

Bachelor Final Project: "The online car-sharing problem"

Given are a set of cars, located at given positions, and a set of requests arriving online over time. Each request i is specified by its releasing time r_i , its pick-up location s_i , and its drop-off location t_i ($1 \leq i \leq n$). Once a request arrives, we must assign it to a car immediately. Given a distance metric, the problem is to find a solution that minimizes total travel time, or total waiting time.

Additional relevant features may include:

- (1) Each car may have a capacity, for instance, each car can serve at most serve two requests simultaneously.
- (2) Special metric spaces: uniform metric space, the line, the star, ...

The goal of this bachelor final project is to:

- (1) study related online literature and related problems,
- (2) design algorithms for this problem, and evaluate its performance, and
- (3) implement algorithms, and experiment with them using realistic instances.

References:

- [1] Elias Koutsoupias, Christos H. Papadimitriou (1995), On the k -Server Conjecture, Journal of the ACM 42(5): 971-983.
- [2] Christian Coester, Elias Koutsoupias (2019), The online k -taxi problem, STOC, 1136-1147.
- [3] Kelin Luo, Frits C. R. Spieksma (2020), Approximation algorithms for car-sharing problems, <https://arxiv.org/abs/2007.03057>

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