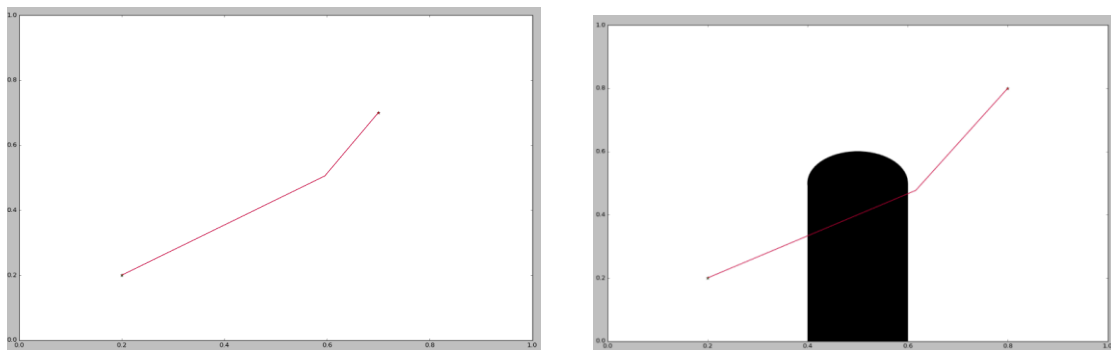


1. The path generated by RRT is not guaranteed to be optimal because at each step of the algorithm we randomly sample a point and grow the tree from there. The randomly sampled point may lie anywhere in the search space and not necessarily in direction of the optimal path. Due to this the RRT adds unnecessary nodes in the path towards the goal which affects its performance. Therefore, one optimal way is trimming of nodes or running a bidirectional RRT from the start state and the goal state simultaneously.
2. Increasing the step size will lead to faster convergence if there are no obstacles. However, in the presence of a complex obstacles space, when freespace between obstacles is very less it may increase the running time or even not give a solution. It may also lead to a wrong path, consider the figure below



In the first figure when step size=0.5 solution converged in 2 steps. However, in the second image, the next sample is not in collision but the path to it is in collision hence it returns a invalid solution.

3. Increasing the bound of search space increases the running time because RRT tends to grow towards the unsearched vornoi space. Increasing the dimension of the search space will have a similar effect and will increase the running time.
4. It is important to have a relatively small step size otherwise the RRT will take a long running time or may not return a solution. If the presence of a complex obstacle space when free space configuration between the obstacle is very small then a large step size will always lead to collision and the RRT tree will grow very slowly.