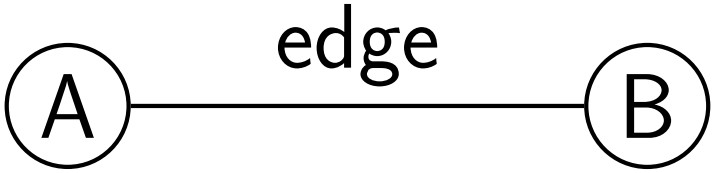
Useful References 1

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

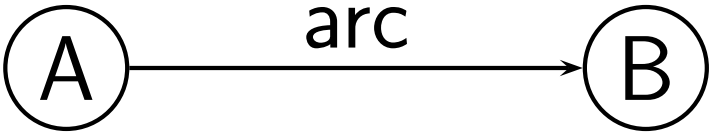
Useful References 2

- 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 $I = \{1, 2, \ldots, k\}$.
   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:

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

   $l_i = \infty$ 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

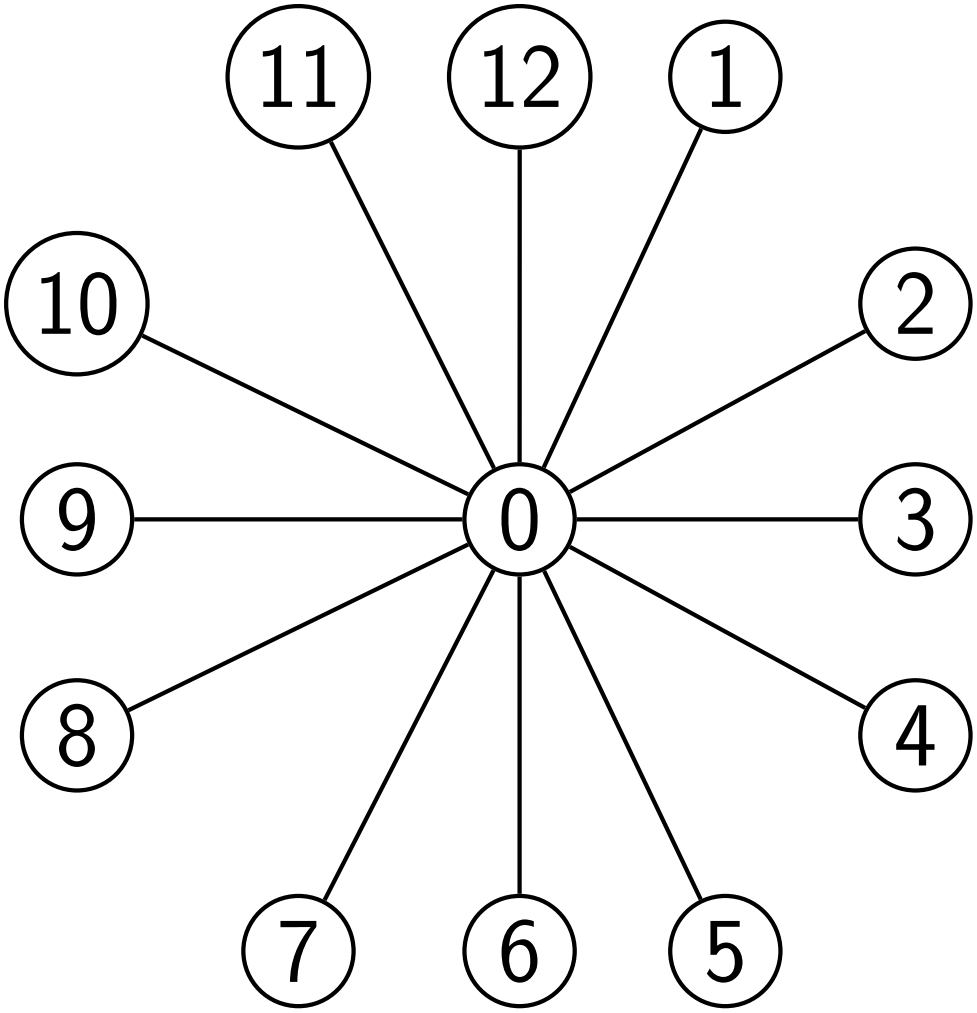
1. Same

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

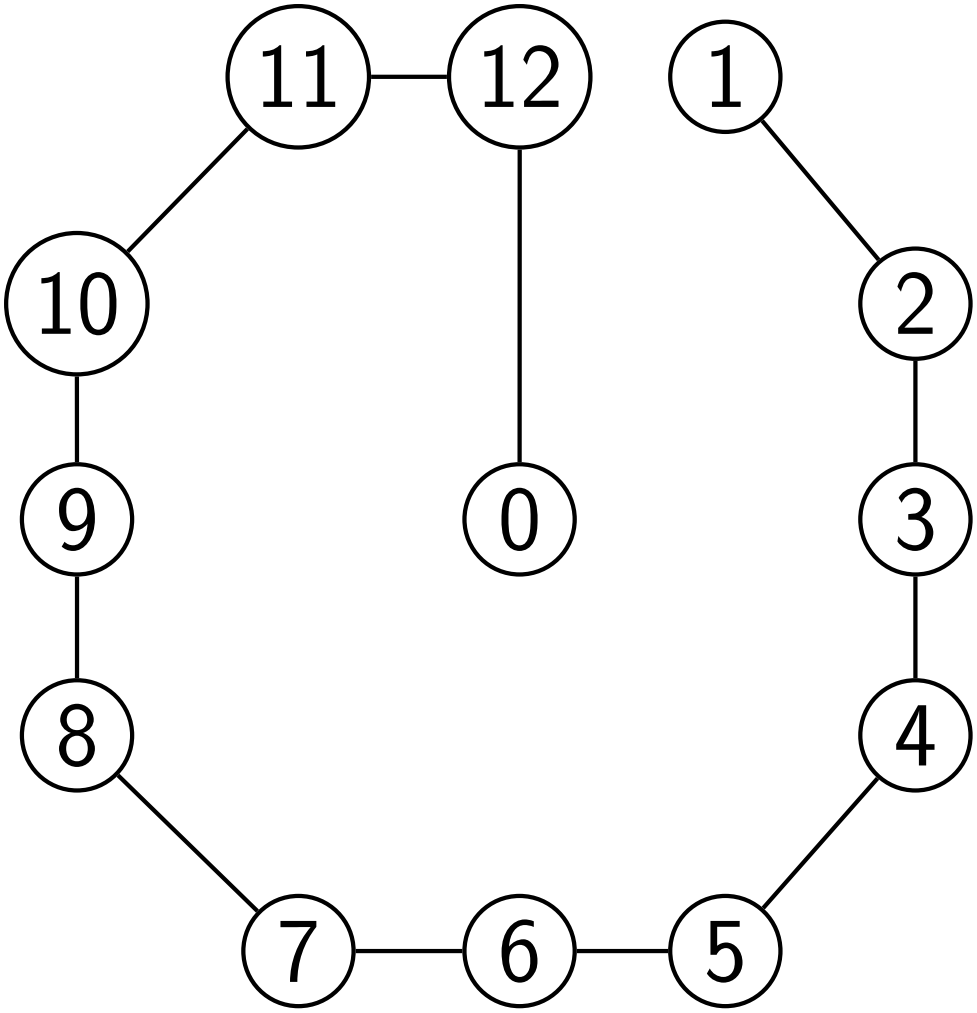
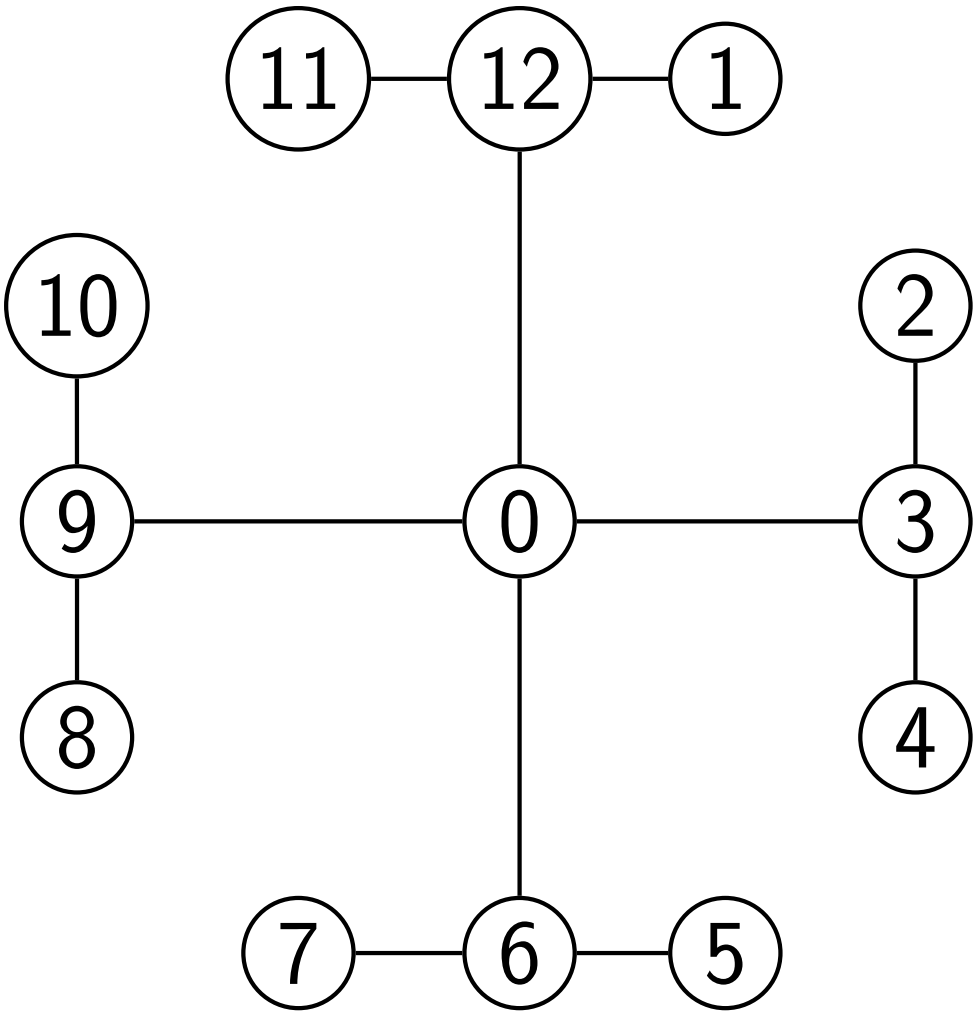
In general

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

Shortest Paths From 0 To All



Minimum Spanning Tree



Minimum Clock Tree