MP6 Dijkstra’s Algorithm Performance Evaluation

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[1] Computational Complexity Verification for Dijkstra’s Algorithm

> Strongly connected graph, Operation 1

./lab6 -g 3 -h 1 -n 11000 -s 0 -d 10999 Time to run: 1018.05ms

./lab6 -g 3 -h 1 -n 5500 -s 0 -d 5499 Time to run: 254.606ms

For a graph with N = 11000 vertices, the program ran in about 1 second. For a graph with N/2 vertices (5500) it ran in about ¼ of the time. , 22 = 4, therefore this function performs at O(n2).

> Randomly connected graph, Operation 2

./lab6 -g 4 -a 20 -h 1 -n 9700 -s 0 -d 9699 Time to run: 1005.71ms

./lab6 -g 4 -a 20 -h 1 -n 4850 -s 0 -d 4849 Time to run: 249.448ms

For a randomly built graph with N = 9700 vertices, the program ran in about 1 second, however, for N/2 vertices (4850) it ran in about ¼ of the time. , 22 = 4, therefore this function performs at O(n2) for a randomly built graph.

[2] Computational Complexity Verification for Network Diameter

/lab6 -g 4 -a 20 -h 2 -n 470 -s 0 -d 469 Time to run: 994.858ms

./lab6 -g 4 -a 20 -h 2 -n 235 -s 0 -d 234 Time to run: 127.875ms

For a randomly built graph with N = 470 vertices, it took about 1 sec to find the network diameter. , 23 = 8, therefore this function performs at O(n3) for a randomly built graph.

[3] Node Density for Random Graphs

Running the network diameter operation on a random graph with an average adjacency of 7 yielded a disconnected graph for 6 of the 10 different seeds. Running the same test with an adjacency of 20 yielded no disconnected graphs.

[4] Multiple Link-disjoint paths

This test was ran on two different graph types. For graph type 3 (strongly connected) the number of paths found was always 1 less than the number of vertices. For the Random graph, it produced a number of paths roughly half than the number of vertices, however it changed slightly with a new seed.

Seed 1:

R = 10, Paths = 7

R = 20, Paths = 9

R = 50, Paths = 21

R = 100, Paths = 49

Seed 2:

R = 10, Paths = 4

R = 20, Paths = 9

R = 50, Paths = 23

R = 100, Paths = 54