GRAPH TRAVERSAL

Analysis of Large Scale Social Networks

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In Social Network Analysis, graph traversals describe the flow of information across networks.

Formally, a traversal can be described as a sequence of nodes and edges (or depending on the definition used, just a sequence of nodes).

Based on the restrictions that are imposed on such a sequence, it is possible to identify different types of traversals

WHAT?

TYPES OF GRAPH TRAVERSALS

Wasserman and Faust (1994) introduces three different types of traversals or routes

- Walk: sequence of alternating nodes and edges, with a start and end node. Edges are connecting preceding and following nodes.
- Trail: A walk in which each edge only occurs once
- Path: A trail in which each node only occurs once.

PROPERTIES OF GRAPH TRAVERSALS

- Length of a traversal or walk is equal to the number of edges in the sequence.
- Direction of edge can be used for restricting the flow in the network
- Weight of an edge can be used to express the cost of the traversal
- Length of a walk in a weighted network can be defined as the sum of the weights of the edges in the walk.

SHORTEST PATH

A shortest path between two nodes is a path for which it is impossible to find a path with a shorter length between these nodes.

Shortest path problem is defined at the local level:

- Between individual pairs
- From one source to all/many others

At the global level:

- Between all possible pairs

SHORTEST PATH ALGORITHMS

- Single Pair Shortest Path
  - A* algorithm
- Single Source / Destination Shortest Path
  - Breadth-First Search
  - Depth-First Search
  - Dijkstra (Weighted Edges, implements a priority queue)
  - Bellman-Ford (Negative Edge Weights)
- All Pairs Shortest Path
  - Floyd-Warshall (Negative Edge Weights)

See: https://www.cs.usfca.edu/~galles/visualization/Algorithms.html