

# sim\_rrt

October 3, 2020

## 1 RRT Sampling-Based Motion Planning

```
In [28]: # The autoreload extension will automatically load in new code as you edit files,
# so you don't need to restart the kernel every time
%load_ext autoreload
%autoreload 2

import numpy as np
import matplotlib.pyplot as plt
from P2_rrt import *

plt.rcParams['figure.figsize'] = [8, 8] # Change default figure size
```

The autoreload extension is already loaded. To reload it, use:

```
%reload_ext autoreload
```

### 1.0.1 Set up workspace

```
In [76]: MAZE = np.array([
    (( 5, 5), (-5, 5)),
    ((-5, 5), (-5,-5)),
    ((-5,-5), ( 5,-5)),
    (( 5,-5), ( 5, 5)),
    ((-3,-3), (-3,-1)),
    ((-3,-3), (-1,-3)),
    (( 3, 3), ( 3, 1)),
    (( 3, 3), ( 1, 3)),
    (( 1,-1), ( 3,-1)),
    (( 3,-1), ( 3,-3)),
    ((-1, 1), (-3, 1)),
    ((-3, 1), (-3, 3)),
    ((-1,-1), ( 1,-3)),
    ((-1, 5), (-1, 2)),
    (( 0, 0), ( 1, 1))
])

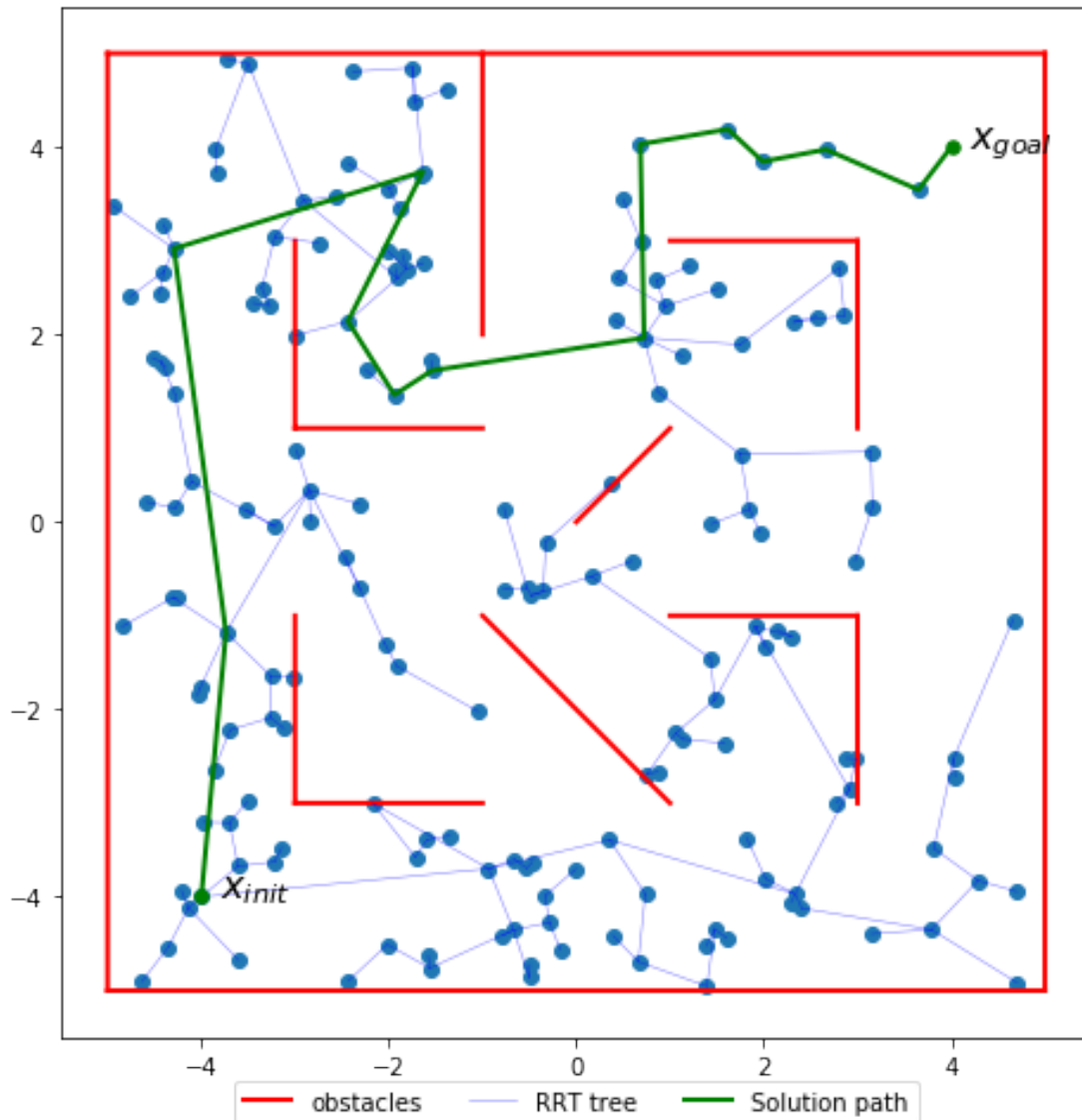
# try changing these!
```

```
x_init = [-4,-4] # reset to [-4,-4] when saving results for submission
x_goal = [4,4] # reset to [4,4] when saving results for submission
```

## 1.1 Geometric Planning

```
In [89]: grrt = GeometricRRT([-5,-5], [5,5], x_init, x_goal, MAZE)
grrt.solve(1.0, 2000)
```

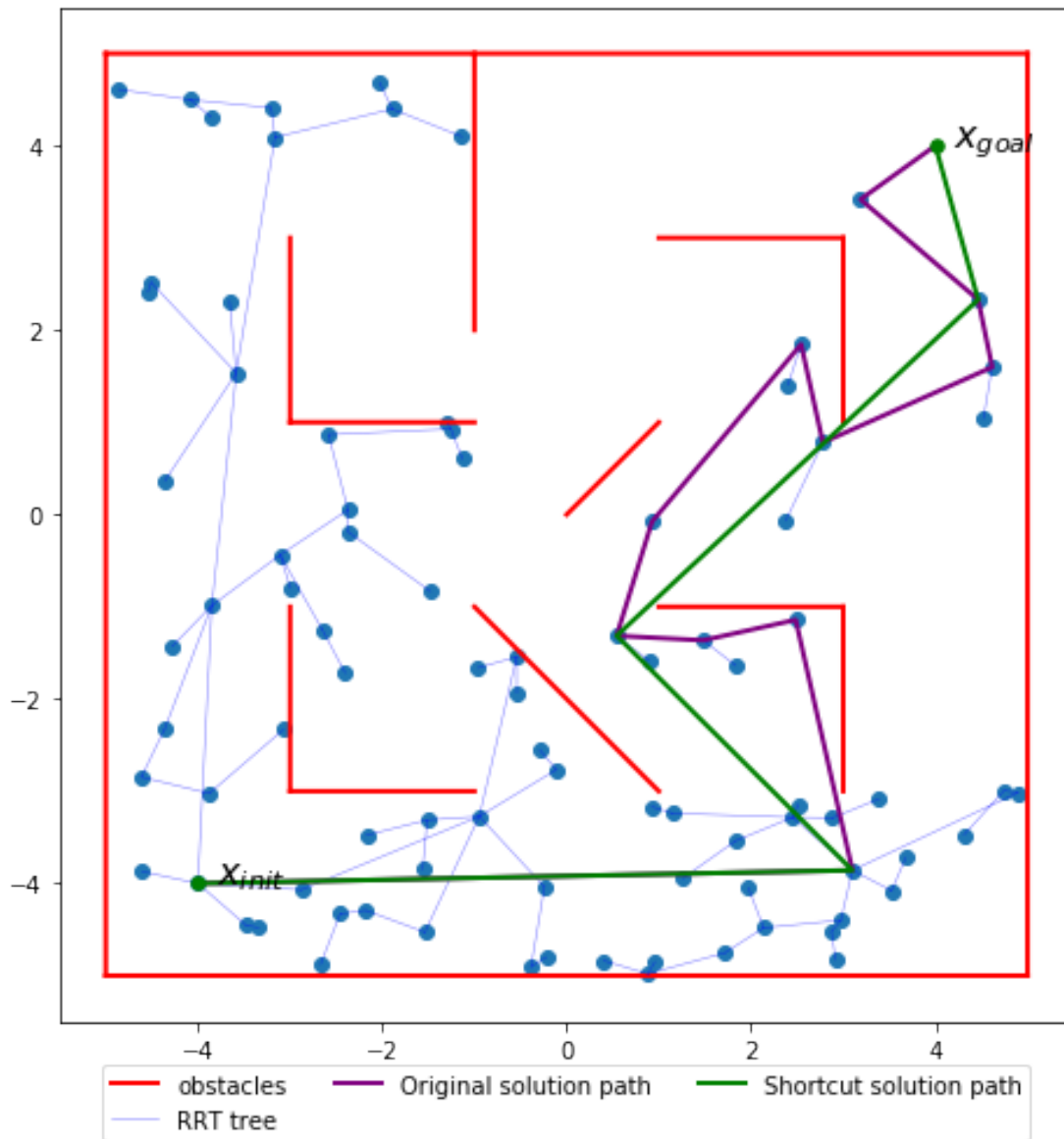
```
Out [89]: True
```



### 1.1.1 Adding shortcutting

```
In [74]: grrt.solve(1.0, 2000, shortcut=True)
```

Out [74]: True

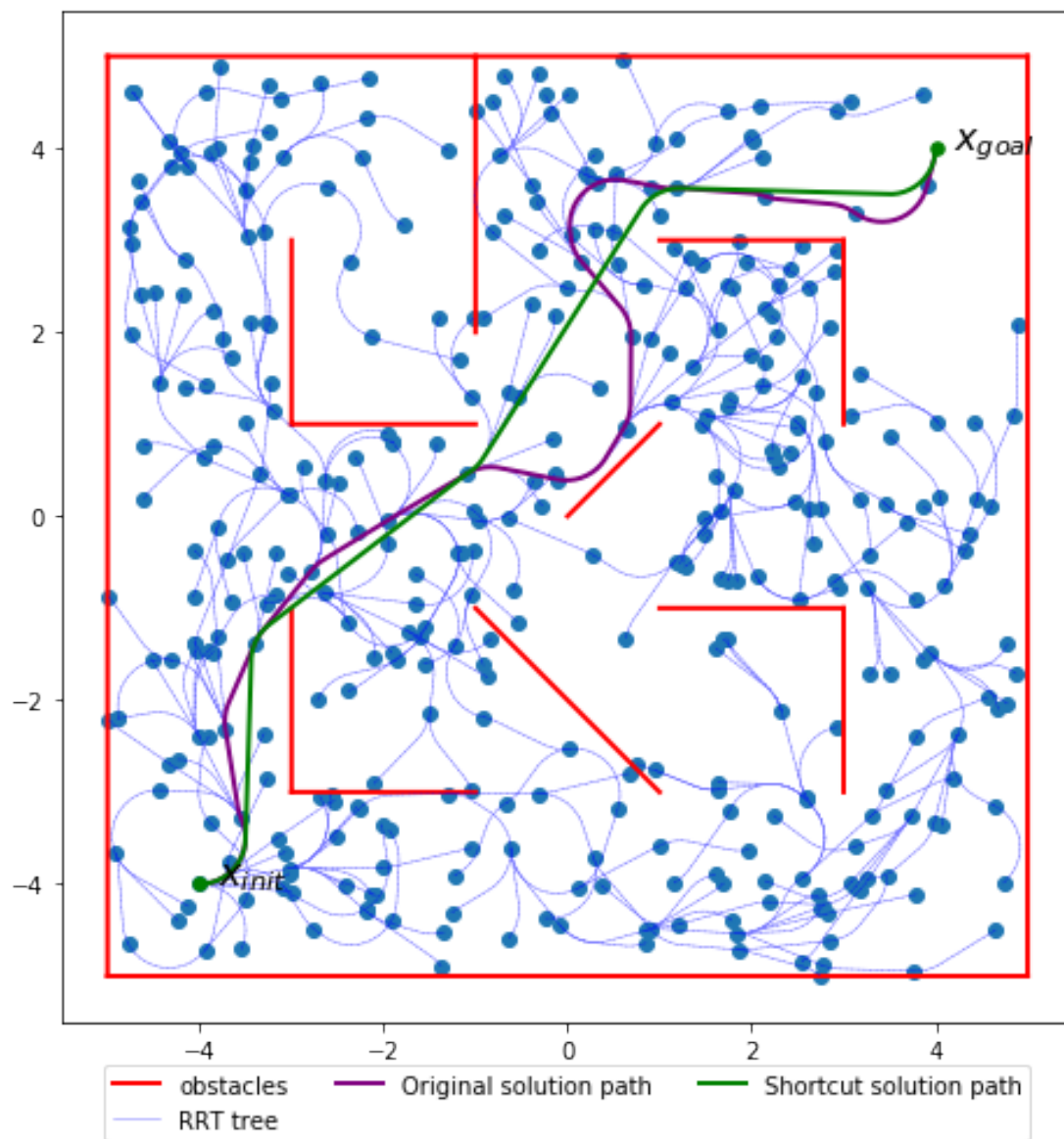


## 1.2 Dubins Car Planning

```
In [39]: x_init = [-4,-4,0]
         x_goal = [4,4,np.pi/2]
```

```
# Occasionally, depending on the generated problem, the solution will fail
# due to numerical precision invalidating the state equality comparison with the goal
drrt = DubinsRRT([-5,-5,0], [5,5,2*np.pi], x_init, x_goal, MAZE, .5)
drrt.solve(1.0, 1000, shortcut=True)
```

Out [39]: True



In [ ]: