University of New Brunswick, Faculty of Computer Science

CS 2263   Lab 2   Winter 2018

Due Date: Friday, January 26, 11:59 pm. A grade of 0 will be given to those students that do not attend the Lab session on Thursday.

Purpose: Use a FIFO queue to implement the Bellman-Ford Algorithm for the SSSP problem

Pairs: You will work with your assigned pair programming partner for this lab.

Bellman-Ford with a FIFO Queue

Note: please refer to class notes on SSSP problem.

For this lab you will implement the Bellman-Ford algorithm, as described in class.

Your implementation must include the following function:

```
int inputCSR(int V[], int E[], int W[], int n, int m);
```

which reads from standard input the offset array (`V`), edge array (`E`), and weight array (`W`) of the compressed sparse row representation. This function returns 1 if all values are read successfully, and returns 0 otherwise.

No further functions other than `main` are required. Your program should input the graph, then the source vertext, from standard input and output the predecessor and distance arrays to standard output. Here's a sample terminal session:

```
$ cat graphtest.txt
8 12
0 2 3 5 7 9 11 12 12
1 2 3 1 4 2 5 5 6 6 7 7
3 1 2 1 5 4 1 1 2 2 4 1
0

$  ./bellmanFord < graphTest.txt
source vertex: 0
P: 0 2 0 1 2 3 5 6
D: 0 2 1 4 6 5 7 8
```

Test your program with this example, and with the following graph:
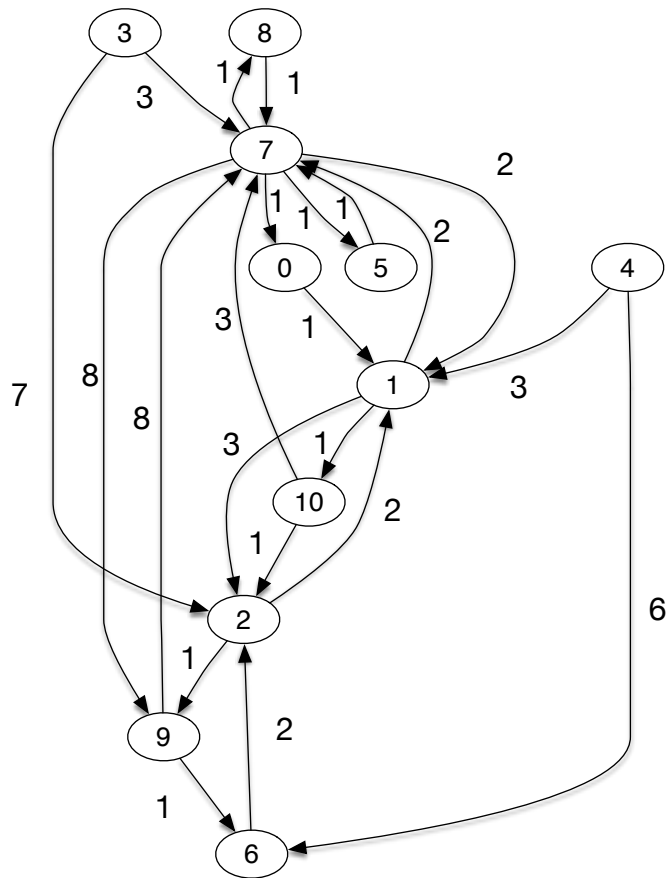
```
11 22
0 1 4 6 8 10 11 12 17 18 20 22
1 2 7 10 1 9 2 7 1 6 7 2 0 1 5 8 9 7 6 7 2 7
1 3 2 1 2 1 7 3 3 6 1 2 1 2 1 1 8 1 1 8 1 3
```

for paths starting from vertex 3 and from vertex 7. Note that all vertices aren't necessarily connected by paths. If there is no path between the source vertex and another vertex, the distance should remain as the largest integer and the predecessor vertex should be indicated as -1.

Submit a code listing and a record of a terminal session showing your testing.

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To pass in the lab: Create a single pdf document that includes both team members' names, with code listing and terminal session. Also include the source file separately. Submit these files to the Desire2Learn dropbox. Name your documents `LastName_FirstName_Lab2.pdf` and `LastName_FirstName_Lab2.zip`

(`LastName` and `FirstName` are of course substituted with your last and first name). Both team members should submit the lab.