Centralized View : Bellman ford algorithm!.

d_{ij} = Link cost between node i and j

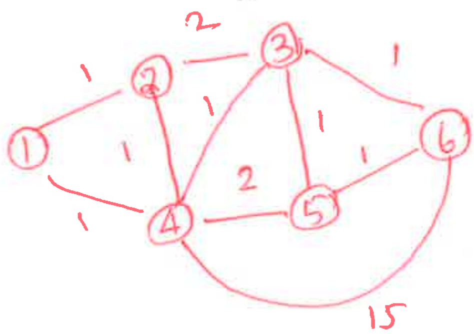
$\overline{D_{ij}}$ = cost of computed minimum cost path from node i to node j

Three notations are used!.

order - Bellman ford

underscore - Dijkstra's

hat ^ - path computations candidate paths (Non additive)



$d_{46} = 15$

Nodes 4 and 6 are directly connected

→ with link cost $d_{46} = 15$

Nodes 1 and 6 are not directly connected

$d_{16} = \infty$ (large value).

nodes 4 to 6 the minimum cost is actually = 2 with the path 4-3-6 (ie) $\overline{D}_{46} = 2$

$d_{46} = 15$.

For Nodes 1 and 6 $\bar{D}_{16} = 3$ and $d_{16} = \infty$

Bellman ford equations to calculate shortest path from node i to node j

$$\bar{D}_{ii} = 0 \quad \text{for all } i \quad \text{— (1)}$$

$$\bar{D}_{ij} = \min \{ \bar{D}_{ik} + d_{kj} \} \quad \text{for } i \neq j \quad \text{— (2).}$$

minimum cost interms of number of hops h !.

$\bar{D}_{ij}^{(h)}$ = cost of the minimum cost path from node i to node j when upto h no of hops are considered.

algorithm!.

Belleman ford centralized algorithm

Initialize for nodes i and j in the network

$$\left.\begin{aligned} \bar{D}_{ii}^{(0)} &= 0 \quad \text{for all } i \\ \bar{D}_{ij}^{(0)} &= \infty \quad \text{for } i \neq j \end{aligned}\right\} \quad — (1)$$

for $h = 0$ to $N-1$ do — (2)

$\bar{D}_{ii}^{(h+1)} = 0$ for all i

$$\bar{D}_{ij}^{(h+1)} = \min_{k \neq j} \left\{ \bar{D}_{ik}^{(h)} + d_{kj} \right\} \quad \text{for } i \neq j \quad — (3).$$

$$\bar{D}_{ij}^{(h+1)} = \min_{k \neq j} \left\{ \bar{D}_{ik}^{(h)} + d_{kj} \right\}$$

hop count for

$D_{16}^{(1)} = \infty$

with $h = 2$ the path 1-4-6 is the only one path between with two link path. (i.e)

$\left.\begin{matrix} 1-4 \\ 4-6 \end{matrix}\right\} h = 2.$

$\boxed{\begin{matrix} 1-4 = 1 \\ 4-6 = 15 \end{matrix} = 16}$.

hop iterated cost is 16. $(= D_{16}^{(2)})$

$$\bar{D}_{ij} = \min_{k \neq j} \{ \bar{D}_{ik} + d_{kj} \}, \quad \text{for } i \neq j$$

$\underline{h=1}$

$d_{12}^{(1)} = 1$

$d_{14}^{(1)} = 1$

$\underline{h=0}$

$d_{11} = 0$

$h=2.$

	K	$\bar{D}_{ik} + d_{kj}$	
$\bar{D}_{13}^{(2)} + d_{36} =$	$2+1 = 3$		$k=3$
$\bar{D}_{15}^{(2)} + d_{56} =$	$3+1 = 4$		$k=5$
$\bar{D}_{14}^{(3)} + d_{46} =$	$1+15 = 16$		$k=4.$

$D_{13} = \bar{D}_{14} + d_{43} = 1+1 = 2$

$D_{16} = \bar{D}_{13} + d_{36} = 2+1 = 3.$

$D_{15} = \bar{D}_{14} + d_{45} = 1+2 = 3$

h	$\bar{D}_{12}^{(h)}$	path	$\bar{D}_{13}^{(h)}$	path	$\bar{D}_{14}^{(h)}$	path	$\bar{D}_{15}^{(h)}$	path	$\bar{D}_{16}^{(h)}$	path
0	∞ $\cancel{\infty}$	–	∞	–	∞	–	∞	–	∞	–
1	1	1-2	∞	–	1	1-4	∞	–	∞	–
2	1	1-2	∞	1-4-3	1	1-4	3	1-4-5	16	1-4-6
3	1	1-2	2	1-4-3	1	1-4	3	1-4-5	3	1-4-3-6
4	1	1-2	2	1-4-3	1	1-4	3	1-4-5	3	1-4-3-6
5	1	1-2	2	1-4-3	1	1-4	3	1-4-5	3	1-4-3-6

actual path – $\underline{1-4-3-6}$. $= 3$.