Motion Planning

In the Motion Planning lectures we have discussed various local and global search algorithms. Below we will revisit some of these methods' properties in the form of multiple-choice questions and have a closer look at the implementation of Breadth First search.

NOTE: In the 'Collision Avoidance & Potential Fields' and 'Graph Search' section of the quiz, there is only 1 attempt allowed!

Collision Avoidance & Potential Fields

3/3 points (graded)

Harmonic Potential Fields may have local minima in addition to a single global minimum.

- ○ True
- ◉ False ✔

Explanation

Harmonic Potential Fields are the solution to the linear Laplace Equation. Hence only a single minimum can be attained.

The Dynamic Window Approach is guaranteed to find a solution path to the goal if one exists.

- ○ True
- ◉ False

✔

Explanation
The DWA is a local method and may thus get stuck in local optima such as cul-de-sacs.

The Reciprocal Velocity Obstacle method can be directly applied to non-holonomic robots.

- ○ True
- ◉ False

✔

Explanation
Input to the RVO method are 2D linear velocity. As such, non-holonomic constraints are not directly modeled.

Submit You have used 1 of 1 attempt

ℹ Answers are displayed within the problem

Graph Search

2/2 points (graded)
Dijkstra's Search

- ◉ orders states according to a priority queue.
- ○ finds an optimal solution on arbitrary graphs even if they contain negative edge weights.
- ○ has a time complexity of O(|N|+|E|)

✔

Explanation

A* Search

- orders states according to their "g"-value (summed edge cost from strart to the current state).
- has a better worst-case time complexity than Dijkstra.
- ✔ employs a heuristic -- which must be consistent for solution optimality to be guaranteed.

Explanation

Submit You have used 1 of 1 attempt

Answers are displayed within the problem

Implementation of Breadth First Search (External resource)

(15.0 / 15.0 points)