Homework of Motion Planning for Mobile Robots

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Abstract

Use The Open Motion Planning Library (OMPL) to implement RRTstar algorithm on ros.

Keywords: RRTstar, ROS, OMPL

1. About RRTstar

RRTstar has made improvements on the basis of RRT, mainly by re-selecting the parent node and rewiring. Imagine that in RRT, our sampling point is finally connected to the nearest point on the entire tree, but this may not be the best choice. Our ultimate goal is to make this point as close as possible to the starting point. RRT* has made an improvement on this. After the sampling point is added to the path tree, it draws a small circle with it as the center of the circle, considering whether there are better parent nodes, and connecting to those nodes can make the distance from the starting point to the point. Shorter (although those nodes are not the closest points to the sampling point). If you choose a more suitable parent node, then connect them and remove the original connection.

2. Result of simulation

Run "roscore" in the terminal, then run "rviz" in the new terminal to start rviz for configuration, and finally run "roslaunch grid_path_searcher demo.launch" in the new terminal, we can see the simulation interface, press the shortcut key G and use the left mouse button to select Set a point to see the result in Fig 1.

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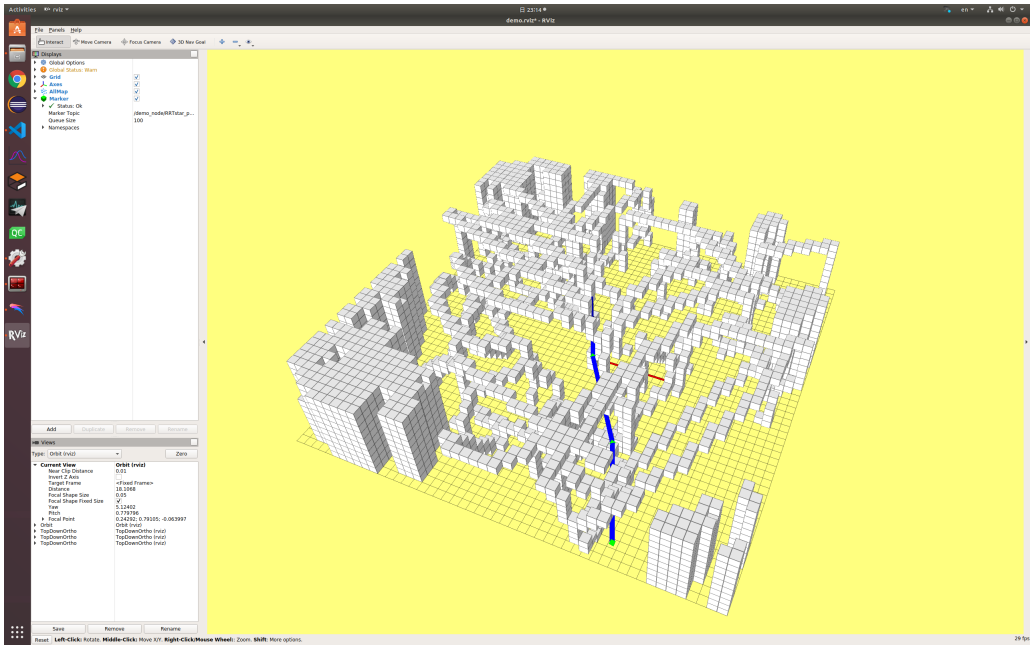
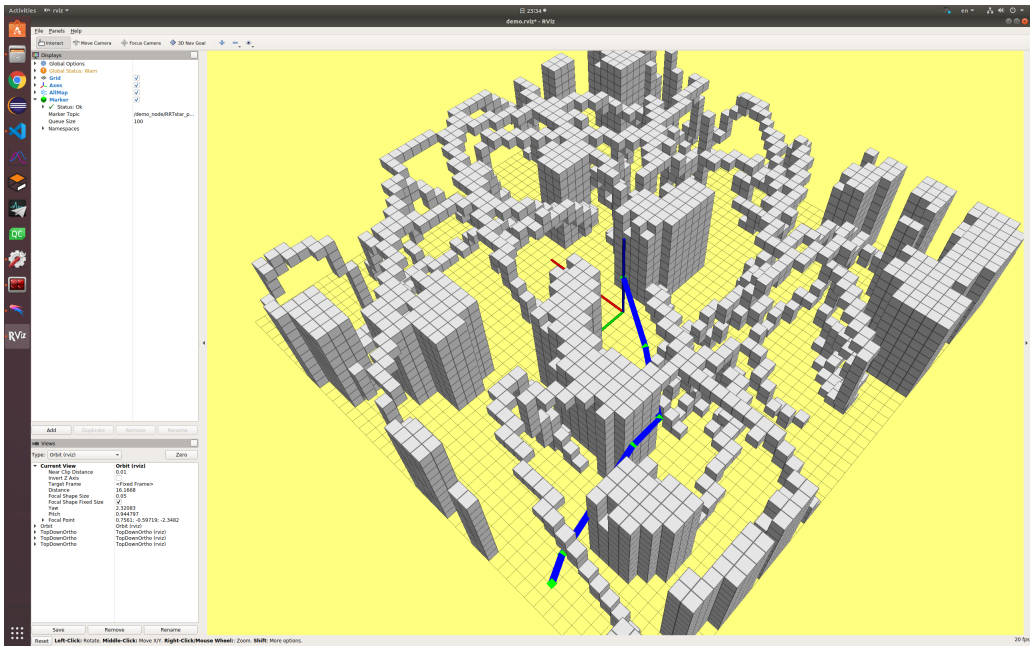


(a) RRTstar: Found an initial solution with a cost of 6.14 in 92 iterations (57 vertices in the graph). Created 6622 new states. Checked 3250059 rewire options. 1 goal states in tree. Final solution cost 5.467



(b) RRTstar: Found an initial solution with a cost of 6.21 in 114 iterations (71 vertices in the graph). Created 6733 new states. Checked 3312473 rewire options. 1 goal states in tree. Final solution cost 6.122

Figure 1: path