



Exercises for *Foundations in Data Engineering*, WiSe 20/21

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<http://db.in.tum.de/teaching/ws2021/foundationsde>

Sheet Nr. bonus3

Bonus Project 3

Reminder: Use Linux as operating system to work on this project. We cannot provide support for any Windows or macOS related problems.

Task

In this project we work on a directed graph and implement an algorithm to find the *K-Nearest-Neighbors (knn)* of a start node.

Each edge of the directed graph has a weight. The K-Nearest-Neighbors are the *k* nodes (*result nodes*) with the cheapest path from *start node* to *result node*. The cost of a path is the sum of all edges of the path. The cheapest path is the one with the lowest cost.

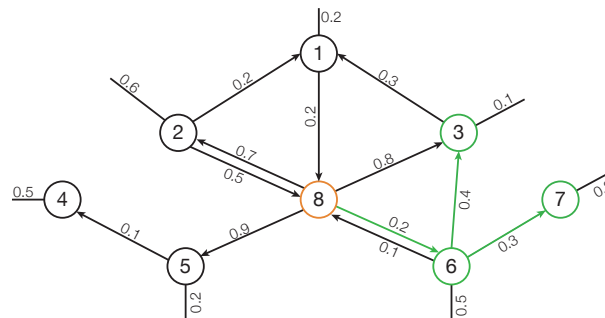


Figure 1: 3-Nearest Neighbors search on a directed graph with start node 8. The result nodes are highlighted in green.

For our example in Figure 1 the 3-Nearest-Neighbors of *start node 8* are the result nodes: (*node : 6, cost : 0.2*), (*node : 7, cost : 0.5*), (*node 3, cost : 0.6*).

For this project we are only interested in the K-Nearest-Neighbor nodes and the cost of their path as shown in the example result. You do not need to keep track of the nodes on the path itself.

Please make sure your K-Nearest-Neighbors result:

- contains the weight of the cheapest paths from start node to each result node
- contains no result node twice

How to work on the project & submit

To complete this project, submit an implementation that manages to compute the benchmark in **less than 2 minutes**. The machine used for evaluation is our submission server with an Intel Core i7-4770K CPU, 3.50GHz, 4 cores, 8 hyperthreads and 32GB of memory. You do not need to parallelize your algorithm, a serial implementation is fast

enough. The README-file in the repository contains all technical details as well as some hints.

To work on the project:

1. Fork the project from this repository.
2. Set it private.
3. Update `team.txt` with the same credentials you had in Bonus Project 1 & 2.