LAB 1 REPORT

BellmanFord.cpp

One problem I met at first was reading csv file. Actually, it's not hard to write C++ code to read csv file since there are so many templates online, but the given csv file has some format problem: the last string of each line has some redundant characters, so I can't directly use it. And some file has this problem, some files not. To fix this, I use regular expression to see if a string has redundant characters, if it has, then trim it. Otherwise it's good.

To implement Bellman-Ford algorithm is straightforward, the pseudocode given by TA is really helpful. I used triple nested for loops, the outer one is total iteration that Bellman-Ford needs, and the inner two is to iterate through all edges. The interesting part of it is that I used a vector to store the vertices that have been visited so as to reduce the total number of loops.

To implement early termination of Bellman-Ford, I use another vector to store the result of last iteration. For each iteration, if new result is identical to the last result, then terminate, obviously.

GraphGen.cpp

The graph used to test Bellman-Ford should be directed and acyclic. At first, I had no idea how to generate a random directed acyclic graph using C++. Later I figured out that I can just generate a random directed graph and then check if it has cycle. And if it has cycle, I can delete some edges or even generate another graph.

BellmanFordPipe.cpp & GraphGenPipe.cpp

Pipe works similar to client and server on a network. A client sends message and the server responds to that message. TA gave us two sample code, one for client and one for server. I tested all my code on UNIX environment. To be honest, the sample codes are good enough to work, all I need to do is to add two lines of code that execute BellmanFord and GraphGen.

I opened two terminals to test it. In the GraphGenPipe side (client), I entered the number of vertices for the graph, say 5. It executed command like "./GraphGen 5" and generate "N5.csv". Then the value "5" passed to the BellmanFordPipe side (server) and it executed command like "./BellmanFord N5.csv". The result file was stored in the same path as usual.