Department of Computer Science

COS212: Practical 8

Release: Monday 24 April 2017
Deadline: Wednesday 1 May 2017, 12:00

Instructions

Complete the tasks below. Certain classes have been provided for you in the task sub-folders of the practical download. You have been given main files which will test some code functionality, but it is by no means intended to provide extensive test coverage. You are encouraged to edit this file and test your code more thoroughly. Remember to test "corner" cases.

Upload **only** the given source files with your Graph.java in a zip archive before the deadline. Please comment your name **and** student number in at the top of each file.

You must implement your code in a class called Graph. Any changes to the other files will be overwritten.

Task 1: Find shortest undirected path [10]

You have to implement a function that finds the shortest path between the two given vertexes, and return the total distance. You have to make sure that this function can deal with negative distances. If the two nodes are not connected, a distance of infinity must be returned.

The shortest path from c to j has a distance of 12.

Task 2: Find undirected cycle [10]

For this task you must implement a function that will find a cycle. Once a cycle is found, the label of any of the vertexes within the cycle must be returned. The simplest would be to use the vertex on which the cycle is first discovered. If no cycle is found, an empty string must be returned.

In the given graph, only i and j are not part of any cycles. So any other vertexes would be correct.

Task 3: Find shortest directed path [10]

Like task 1, you have to implement a function that finds the shortest path between the two given vertexes, and return the total distance. Except that this time the graph is directed. The direction of an edge is from the first vertex to the second vertex (so i-¿a). You have to make sure that this function can deal with negative distances. If the two nodes are not connected, a distance of infinity must be returned.

The shortest path from c to j has a distance of 17.

Task 4: Find directed cycle [10]

For this task you must implement a function that will find a cycle within a directed graph. Once a cycle is found, the label of any of the vertexes within the cycle must be returned.

The simplest would be to use the vertex on which the cycle is first discovered. If no cycle is found, an empty string must be returned.

In the given graph, the only cycle is a-¿c-¿b-¿a.

Submission

Submit your source files on the CS Website. Place all the files in a zip archive named as uXXXXXXXX.zip where XXXXXXXX is your student number. Upload your archive to the *Prac8* slots on the CS website. Submit your work before the deadline. No late submissions will be accepted.