STAMFORD UNIVERSITY BANGLADESH

Name : **Abdullah Al Monayem**

ID : **CSE 071 08128**

Subject : Algorithms (CSI - 231)

Batch : 71 - A

Email : **almonayem2019@gmail.com**

Contact No. : **01747-534818**

Sub :

Day | Sat | Sun | Mon | Tue | Wed | Thu | Fri

Time : Date : / /

Ans. the. Q. No: 1

Given,

$M_1 (25 \times 56) = P_0 \times P_1$

$M_2 (56 \times 71) = P_1 \times P_2$

$M_3 (71 \times 19) = P_2 \times P_3$

$M_4 (19 \times 71) = P_3 \times P_4$

$$m[i,j] = \begin{cases} 0, & \text{if } i = j \\ \min\{m[i,k] + m[k+1,j] + P_{i-1} P_k P_k\}, & \text{if } i < j \end{cases}$$

$i \le k < j$

Length $l = 1$, $m[i,j] = 0 = m[i,i] = 0$

P.T.O

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Length $l = 2$,

$$m[1,2] = m[1,1] + m[2,2] + P_0 P_1 P_2$$

$$= 0 + 0 + (25 \times 56 \times 71) = 99400$$

$$m[2,3] = m[2,2] + m[3,3] + P_1 P_2 P_3$$

$$= 0 + 0 + (56 \times 71 \times 19) = 75544$$

$$m[3,4] = m[3,3] + m[4,4] + P_2 P_3 P_4$$

$$= 0 + 0 + (71 \times 19 \times 96) = 129504$$

Length $l = 3$,

$$m[1,3] = \min \begin{cases} m[1,1] + m[2,3] + P_0 P_1 P_3 \\ = 0 + 75544 + (25 \times 56 \times 19) = 102144 \\ m[1,2] + m[3,3] + P_0 P_2 P_3 \\ = 99400 + 0 + (25 \times 71 \times 19) = 133125 \end{cases}$$

$$= 102144$$

$$m[2,4] = \min \begin{cases} m[2,2] + m[3,4] + P_1 P_2 P_4 \\ = 0 + 129504 + (56 \times 71 \times 96) = 511200 \\ m[2,3] + m[4,4] + P_1 P_3 P_4 \\ = 75594 + 0 + (56 \times 19 \times 96) = 177688 \end{cases}$$

$$= 177688$$

$$m[3,5] = \min \begin{cases} m[3,3] + m[4,5] + P_2 P_3 P_5 \\ = \\ m[3,4] + m[5,5] + P_2 P_4 P_5 \\ = \end{cases}$$

$$=$$

P.T.O

Length $l = 4$

$$m[1,4] = \min \begin{cases} m[1,1] + m[2,4] + P_0 P_1 P_4 \\ = 0 + 177688 + (25 \times 56 \times 96) = 312088 \\ m[1,2] + m[3,4] + P_0 P_2 P_4 \\ = 99400 + 129504 + (25 \times 71 \times 96) = 399304 \\ m[1,3] + m[4,4] + P_0 P_3 P_4 \\ = 102144 + 0 + (25 \times 19 \times 96) = 147744 \end{cases}$$

$$= 147744$$

$$m[2,5] = \min \begin{cases} m[2,2] + m[3,5] + P_1 P_2 P_5 \\ = \\ m[2,3] + m[4,5] + P_1 P_3 P_5 \\ = \\ m[2,4] + m[5,5] + P_1 P_4 P_5 \\ = \end{cases}$$

$$=$$

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m:

	1	2	3	4
1	0	99400	102144	147744
2	0	0	75544	177688
3	0		0	129504
4	0			0

S:

	1	2	3	4
1		1	1	3
2			2	3
3				3
4				

P.T.O

Parenthesizing the Matrices:

(i) $M_1 \; M_2 \; M_3 \; M_4$

(ii) $(M_1 M_2 M_3)(M_4)$

(iii) $((M_1 M_2)(M_3))(M_4)$

Optimal solution:

(i) $((M_1 M_2)(M_3))(M_4)$

Sub :

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Time : Date : / /

Am. the Q. No: 2

$g(4, \phi) = c_{41} = 9$

$g(3, \phi) = c_{31} = 18$

$g(2, \phi) = c_{21} = 19$

$g(3, \{4\}) = c_{34} + g(4, \phi)$

$= 3 + 9 = 12$

$g(4, \{3\}) = c_{43} + g(3, \phi)$

$= 8 + 18 = 26$

$g(2, \{4\}) = c_{24} + g(4, \phi)$

$= 5 + 9 = 14$

Sub:

$$g(4,\{2\}) = c_{42} + g(2,\varphi)$$

$$= 8 + 19$$

$$= 27$$

$$g(2,\{3\}) = c_{23} + g(3,\varphi)$$

$$= 22 + 18$$

$$= 40$$

$$g(3,\{2\}) = c_{32} + g(2,\varphi)$$

$$= 7 + 19$$

$$= 26$$

$$g(2,\{3,4\}) = \min\{c_{23} + g(3,\{4\}), c_{24} + g(4,\{3\})\}$$

$$= \min\{(22+12), (5+26)\} = 31$$

$$g(3, \{2,4\}) = \min\{c_{32} + g(2, \{4\}), c_{34} + g(4, \{2\})\}$$

$$= \min\{(7+14), (3+27)\}$$

$$= 21$$

$$g(4, \{2,3\}) = \min\{\cancel{c_{42}}\ c_{42} + g(2, \{3\}), c_{43} + g(3, \{2\})\}$$

$$= \min\{(8+40), (8+26)\}$$

$$= 34$$

$$g(1, \{2,3,4\}) = \min\{c_{12} + g(2, \{3,4\}), c_{13} + g(3, \{2,4\}), c_{14} + g(4, \{2,3\})\}$$

$$= 28$$

Sub :

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Path, $A \rightarrow C \rightarrow B \rightarrow D \rightarrow A$

Sub :

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Ans. the. Q . NO: 3

The steps of Dynamic programming algorithm is ———

(i) Characterize optimal substructure

(ii) Recursively define the value of an optimal solution

(iii) Compute the value bottom up

(iv) (if) needed construct an optimal solution.

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$$=$$

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$= 147744$

$$\cancel{m[2,5] = \min \begin{cases} m[2,2] + m[3,5] + P_1 P_2 P_5 \\ = \\ m[2,3] + m[4,5] + P_1 P_3 P_5 \\ = \\ m[2,4] + m[5,5] + P_1 P_4 P_5 \\ = \end{cases}}$$

$\cancel{=}$

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m:

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	1	2	3	4
1		1	1	3
2			2	3
3				3
4				

P.T.O

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Parenthesizing the Matrices:

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$$g(1,\{2,3,4\}) = \min\{c_{12} + g(2,\{3,4\}), c_{13} + g(3,\{2,4\}), c_{14} + g(4,\{2,3\})\}$$

$$= 28$$

Path, A $\rightarrow$ C $\rightarrow$ B $\rightarrow$ D $\rightarrow$ A

Ans.the.Q.NO:3

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