# sim_astar

October 6, 2020

## 1 A* Motion Planning

[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 P1_astar import DetOccupancyGrid2D, AStar
from utils import generate_planning_problem
```

### 1.1 Simple Environment

#### 1.1.1 Workspace

(Try changing this and see what happens)

[8]:
```
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)
```

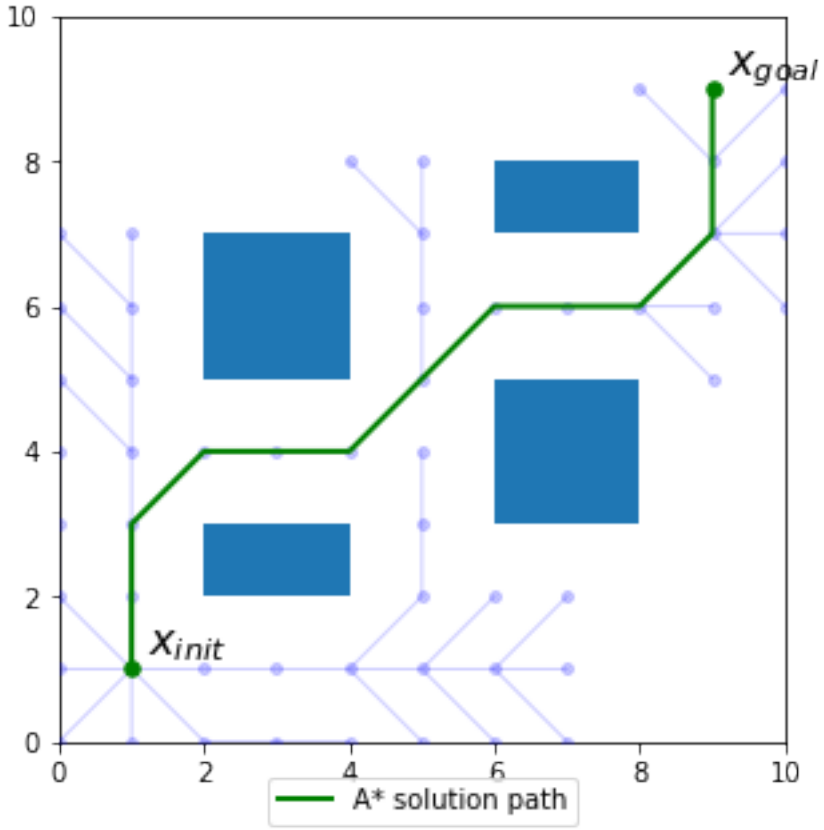
#### 1.1.2 Starting and final positions

(Try changing these and see what happens)

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

### 1.1.3 Run A* planning

[10]:
```
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()
```




## 1.2 Random Cluttered Environment

### 1.2.1 Generate workspace, start and goal positions

(Try changing these and see what happens)

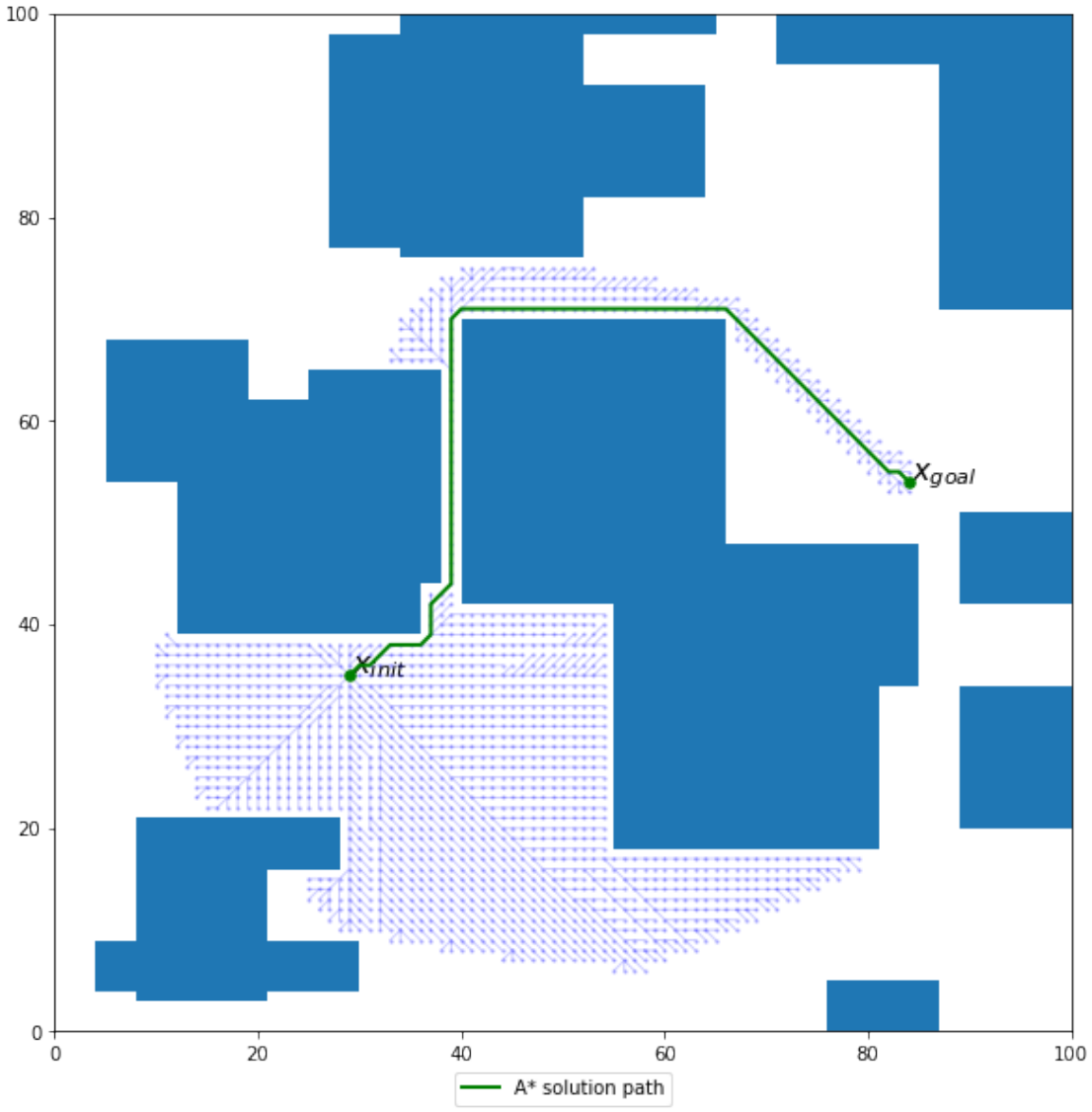
[5]:
```
width = 100
height = 100
num_obs = 25
```

```
min_size = 5
max_size = 30

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

### 1.2.2 Run A* planning

[6]:
```
astar = AStar((0, 0), (width, height), x_init, x_goal, occupancy)
if not astar.solve():
    print "No path found"
else:
    plt.rcParams['figure.figsize'] = [10, 10]
    astar.plot_path()
    astar.plot_tree(point_size=2)
```


100
80
60
40
20
0
0
20
40
60
80
100
$x_{goal}$
$x_{init}$
A* solution path