Dijkstra's algorithm

The implementation of the Dijkstra's algorithm can be found in the `src` folder, file `dijkstra.c` .

A Makefile can be produced by using `cmake` as follows: `cmake -G "Unix Makefiles" CmakeLists.txt` .

By compiling the code with `make` , an executable named `dijkstra_test` will be produced.

The output shows the distances and the predecessors for each node in the (randomly built) graph for both array based and heap based version of the algorithm. Also, the execution times are printed, testing both versions on increasing sizes (number of nodes) of the graph.

The array based version of the Dijkstra's algorithm is implemented by the function `dijkstra` , while the heap based version is implemented by the function `dijkstra_heap` .

In the following plot are shown the execution times for the two versions of the algorithm.
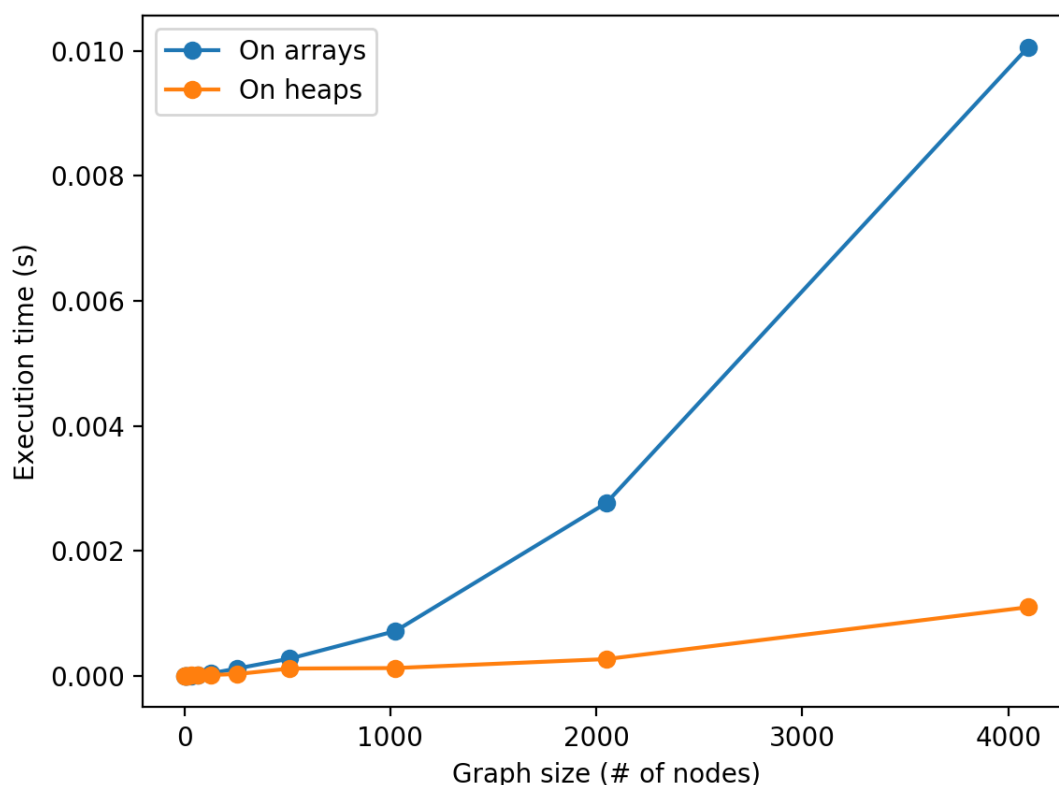
From this plot it is possible to notice that the heap based implementation leads to better performance with respect to the array based version, even more when the number of nodes grows, and the results obtained are consistent with the asymptotic complexity of Dijkstra's algorithm. In fact, if $|V|$ is the number of nodes in the graph and $|E|$ the number of edges, for the array based implementation the complexity is $\Theta(|V|^2 + |E|)$ while for the heap based version is $O((|V| + |E|) * log|V|)$. Thus, especially when the graph is sparse, an heap based queue structure is preferable.