ME 570: Robot Motion Planning

Homework 4 Report

By Cameron Cipriano

12/02/2021

**Problem 1: Graph Search**

Question 1.1 \_code\_: Graph.heuristic

Implemented using numpy’s linalg.norm() and subtracting the two points’ physical locations in the graph

Question 1.2 \_code\_: Graph.get\_expand\_list

Question 1.3 \_code\_: Graph.expand\_element

Question 1.4 \_code\_: Graph.path

Question 1.5 \_code\_: Graph.search

**Problem 2: Application of A\* to the Sphere World**

Question 2.1 \_code\_: SphereWorldGraph.\_\_init\_\_

Question 2.2 \_code\_: Graph.search\_start\_goal

Question 2.1 \_report\_: nb\_cells discretization

Question 2.2 \_report\_: SphereWorldGraph run\_plot method

Question 2.3 \_report\_: A\* Behavior given choice of nb\_cells

Question 2.4 \_report\_: A\* Behavior with respect to the potential planner

**Problem 3: Application of A\* to the Two-Link Manipulator**

Question 3.1(a) \_report\_: TwoLinkGraph.load\_free\_space\_graph

Question 3.1(b) \_report\_: TwoLinkGraph.plot

Question 3.1(c) \_report\_: TwoLinkGraph.search\_start\_goal

Question 3.2 \_report\_: Plot the points obstacle\_points

Question 3.3 \_report\_: Comment on the *unwinding* phenomenon in the easy case

Question 3.4 \_report\_: Comment on the obstacle closeness issue and practical solutions