Lab 13: Shortest Path

Lecture date 6/1/2016
Due date 7/6/2016 11:59 PM

In this lab, we will implement Dijkstra's algorithm for finding the shortest path. When a graph structure (i.e. a set of nodes and edges) is given, your program prints the shortest path as a result of running Dijkstra's algorithm. You may want to use a priority queue to find the node with the smallest distance from the source node.

1. Input

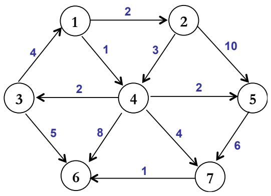
Read a set of vertices from the first line and a set of edges from the second line of the given input file. Each line is described below. You may assume that your node is represented by any integer.

- Vertices are given in the first line. Each vertex is separated by a space.
- Edges are given in the second line. Each edge is represented by a pair of vertices and its weight. For example, "1-3-4" represents an edge from the vertex 1 to 3 with the weight value of 4.

An exemplary input file is given below with the corresponding graph for your reference.

Input.txt

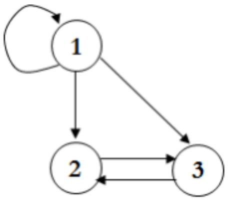
```
1 2 3 4 5 6 7
1-2-2 1-4-1 2-5-10 2-4-3 3-1-4  3-6-5  4-3-2  4-6-
8  4-7-4  4-5-2  5-7-6  7-6-1
```



2. Data structure

(1) Data structure for the graph

You can use an adjacency matrix to store your graph information as we discussed in class. An example is shown below.



	1	2	3
1	1	1	1
2	0	0	1
3	0	1	0

(2) Data structure for nodes in priority queue

```
struct Node {
    int vertex;
    int priority;
}
```

3. Program description

- name : p11.c
- input : an input file name is given as a command line argument. See the example in “1. input” .
- output : the shortest path (for the given graph in input) in the standard output

Submit to the course website (https://portal.hanyang.ac.kr) your source code and a written report. Your report should include the description of your own implementation.