

FIT2004: Lab questions for week 8

Objectives: This prac provides a platform for you to practise the formal concepts introduced during the lectures in week 8. Primarily, these concepts include shortest-path algorithms on graphs.

Consider the file OL.cedge uploaded on Moodle. This file represents the undirected road network of a German city Oldenburg¹. Each line represents the information of an edge. The first column is the edge ID, the second and third columns are the IDs of the nodes that are connected by the edge and the fourth column represents the distance between the two nodes (i.e., edge weight).

1. Write a program that reads the input file and represents it as a graph using adjacency lists. The program then must ask the user to input ID of a vertex v and display all the adjacent vertices of v as well as the distances between these vertices and the vertex v . Why you should not represent this graph as an adjacency matrix?
2. Write a program implementing the Breadth-First Search (BFS) to find the single-source shortest path on Oldenburg road network ignoring the weights of the edges, i.e., you want to find the path that has the minimum number of intersections (i.e., nodes). Your program must ask the user to enter the IDs of a source vertex s and a target vertex t and return the shortest path from s to t as well as the length of the path (i.e., the number of edges along the path).
3. Implement Dijkstra's algorithm to compute the path between s and t that has the minimum distance. The program must return the shortest path as well as the distance of the shortest path.

--o0o--
END
--o0o--

¹Downloaded from <https://www.cs.utah.edu/%9lifeifei/SpatialDataset.htm>