ECE183DA (Winter 2022)

Design of Robotic Systems I

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Problem set 4 | Linear quadratic regulators

Key takeaways

After this lecture, you should understand:

- What restrictions atop general MDPs are needed for a problem to fall into the class of "motion planning";
- Why those restrictions allow us to use other planning algorithms (i.e. graph search), and why we would want to use those algorithms instead of exact (general) MDP methods; and
- How to develop, configure, and implement a variety of exact and approximate graph-based methods for planning on such problems.

Assignment

4(a). Come up with a planning problem for which a graph-search based approach (either exact or probabilistic) might NOT be the most appropriate solution method, despite the problem having the following characteristics:

- The system is deterministic.
- The system state is based on its position/orientation within the environment.
- The task has no urgency/time limit.

In two to three English sentences, explain why graph search based approaches are less effective on your problem.

4(b). In two to three English sentences, explain how might you reframe that problem (i.e. define an alternative mathematical representation) so that you nonetheless use a graph-search based approach to solve that very problem.

4(c). Would you be willing to let us use your correct responses as (anonymized) examples for the class?