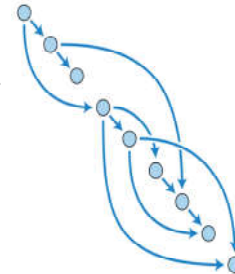


Intro & Overview

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Simple concepts about Map Graph:

- 1- We Have Directed Graph in Maps.
Edges(Routs) between Nodes has Orientation.
- 2- We Have Weighted Graphs.
Edges(Routes) Between Nodes Has different Weight.
- 3- When searching for Shortest Path We May Use
Directed Acyclic Graphs(DAG) to Produce
Topological ordering of Nodes.



Useful Link to Explain That With Source Code:

<https://www.techiedelight.com/find-all-possible-topological-orderings-of-dag/>

Image Source:

https://en.wikipedia.org/wiki/File:Topological_Ordering.svg

Representing The Graph:

- 1- Adjacency Matrix.
N x N Matrix with Weight of Shortest path between Nodes.
- 2-Adjacency List.
Every Node Has List of Connected Nodes with weight.
- 3- Edge List , (A,B,w1),(B,A,w2),(A,C,w3).

Common Problems

1- Shortest Path Problem:

Algorithms:

Dijkstra - Bellman-Ford - Floyd-Warshall - A* etc....

2- Connectivity:

Is there a Path between this 2 Nodes ?

We Can Use : Union Find Data Structure, or any Search Algorithm
(Depth First Search : DFS)

Depth First Search (DFS)

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We Can Augment DFS to Do:

- 1- Compute a Graph Minimum Spanning Tree.
- 2- Detect and Find Cycles in the Graph.
- 3- Check if a Graph is Bipartite.
- 4- Find Strongly Connected Components.
- 5- Topologically Sort The Nodes of a Graph.
- 6- Find Bridges and Articulation points.
- 7- Find Augmenting Paths in flow network.
- 8- Generate Mazes !

--**Breadth First Search (BFS)**

--Useful in Finding Shortest Path in unweighted graph.

The Algorithm Explained Well With Source code on:

<https://www.techiedelight.com/depth-first-search/>