic- Short Notes-

What ?? Why ?? How ???

~~Sorting~~ Algorithm.

TC SC

Differences Greedy && DP

DP && Divide & Conquer.

Difference b/w 2 sorting algos.

Prims vs Kruskal.

Dijkstra vs Floyd Warshall

vs Bellman Ford.

Prims

Kruskal.

LCS → ✗

Prepare.