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CS590 Homework Assignment 12: Application Exercises

Due Date: April 17, 2022

Problem 14.7.18:

Consider stations as Vertex in graph and channels as edges. Assign 1 weight to all edges that are not compromised. Assign large weight like 10000 to all compromised channels. Apply single source shortest path algorithm to the graph (Dijkstra's algorithm below).

Algorithm->

->Create a set that keeps track of vertices included in shortest path tree, i.e., whose minimum distance from source is calculated and finalized. Initially, this set is empty.
-> Assign a distance value to all vertices in the input graph. Initialize all distance values as INFINITE. Assign distance value as 0 for the source vertex so that it is picked first.
->While set doesn't include all vertices
…. Pick a vertex u which is not there in set and has minimum distance value.
…. Include u to set.

.... Relax all adjacent unvisited vertices. Update distance value of all adjacent vertices of u. To update the distance values, iterate through all adjacent vertices. For every adjacent vertex v, if sum of distance value of u (from source) and weight of edge u-v, is less than the distance value of v, then update the distance value of v.

Time complexity-> O(n^2) for adjacency matrix. Time complexity can be reduced to O(m + nLogn) using Fibonacci Heap implementation of Dijkstra's algorithm.