

PROJECT 6

SHORTEST PATH

for teams of 1 - 3

SYNOPSIS

Write a program to implement the algorithm discussed in class for finding a shortest path from source to sink in a network.

INSTRUCTIONS

In the programming language of your choice, write a program that implements the shortest path algorithm we discussed, subject to the following requirements.

1. The program should be able to read in a data file consisting of the distances between nodes given in the form of a two-dimensional array.
2. The user should be prompted to identify the source and sink.
3. The program should be able, in principle, to solve problems with up to 100 nodes.
4. You may assume that the distances will be nonnegative integers.
5. Give the user the option to simply run the program or to step through it. In other words, give the user the option to see the intermediate steps in the operation of the program. This is primarily to help me identify which portions of the program are working correctly.

A POSSIBLE PARTIAL OUTLINE OF THE PROGRAM

1. Read the data file.
2. Save the data to a two-dimensional array.
3. Sort each row of the array from shortest distance to longest distance. In doing so, transfer the result to a new array. This might be another two-dimensional array, but one that is transposed from the original array and in which each cell contains not only the distance, but also the destination city and a variable that indicates whether that path has been circled. You may also want to include two extra rows, one corresponding to whether the column has been starred and one with the distance to that city.
4. Perform the forward portion of the algorithm: that is, the portion that iteratively assigns stars and distances to the columns.
5. Perform the reverse portion of the algorithm: that is, the portion that reconstructs the sequence of cities used to reach the sink.

WHAT YOU SHOULD SUBMIT

I will provide data in the form of one or more Excel spreadsheets of distances between cities. You should provide the corresponding output. Also submit a copy of your code. It should be well documented so I can tell what is going on. This should all be submitted electronically.