Weighted Graphs: Homework (30/4/2020)

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The required codes are inside the folder `Ad_dijkstra`, conpiling the codes will produce an executable `dijkstra_test` which tests both the correctness (by reproducing the example analyzed during lectures) and the performance of the codes.

1.

The array-based version of the Dijkstra's algorithm is implemented by the function `Dijkstra_Aq` (`Ad_dijkstra/src/dijkstra.c`).
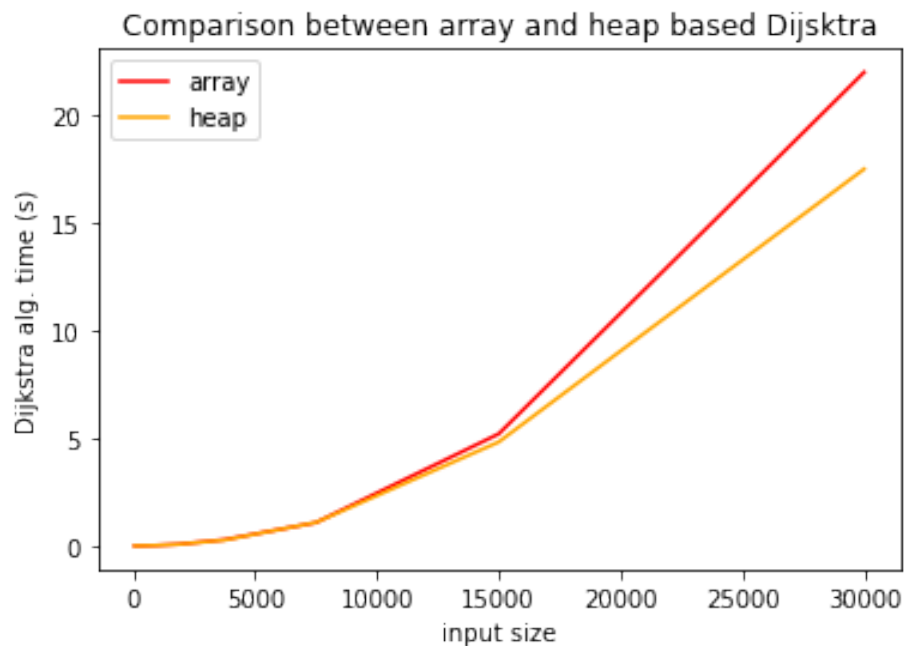
2.

The heap-based version of the Dijkstra's algorithm is implemented by the function `Dijkstra_minheap` (`Ad_dijkstra/src/dijkstra.c`).

3.

I tested the implementation of these functions for several sizes of the input graph.

The following plot reports the execution time:

If we consider a graph $G = (V, E)$, then the asymptotic complexity of Dijkstra's algorithm is:

- $\Theta(|V|^2 + |E|)$ for the array-based implementation;
- $O((|V| + |E|) \cdot log(|V|))$ for the binary heap-based implementation.

The result I obtained is somehow consistent with the theoretical results: we can observe that the heap-based implementation leads to better results in terms of execution time (especially for larger inputs).