Task 5. Algorithms on graphs. Introduction to graphs and basic algorithms on graphs

Goal

The use of different representations of graphs and basic algorithms on graphs (Depth-first search and Breadth-first search).

Problems and methods

I. Generate a random adjacency matrix for a simple undirected unweighted graph with 100 vertices and 2000 edges (note that the matrix should be symmetric and contain only 0s and 1s as elements). Transfer the matrix into an adjacency list. Visualize the graph and print the adjacency matrix and the adjacency list. Which purposes is each representation more convenient for?

II. Use Depth-first search to find connected components of the graph and Breadth-first search to find a shortest path between two random vertices. You may use existing implementations of the algorithms. Analyse the results.

Comments

Use any programming language you want. The findings and the plots should be informative and correct.

The report should be a pdf-document containing

- Task number and its topic, your group name, your name and surname, the report date;
- code of your programs required values and graphs, as well as analysis of the results.

Reports must be sent to chunaev@itmo.ru no later than three weeks after the task is given in English. Use the following format for the email subject: Task #, Name Surname, Group.