3D Path Planning: Pruning with Constraint Satisfaction (7A)

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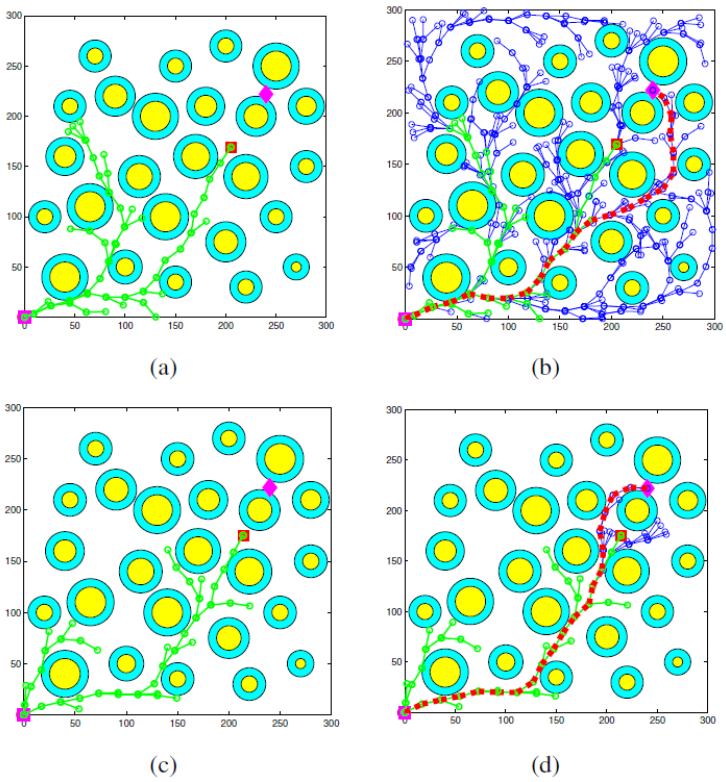
1 Two Phase Sampling

In two phase sampling as the name suggests we sample the points of the path in two ways. Before the frontier of the tree reaches the within a specified radius of the goal we follow the normal exploration strategy to grow tree quickly. After the frontier comes within a certain radius of the goal point we shift to concentration strategy where the tree grows near the goal point.

Figure 1: Two phase sampling v/s normal sampling



In the figure above (a) and (c) are the figures where the frontier has just reached within the range, therefore till now normal sampling was done. In figure (b) we continue the normal sampling till the goal point is reached, which results in a very big tree. Whereas in figure (d) we use concentration strategy after the threshold range which leads the tree to the goal point without unnecessary searches hence saving a lot of search time.

2 Effect of RRT* on two phase sampling

Since we are using RRT* algorithm for the tree generation therefore here if the frontier is not within a particular range then RRT* is used but when a particular range is reached and there is no obstacle between the frontier and the goal point then we directly connect the frontier to the goal point. This can be done as in RRT* we don't have a defined step size.

References

[1] Sertac Karaman et al. (2016). Anytime Motion Planning using the RRT* `https://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=5980479`

[2] Kwangjin Yang (2013) An Efficient Spline-based RRT Path Planner for Non-Holonomic Robots in Cluttered Environments. `https://ieeexplore.ieee.org/document/6564701`