

Design and Analysis of Algorithms

TAE-2 Set-1

Name: Shivam Tawani

Roll no.: A-58

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Set 1:

Q.1.

A. $\langle 5, 4, 6, 2, 7 \rangle$

P_0, P_1, P_2, P_3, P_4

Total matrices = 4

	A_1	A_2	A_3	A_4
A_1	0	120	88	158
A_2	0	0	48	104
A_3	0	0	0	84
A_4	0	0	0	0

$m[1, 2]$:

$i = 1, j = 2$
 $k = 1$

$$\begin{aligned}m[1, 2] &= m[1, 1] + m[2, 2] + 5 \times 4 \times 6 \\&= 0 + 0 + 120 \\&= 120\end{aligned}$$

$$m[2,3]: i=2, j=3, k=2$$

$$\begin{aligned} m[2,3] &= m[2,2] + m[3,3] + 4 \times 6 \times 2 \\ &= 0 + 0 + 48 = 48 \end{aligned}$$

$$m[3,4]: i=3, j=4, k=3$$

~~Recall~~:

$$m[1,3]: i=1, j=3, k=1, 2$$

$k=1$:

$$\begin{aligned} m[1,3] &= m[1,1] + m[2,3] + 5 \times 4 \times 2 \\ &= 0 + 48 + 40 \\ &= 88 \end{aligned}$$

$k=2$:

$$\begin{aligned} m[1,3] &= m[1,2] + m[3,3] + 5 \times 6 \times 2 \\ &= 120 + 0 + 60 \\ &= 180 \end{aligned}$$

$$\Rightarrow m[1,3] = \min(88, 180) = 88 \text{ at } k=1$$

$$m[2,4]: i=2, j=4, k=2, 3$$

$k=2$:

$$\begin{aligned} m[2,4] &= m[2,2] + m[3,4] + 4 \times 6 \times 7 \\ &= 0 + 94 + 168 \\ &= 262 \end{aligned}$$

$$K=3$$

$$\begin{aligned} m[2,4] &= m[2,3] + m[4,4] + 4 \times 2 \times 7 \\ &= 48 + 0 + 56 \\ &= 104 \end{aligned}$$

$$\min(252, 96) = 96 = m[2,4] \quad \text{at } K=3$$

$$m[1,4] : i=1, j=4, K=1, 2, 3$$

For $K=1$:

$$\begin{aligned} m[1,4] &= m[1,1] + m[2,4] + 5 \times 4 \times 7 \\ &= 0 + 104 + 140 \\ &= 244 \end{aligned}$$

For $K=2$:

$$\begin{aligned} m[1,4] &= m[1,2] + m[3,4] + 5 \times 6 \times 7 \\ &= 120 + 84 + 210 \\ &= 414 \end{aligned}$$

For $K=3$:

$$\begin{aligned} m[1,4] &= m[1,3] + m[4,4] + 5 \times 2 \times 7 \\ &= 88 + 0 + 70 \\ &= 158 \end{aligned}$$

$$\Rightarrow m[1,4] = 158 \quad \text{at } K=3$$

Order / seq.:

$$S[1,4] = 3 \quad \Rightarrow (A_1 A_2 A_3) \cdot A_4$$

$$S[1,3] = 1 \quad \Rightarrow (A_1 (A_2 A_3)) A_4$$

Ans

Q. 1.

B. $X = \langle A, B, C, B, D, A, B \rangle$

$Y = \langle B, D, C, A, B, A \rangle$

		B	D	C	A	B	A	
	x \ y	0	1	2	3	4	5	6
0		0	0	0	0	0	0	0
A 1		0	0↑	0↑	0↑	1←	0↑	1←
B 2		0	1↗	1←	1←	1←	2↖	2←
C 3		0	1↑	1↑	2↖	2←	2←	2←
B 4		0	1↑	1↑	2↑	3↖	3←	3←
D 5		0	1↑	2↖	2↑	3↑	3↑	3↑
A 6		0	1↑	2↑	2↖	3←	3↑	4↑
B 7		0	1↖	2↑	2↑	3↑	4←	4↑

LCS length = 4

LCS = B C B A