

EXPERIMENT :8(C)

Aim:

You have a business with several offices; you want to lease phone lines to connect them up with each other; and the phone company charges different amounts of money to connect different pairs of cities. You want a set of lines that connects all your offices with a minimum total cost. Solve the problem by suggesting appropriate data structures

Theory:

Properties of a Greedy Algorithm:

1. At each step, the best possible choice is taken and after that only the sub-problem is solved.
2. Greedy algorithm might be depending on many choices. But, it cannot ever be depending upon any choices of future and neither on sub-problems solutions.
3. The method of greedy algorithm starts with a top and goes down, creating greedy choices in a series and then reduce each of the given problem to even smaller ones.

Minimum Spanning Tree:

A Minimum Spanning Tree (MST) is a kind of a sub graph of an undirected graph in which, the sub graph spans or includes all the nodes has a minimum total edge weight.

To solve the problem by a prim's algorithm, all we need is to find a spanning tree of minimum length, where a spanning tree is a tree that connects all the vertices together and a minimum spanning tree is a spanning tree of minimum length.

Properties of Prim's Algorithm:

Prim's Algorithm has the following properties:

1. The edges in the subset of some minimum spanning tree always form a single tree.
 2. It grows the tree until it spans all the vertices of the graph.
 3. An edge is added to the tree, at every step, that crosses a cut if its weight is the minimum of any edge crossing the cut, connecting it to a vertex of the graph.
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Algorithm:

1. Begin with any vertex which you think would be suitable and add it to the tree.
2. Find an edge that connects any vertex in the tree to any vertex that is not in the tree. Note that, we don't have to form cycles.

Stop when $n - 1$ edges have been added to the tree

Conclusion:

We have find minimum cost path i.e minimum spanning tree using Prim's Algorithm.