

# Geocaching: Route Planning with Points of Interest

Supervisor: Álvaro Torralba, alto@cs.aau.dk

August 24, 2020

Route planning is the problem of finding a (shortest) path between a source and a target location. Geocaching is a game about finding objects hidden at a given set of GPS locations. In this project, we would like to find, not the shortest route, but the route that maximizes the amount of geocaches found.

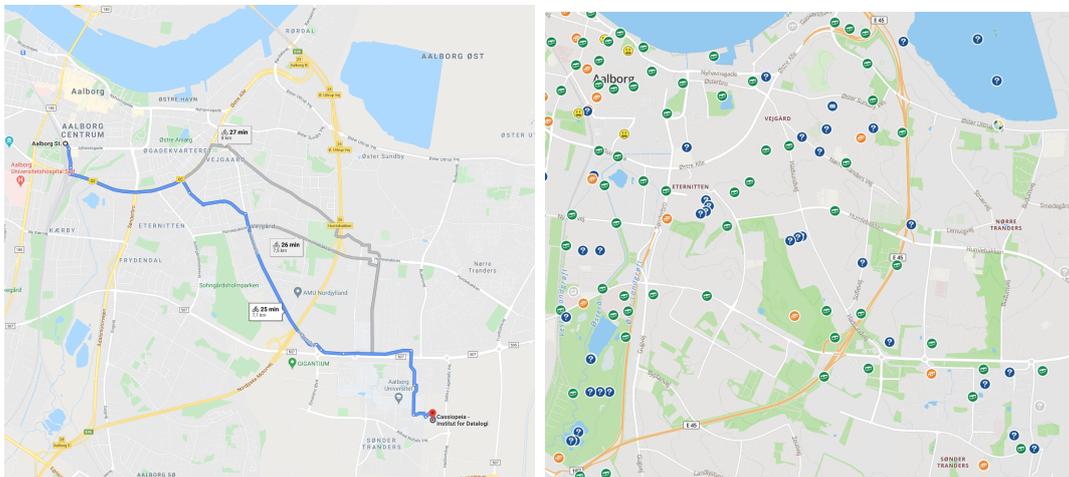


Figure 1: Shortest route from Cassiopeia to Aalborg st. (left), and related map with points of interest (right).

In this project, you will develop a solver that, given a road map, an initial and target location, plus a set of points of interest (POI) that one would like to visit, provides a set of candidate routes. Each POI has an associated utility, as well as some constraints (e.g. must spent some time). The goal is to find routes that maximize the utility of the visited POI, while minimizing the total time spent. This is a multi-objective problem, where the result is a set of solutions that balance time spent and utility value.

Moreover, one can also consider additional objectives (e.g. find a cache of every kind), and constraints (e.g. multi-caches where one needs to visit multiple locations to find them). In our case, we will use the dataset of Geocaches, which can be downloaded from the [geocaching.com](http://geocaching.com) website.

**Theoretical Approach:** Develop an algorithm with theoretical guarantees on solution quality, i.e., optimal solutions or bounded-suboptimal solutions.

**Practical Approach:** Develop algorithms that achieve as good solutions as possible in as little time as possible. Analyze the trade-off between solution quality and efficiency, and how different parameters of the algorithm have different influence on it.