

Useful References 1

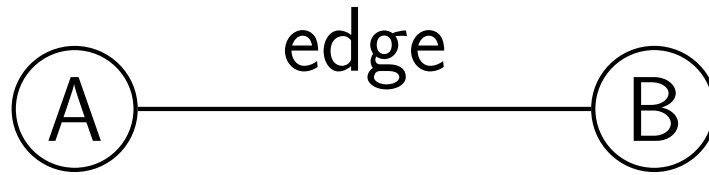
- Cormen, Leiserson, Rivest & Stein
- T.C. Hu and M.T. Shing
Enlarged Second Edition, Dover
paperback
- Cook, Cunningham, Pulleyblank,
Schrijver
- Korte & Vygen
- Kleinberg & Tardos

Useful References 2

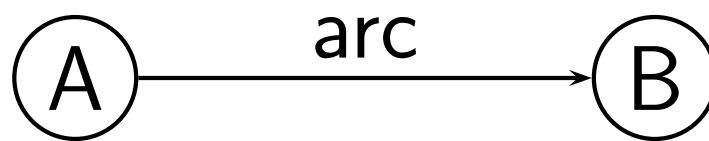
- Graphs, Networks & Algorithms
by Dieter Jungnickel

- Combinatorial Optimization
by Alexander Schrijver
Vol A, B, C
Pages 1 – 1882

Edge & Arc



Node A and Node B are neighbors



A is not a neighbor of B

B is a neighbor of A

Graph Algorithms

- BFS
- DFS
- Shortest Path (Dijkstra)
- Minimum Spanning Tree (Prim)
- Shortest Paths (Floyd & Warshall)

BFS

0. Label a vertex $V_0 = 0$.
Initialize $I = \{1\}$.
1. Let $I = \{1, 2, \dots, k\}$.
Let x be a neighbor of the
smallest index vertex.
2. Label x with $k + 1$.
Return to Step 1.

DFS

- 0. Same
- 1. Smallest $\leftarrow$ largest
- 2. Same

Shortest Paths (Dijkstra)

0. Vertex V_0 is initialized with label $l_0^* = 0$.

For all other vertices V_i :

$$l_i = d_{0,i} \quad \text{if } V_i \text{ is a neighbor of } V_0$$

$$l_i = \infty \quad \text{otherwise}$$

1. Pick $l_k = \min_i l_i$, then update $l_k \leftarrow l_k^*$.

2. Relax vertex k 's neighbors:

$$l_i \leftarrow \min[l_i, l_k^* + d_{k,i}].$$

Minimum Spanning Tree (Prim)

0. Same

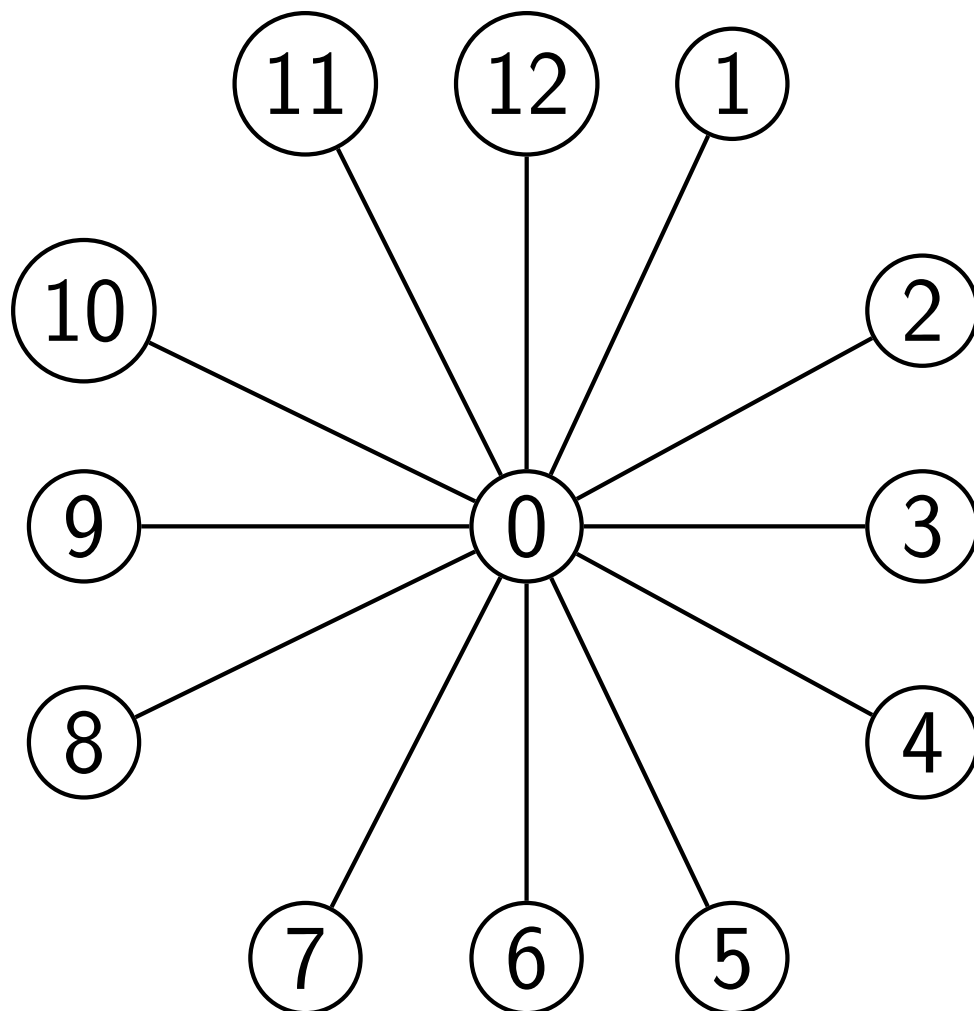
1. Same

2. $l_i \leftarrow \min[l_i, d_{k,i}]$.

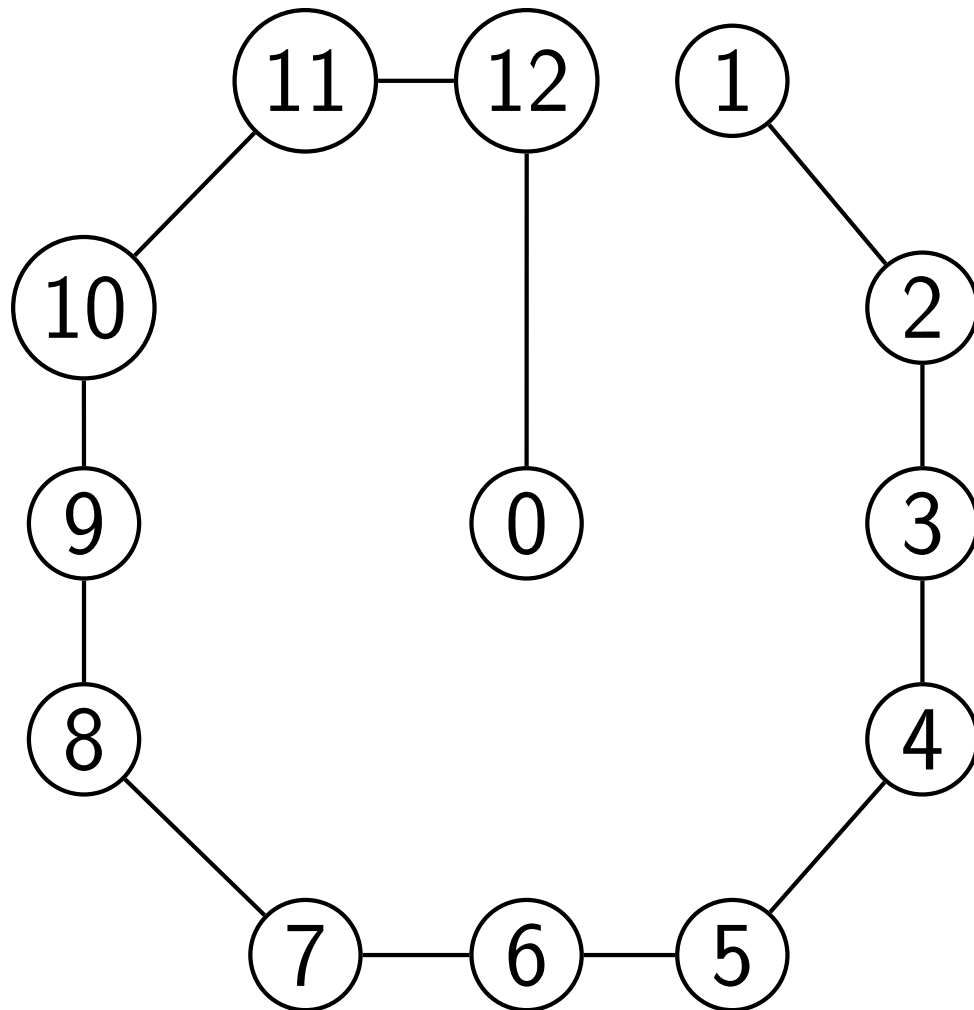
In general

$$l_i \leftarrow \min[l_i, \alpha l_k^* + \beta d_{k,i}]$$

Shortest Paths From 0 To All



Minimum Spanning Tree



Minimum Clock Tree

