
Algorithm 1 rand_center(qsource, qgoal, map_size, obstacles)

```
function RAND_CENTER(qsource, qgoal, map_size, obstacles)
2:   straightLineMidpoint  $\leftarrow \lceil \frac{(qsource(1)+qgoal(1))}{2} \frac{(qsource(2)+qgoal(2))}{2} \rceil$ 
      straightLineStartX  $\leftarrow \text{linspace}(qsource(1), \text{straightLineMidpoint}(1), \max(100, \text{map\_size}))$ 
4:   straightLineStartY  $\leftarrow \text{linspace}(qsource(2), \text{straightLineMidpoint}(2), \max(100, \text{map\_size}))$ 
      straightLineStartX  $\leftarrow \text{linspace}(qgoal(1), \text{straightLineMidpoint}(1), \max(100, \text{map\_size}))$ 
6:   straightLineStartY  $\leftarrow \text{linspace}(qgoal(2), \text{straightLineMidpoint}(2), \max(100, \text{map\_size}))$ 
      validStraightLineFromStart  $\leftarrow \text{CheckCollision}(\text{straightLineFromStart}, \text{obstacles}, \text{map\_size})$ 
8:   validStraightLineFromEnd  $\leftarrow \text{CheckCollision}(\text{straightLineFromEnd}, \text{obstacles}, \text{map\_size})$ 
      centerPointsFromStart  $\leftarrow \text{floor}(0.25 * \text{height}(\text{validStraightLineFromStart}))$ 
10:  centerPointsFromEnd  $\leftarrow \text{floor}(0.25 * \text{height}(\text{validStraightLineFromEnd}))$ 
      centerStartPoints  $\leftarrow \text{zeros}(\text{numberCenterPointsFromStart}, 2)$ 
12:  for  $i = 1 \rightarrow \text{centerPointsFromStart}$  do
      centerStartPoints( $i, :$ )  $\leftarrow \text{validStraightLineFromStart}(i)$ 
14:  end for
      centerEndPoints  $\leftarrow \text{zeros}(\text{numberCenterPointsFromEnd}, 2)$ 
16:  for  $i = 1 \rightarrow \text{numberCenterPointsFromEnd}$  do
      centerEndPoints( $i, :$ )  $\leftarrow \text{validStraightLineFromEnd}(i)$ 
18:  end for
      sampleSet  $\leftarrow \text{centerPoints}$ 
20:  point  $\leftarrow \text{sampleSet}(\text{randi}(\text{height}(\text{sampleSet}), 1), :)$ 
      return point
22: end function
```

Algorithm 2 rand_center(qsource, qgoal, map_size, obstacles)

```
1: function RAND_CENTER(qsource, qgoal, map_size, obstacles)
2:   straightLineMidpoint  $\leftarrow \lceil \frac{(qsource(1)+qgoal(1))}{2} \frac{(qsource(2)+qgoal(2))}{2} \rceil$ 
3:   straightLineStartX  $\leftarrow \text{linspace}(qsource(1), \text{straightLineMidpoint}(1), \max(100, \text{map\_size}))$ 
4:   straightLineStartY  $\leftarrow \text{linspace}(qsource(2), \text{straightLineMidpoint}(2), \max(100, \text{map\_size}))$ 
5:   straightLineGoalX  $\leftarrow \text{linspace}(qgoal(1), \text{straightLineMidpoint}(1), \max(100, \text{map\_size}))$ 
6:   straightLineGoalY  $\leftarrow \text{linspace}(qgoal(2), \text{straightLineMidpoint}(2), \max(100, \text{map\_size}))$ 
7:   validStraightLineFromStart  $\leftarrow \text{CheckCollision}(\text{straightLineFromStart}, \text{obstacles}, \text{map\_size})$ 
8:   validStraightLineFromEnd  $\leftarrow \text{CheckCollision}(\text{straightLineFromEnd}, \text{obstacles}, \text{map\_size})$ 
9:   centerPointsFromStart  $\leftarrow \text{floor}(0.25 * \text{height}(\text{validStraightLineFromStart}))$ 
10:  centerPointsFromEnd  $\leftarrow \text{floor}(0.25 * \text{height}(\text{validStraightLineFromEnd}))$ 
11:  centerStartPoints  $\leftarrow \text{zeros}(\text{numberCenterPointsFromStart}, 2)$ 
12:  for  $i = 1 \rightarrow \text{centerPointsFromStart}$  do
13:    centerStartPoints( $i, :$ )  $\leftarrow \text{validStraightLineFromStart}(i)$ 
14:  end for
15:  centerEndPoints  $\leftarrow \text{zeros}(\text{numberCenterPointsFromEnd}, 2)$ 
16:  for  $i = 1 \rightarrow \text{numberCenterPointsFromEnd}$  do
17:    centerEndPoints( $i, :$ )  $\leftarrow \text{validStraightLineFromEnd}(i)$ 
18:  end for
19:  sampleSet  $\leftarrow \text{centerPoints}$ 
20:  point  $\leftarrow \text{sampleSet}(\text{randi}(\text{height}(\text{sampleSet}), 1), :)$ 
21:  return point
22: end function
```
