

A* Motion Planning

```
In [1]: # 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 Pl_astar import DetOccupancyGrid2D, AStar  
from utils import generate_planning_problem
```

Simple Environment

Workspace

(Try changing this and see what happens)

```
In [2]: width = 10  
height = 10  
obstacles = [((6,7), (8,8)), ((2,2), (4,3)), ((2,5), (4,7)), ((6,3), (8,5))]  
occupancy = DetOccupancyGrid2D(width, height, obstacles)
```

Starting and final positions

(Try changing these and see what happens)

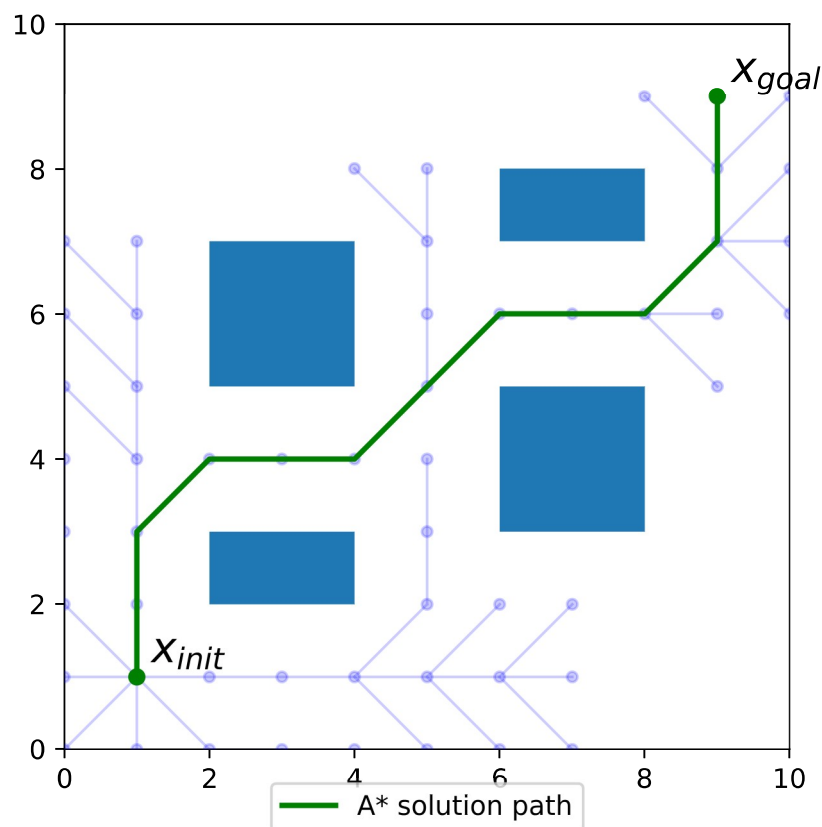
```
In [3]: x_init = (1, 1)  
x_goal = (9, 9)
```

Run A* planning

```
In [4]: astar = AStar((0, 0), (width, height), x_init, x_goal, occupancy)
if not astar.solve():
    print "No path found"
else:
    plt.rcParams['figure.figsize'] = [5, 5]
    astar.plot_path()
    astar.plot_tree()
```

/home/parthiv/miniconda2/envs/aa274a/lib/python2.7/site-packages/matplotlib/figure.py:107: MatplotlibDeprecationWarning: Adding an axes using the same arguments as a previous axes currently reuses the earlier instance. In a future version, a new instance will always be created and returned. Meanwhile, this warning can be suppressed, and the future behavior ensured, by passing a unique label to each axes instance.

warnings.warn(message, mplDeprecation, stacklevel=1)



Random Cluttered Environment

Generate workspace, start and goal positions

(Try changing these and see what happens)

```
In [5]: width = 100
height = 100
num_obs = 25
min_size = 5
max_size = 30

occupancy, x_init, x_goal = generate_planning_problem(width, height, num_obs, min_size, max_size)
```

Run A* planning

The figure shows a 2D environment with obstacles (blue rectangles) and a pathfinding problem. The start point is labeled x_{init} and the goal point is labeled x_{goal} . A green line represents the A* solution path. A blue shaded region with arrows indicates the search area.