TECHNISCHE UNIVERSITÄT WIEN
Vienna University of Technology

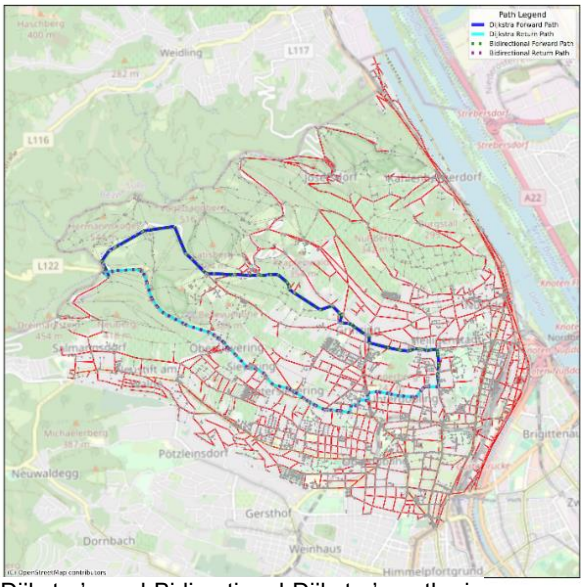
INSTITUT FÜR MECHANIK UND MECHATRONIK
Mechanics & Mechatronics

Announcement Bachelor's Thesis

Development & Implementation of an Energy-based Heuristic for the A* Search Algorithm applied to an existing Road Network Graph

Content

The research project *OmniMOV* investigates travel behavior patterns and mode selection based on survey and topological data in form of network graphs.
The aim of this thesis is to implement the A* search algorithm for computing paths of minimum physiological energy consumption using a novel heuristic specifically designed to speed up calculation time. Instead of a geometric search, here, we look at an energy-based search space. The primary objective is to research, develop, and evaluate this energy-based heuristic, in comparison with Dijkstra's algorithm, which is traditionally used for shortest path calculations. Additionally, the thesis will explore the implementation of the k-shortest paths algorithm to identify the most energy-efficient routes under various constraints, e.g. power thresholds or available travel modes.



Dijkstra's and Bidirectional Dijkstra's paths in Vienna's 19th District.

Tasks

- Research, develop, and implement a suited energy-based heuristic for the A* search algorithm applied on a given road network graph.
- Compare the A* algorithm with Dijkstra's algorithm for specific performance metrics.
- Analyze and document the results for different algorithmic approaches.

Requirements

- Good programming skills in Python3.
- Independent research and problem-solving skills.
- Knowledge of graph theory and shortest path search algorithms (optional).

If you are interested or have any questions, please do not hesitate to contact us.

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