Elementary Graph Algorithms

Chapter 22
Graphs

- A flexible data structure for a wide range of applications
- Consists mainly of Vertices (nodes) and Edges (arcs)
- Vertices and/or Edges can be annotated with further information
- Applications?
Graphs

- Social Network
- Knowledge Base

- Jerry Brown Governor-of California Resident-in Washington Capital-of US
Outline

- Types of graphs
- Representations of graphs
  - Adjacency list
  - Adjacency matrix
- Elementary graph algorithms
  - Bread-first Search (BFS)
  - Depth-first Search (DFS)
  - Connectivity
  - Cycle Detection
Types of Graphs

- Directed and Undirected graphs
- Weighted and Unweighted graphs
- Connected graphs
- Bipartite graphs
- Acyclic graphs
- Tree/Forest
Adjacency List
Adjacency List
Adjacency Matrix

```
   1 2 3 4 5
1 1 0 1 0 0 1
2 1 0 1 1 1
3 0 1 0 1 0
4 0 1 1 0 1
5 1 1 0 1 0
```
**Adjacency Matrix**

![Graph Diagram]

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