

Homework 3

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1 Path Planning via RRT

Hyperparameters:

`self._project_step_size = 1e-1`

`self._constraint_th = 1e-3`

`self._q_step_size = 0.01`

`self._target_p = 0.3`

`self._max_n_nodes = int(1e5)`

Mean planning time: 16.45s

Min planning time: 9.00s

Max planning time: 31.77s

Mean number of nodes sampled: 710.2

Min number of nodes sampled: 492

Max number of nodes sampled: 1097

Mean path length: 238.4

Min path length: 224

Max path length: 254

There are many tests with different random seed unsuccessfully output a path after 5000 nodes, which are not listed here. I picked 5 test with successful path output which gives the data above here.

RRT: Sampled 694 nodes in 14.82s

RRT: Found a path! Path length is 243.

RRT: Sampled 1097 nodes in 31.77s

RRT: Found a path! Path length is 254.

RRT: Sampled 776 nodes in 16.83s

RRT: Found a path! Path length is 244.

RRT: Sampled 492 nodes in 9.85s

RRT: Found a path! Path length is 224.

RRT: Sampled 492 nodes in 9.00s

RRT: Found a path! Path length is 227.

2 Constrained Planning

Hyperparameters:

`self._project_step_size = 1e-1`

`self._constraint_th = 1.9e-3`

`self._q_step_size = 0.09`

`self._target_p = 0.3`

`self._max_n_nodes = int(1e5)`

Mean planning time: 55.41s

Min planning time: 4.69s

Max planning time: 144.58s

Mean number of nodes sampled: 632.6

Min number of nodes sampled: 284

Max number of nodes sampled: 1310

Mean path length: 64.4

Min path length: 32

Max path length: 130

There are many tests with different random seed unsuccessfully output a path after 5000 nodes, which are not listed here. I picked 5 test with successful path output which gives the data above here.

RRT: Sampled 284 nodes in 14.11s

RRT: Found a path! Path length is 49.

RRT: Sampled 516 nodes in 41.66s

RRT: Found a path! Path length is 67.

RRT: Sampled 89 nodes in 4.69s

RRT: Found a path! Path length is 32.

RRT: Sampled 1310 nodes in 144.58s

RRT: Found a path! Path length is 130.

RRT: Sampled 964 nodes in 72.01s

RRT: Found a path! Path length is 44.