Search-based Motion Planning with Motion Primitives

Programming Exercise I (Search) - Fundamentals of AI WS22

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Task Description

Develop a search-based motion planner for an autonomous vehicle to solve CommonRoad scenarios

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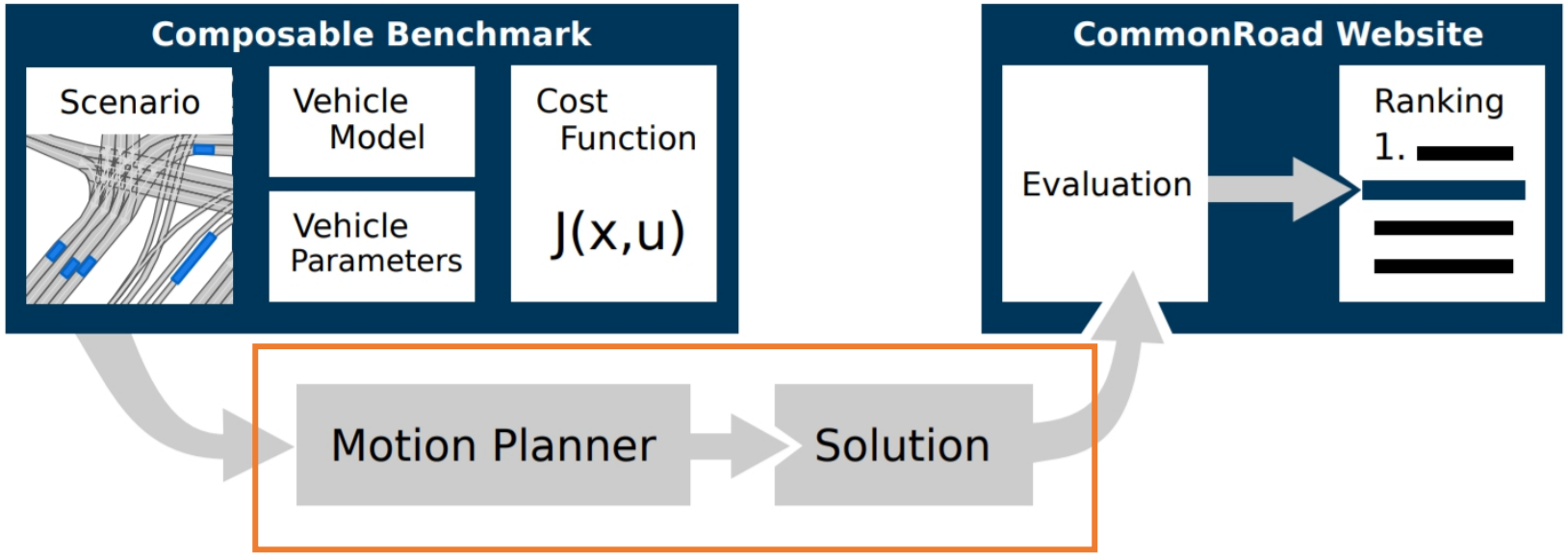
Composable benchmarks for **Mo**tion planning **on Road**s



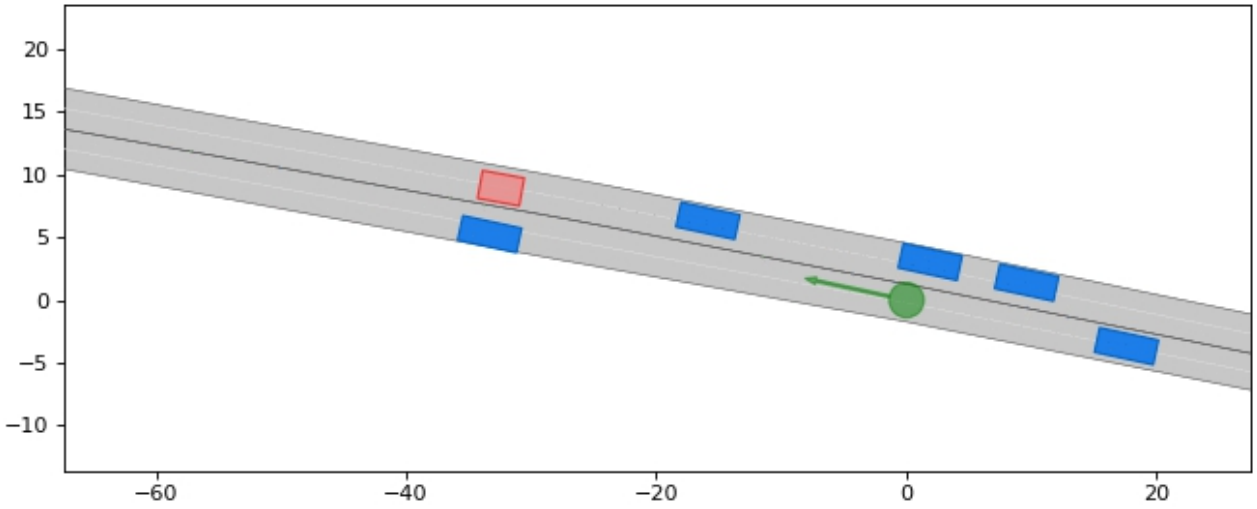
https://commonroad.in.tum.de

More details can be found in the exercise guide

Task Description

Motion planning using search algorithms with motion primitives

Example CommonRoad scenario



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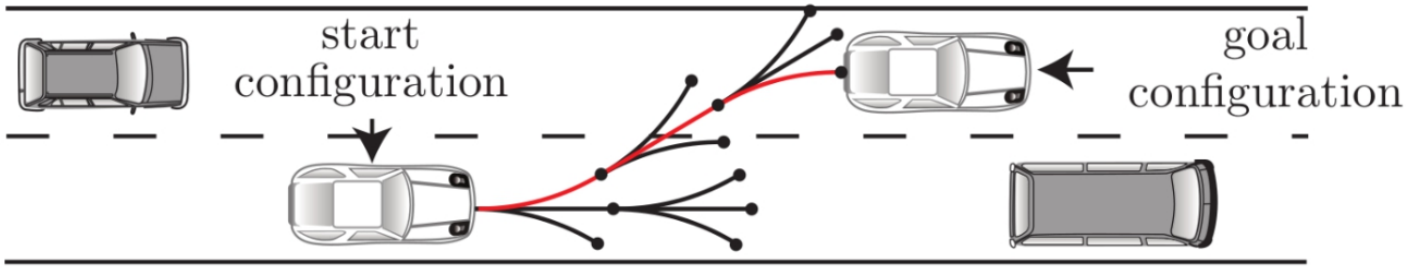
Motion planning using search algorithms with motion primitives

Motion primitives: short trajectories that are drivable by a given vehicle model



A search tree with precomputed motion primitives

More details can be found in the exercise guide

Task Description

We provide the implementations of 6 basic search algorithms:

1. Breadth First Search
2. Depth First Search
3. Depth-limited Search
4. Uniform Cost Search (aka Dijkstra)
5. Greedy Best First Search
6. A* Search

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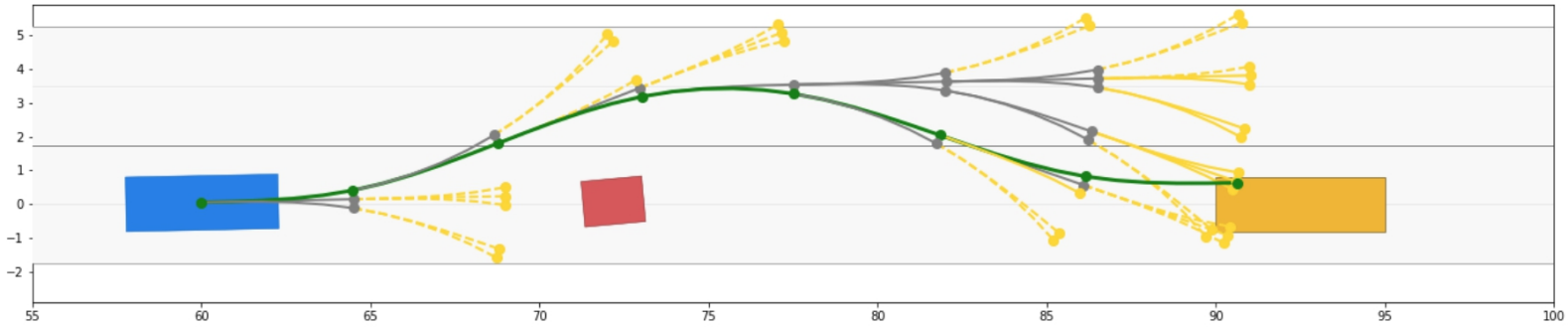

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You need to...

- improve the heuristic function,
- OR: develop your own search algorithm.

More details can be found in the exercise guide

Evaluation and Submission

Passing requirements for 2 bonus points:

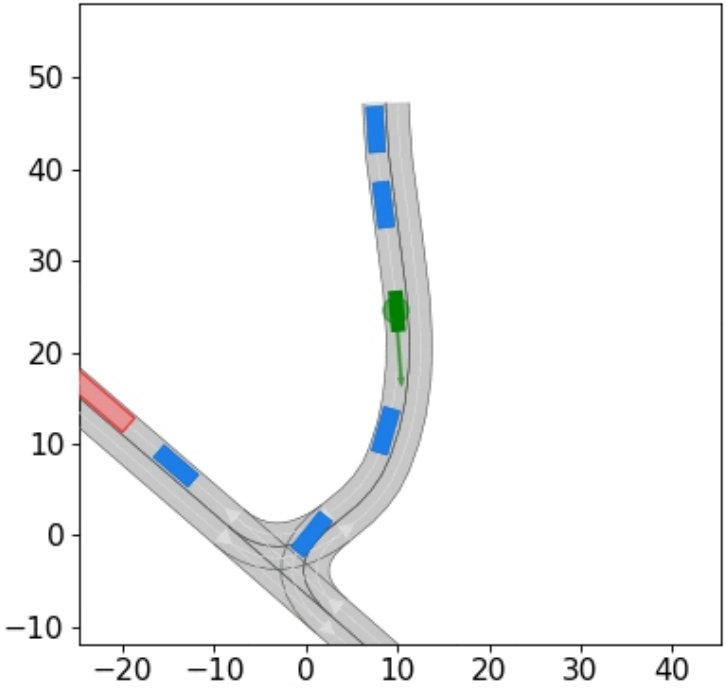
- You need to solve at least **340 scenarios** out of the 500 provided scenarios.
  (Don't be scared: ~ 320 already solvable with the given planners).
- Work independently. If plagiarism detected you will lose bonus points.

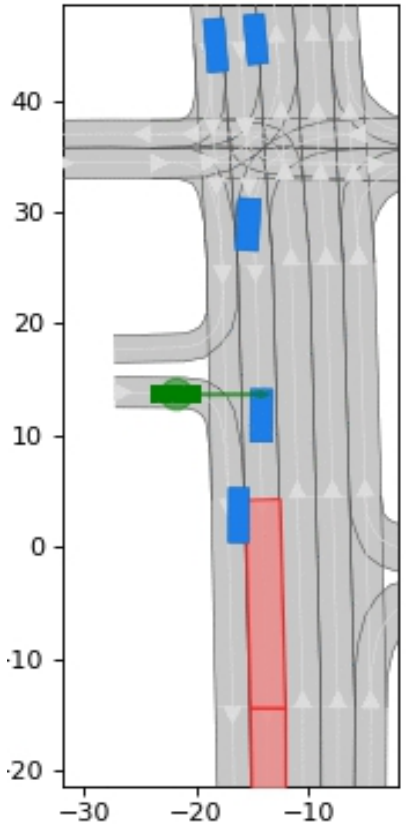
- Submission Window: **November 25th, 2022 - January 27th, 2023**

- All further details are provided in our exercise guide PDF

Examples

Submissions from last year





Examples

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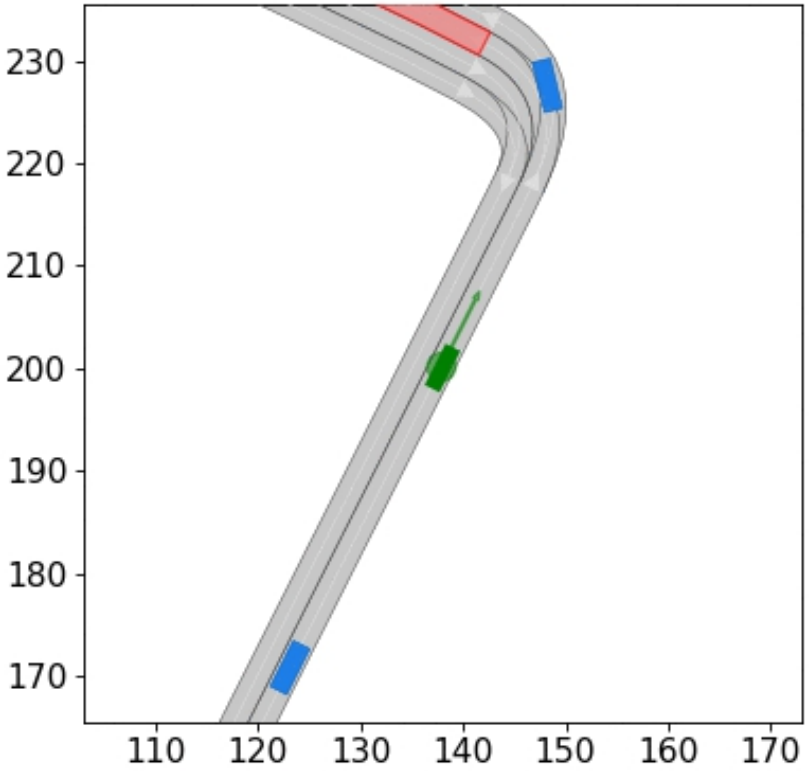

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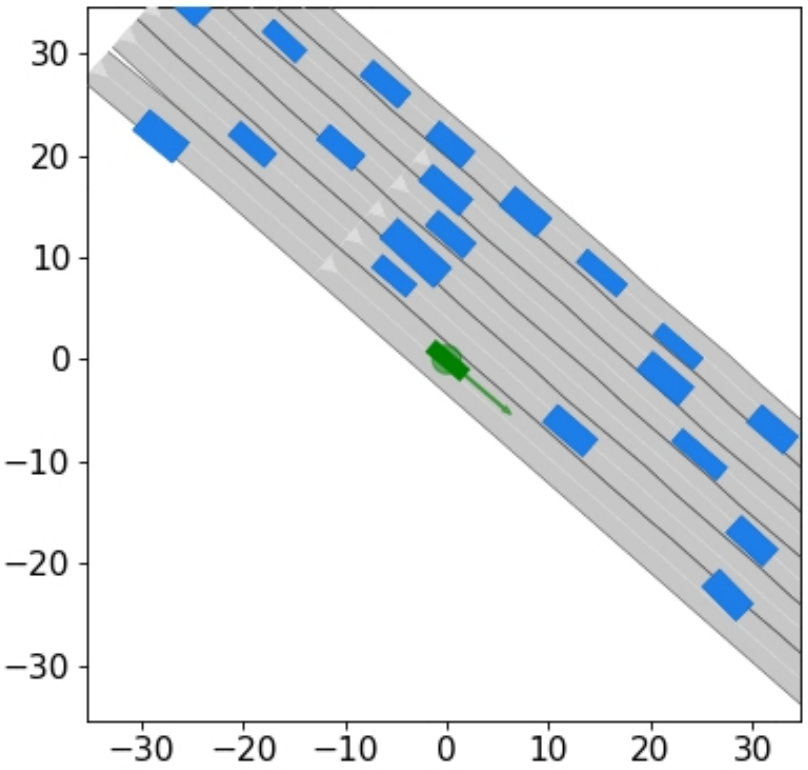

Rewards

Students who…

- Successfully pass the exercise

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- Submit the most solutions (Top 10)

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- Submit the most solutions (Top 3)

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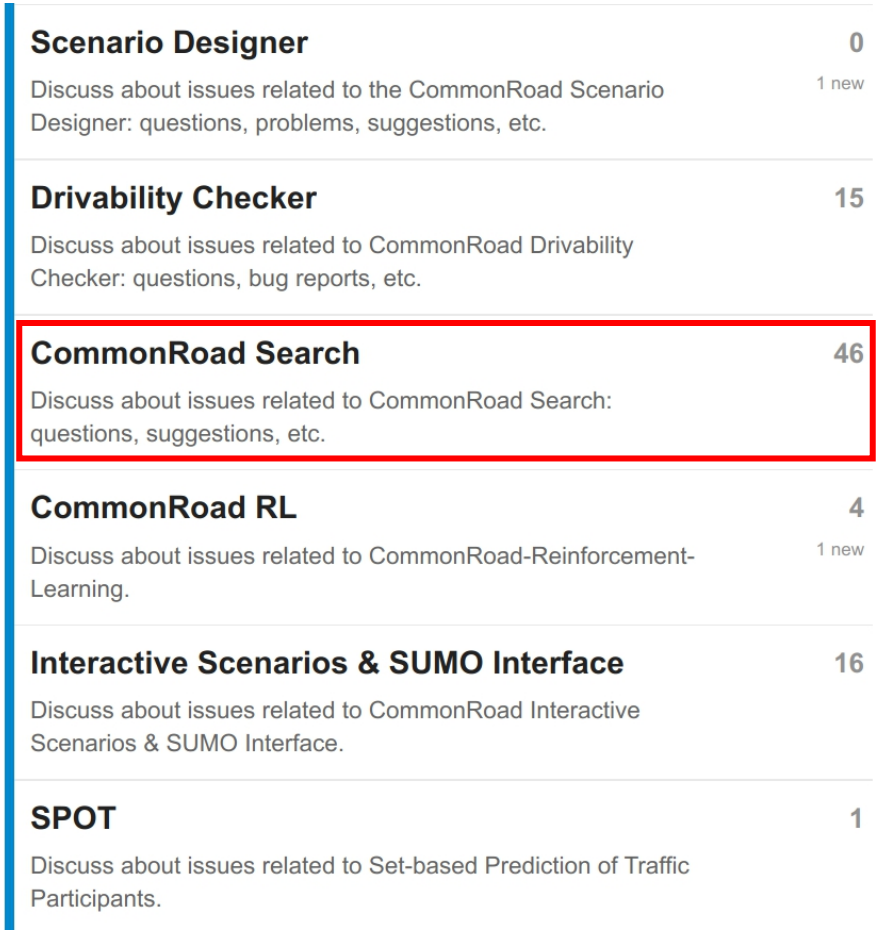
The best student will receive 200 Euros

Questions

Please ask your questions in the CommonRoad Forum



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More details can be found in the exercise guide

Getting Started

- Visit the repository at https://gitlab.lrz.de/tum-cps/commonroad-search
- Clone the exercise repository
- Check out the README for installation instructions
- Check out the exercise guide

More details can be found in the exercise guide

Questions?