

$$L_{ij} = SP(v, j)$$

25.1-6

Fix vertex v

We want for each vertex j



$$SP(v, i) + w_{ij} = SP(v, j)$$

$$\underbrace{L_{vi}}_{\text{computed}} + w_{ij} = \underbrace{L_{vj}}$$

computed as SP matrix

FLOYD-WARSHALL (W)

1 $n = W.rows$

2 $D^{(0)} = W$

3 **for** $k = 1$ **to** n

4 let $D^{(k)} = (d_{ij}^{(k)})$ be a new $n \times n$ matrix

5 **for** $i = 1$ **to** n

6 **for** $j = 1$ **to** n

7 $d_{ij}^{(k)} = \min(d_{ij}^{(k-1)}, d_{ik}^{(k-1)} + d_{kj}^{(k-1)})$

8 **return** $D^{(n)}$



vert
 $1, 2, \dots, k-1$

STORAGE

$k=3$
 $k=2$
 $k=1$

did it change at stage

$d_{ik}^{(k)} = d_{ik}^{(k-1)}$

SP(i,k) only using interan vert $1, 2, \dots, k-1$

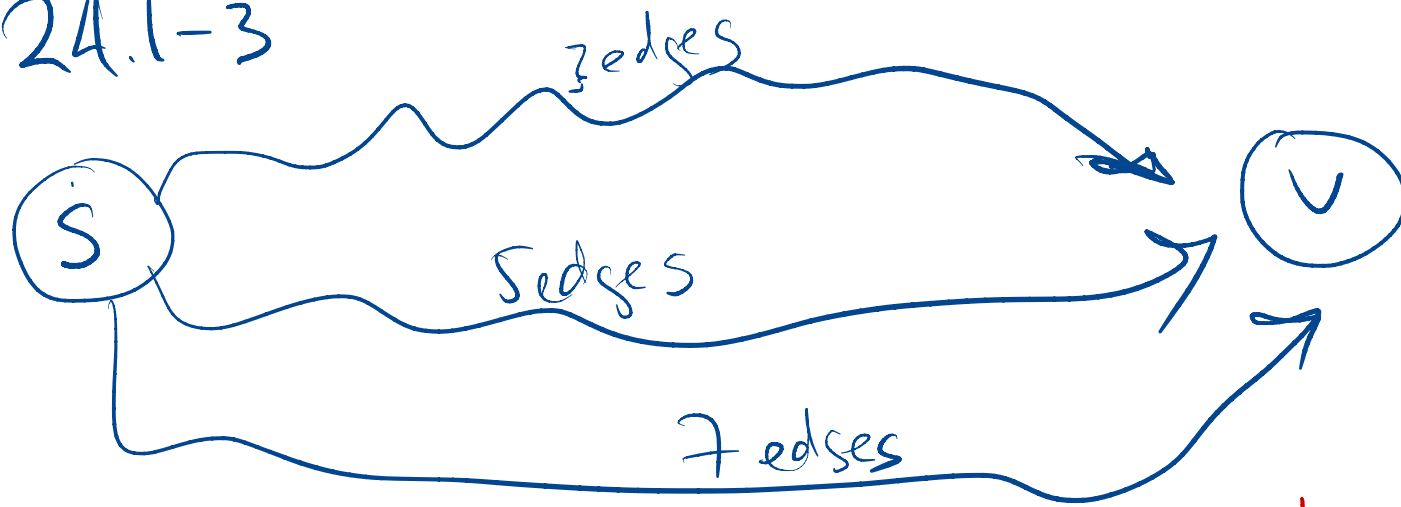
$d^{(0)}$

$d^{(3)}$

$d^{(2)}$

$d^{(1)}$

24.1-3



$SP(s, v)$ all shortest paths

$m_v = \min \# \text{ of edges on all } SP(s, v) = 3$
Min edge-SP

$m = \max_v \{ m_v \}$ = # of edges large enough to cover every v .
(graph)

$\boxed{\text{Min edges} \rightarrow \text{SP}}$ to every v .