Minimum Spanning Trees

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Spanning Tree

A spanning tree of an undirected connected graph is a subgraph that contains all of that graph's vertices and is a single tree. A spanning forest of a graph is the union of the spanning trees of its connected components.

Search Algortihms

Depth-first Search (DFS)

Depth-first search is a classic recursive method for systematically examining each of the vertices and edges in a graph. To visit a vertex:

1. Mark it as having been visited.
2. Visit (recursively) all the vertices that are adjacent to it and have not yet been marked.

Search Algorithms

Contd.

Breadth-first Search

We put the source vertex on the queue, then perform the following steps until the queue is empty:

1. Remove the next vertex v from the que.
2. Put onto the ques all unmarked vertices that are adjacent to v and mark them.

Minimum Spanning Tree

Spanning Tree

An edge-weighted graph is a graph where we associate weights or costs with each edge.

Minimum Spanning Tree (MST)

A minimum spanning tree (MST) of an edge-weighted graph is a spanning tree whose weight (the sum of the weights of its edges) is no larger than the weight of any other spanning tree.

Kruskal's Algorithm

Idea of the algorithm

1. Start with a forest of $|V|$ MSTs.
2. Successively connect them by adding edges.
3. Do not add an edge if it creates a cycle.