Weighted Graphs: Homework Solutions

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July 13, 2020

Exercises 1, 2, 3

Text:

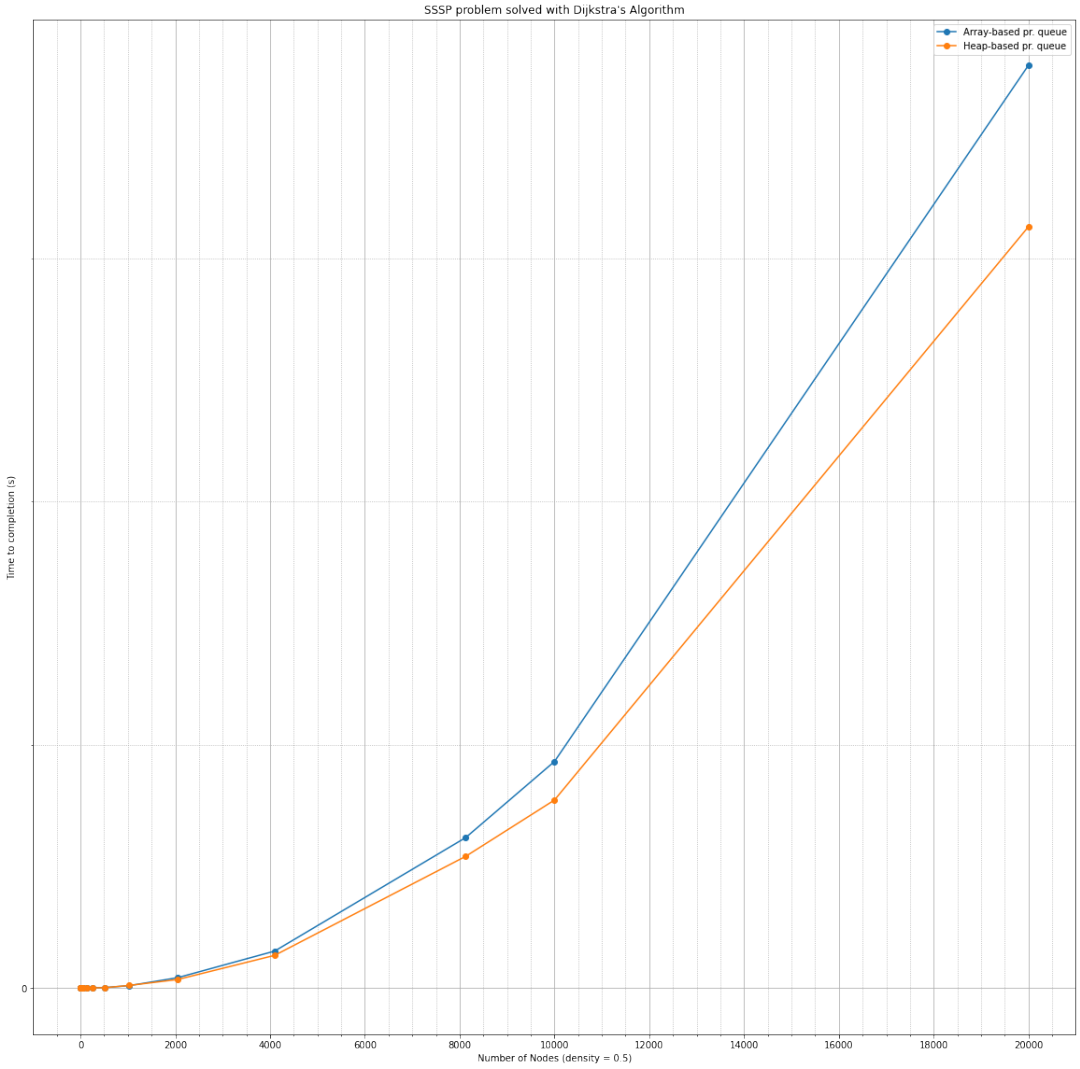
Implement the array-based version of the Dijkstra's algorithm.
Implement the binary heap-based version of the Dijkstra's algorithm by using the library `binheap` *that was developed during Lesson 6, Lesson 7 and Lesson 8.*
Test the implementations on a set of instances of the problem and compare their execution times.

Solution:
After having implemented both versions of *Dijkstra's Algorithm*, the two versions have been compared w.r.t. execution times by using random-generated graphs represented ad adjacency (linked) lists.

Since the complexity of the algorithm depends in any case both on the number of nodes on the graph and on their connectivity (namely: on the number of edges), graph density has been kept constant while varying the number of nodes.

As we can see from the graph, the *heap-based* version of the algorithm (i.e. that using a heap to manage the priority queue) performs better than the array-based one, especially as the size of the graph grows.
Results are shown below.

Benchmarks:


SSSP problem solved with Dijkstra's Algorithm
Array-based pr. queue
Heap-based pr. queue
Time to completion (s)
0
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
20000
Number of Nodes (density = 0.5)