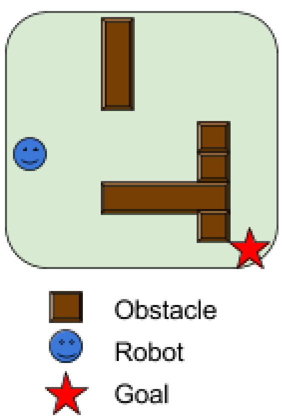
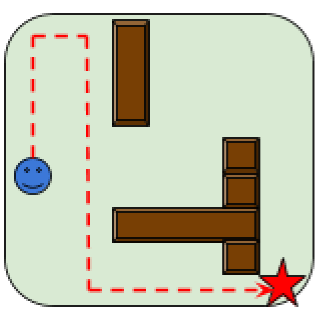
Motion Planning: Discrete planner

You have been assigned to extend a library of discrete motion planners for an holonomic robot. The robot moves in a static and flat environment and must find a path to a goal. All the planners share the same common interface and should implement the **search** method that has the following signature:

```
search(world_state, robot_pose, goal_pose) return path
```

`world_state` is a 2D-grid representation of the environment where the value 0 indicates a navigable space and the value 1 indicates an occupied/obstacle space.
`robot_pose` is a tuple of two indices (x, y) which represent the current pose of the robot in `world_state`.
`goal_pose` is a tuple of two indices (x, y) which represent the goal in `world_state` coordinate system.
`path` is a list of tuple (x, y) representing a path from the `robot_pose` to the `goal_pose` in `world_state`, or `None` if no path has been found

Here is a simple example that shows the correspondence between an environment and a representation.

Environment	**Corresponding world_state, robot_pose and goal_pose**
	**`world_state = [[0, 0, 1, 0, 0, 0],`** **`[0, 0, 1, 0, 0, 0],`** **`[0, 0, 0, 0, 1, 0],`** **`[0, 0, 1, 1, 1, 0],`** **`[0, 0, 0, 0, 1, 0],`** **`[0, 0, 0, 0, 0, 0]]`** **`robot_pose = (2, 0)`** **`goal_pose = (6, 6)`**
	Example of a valid path shown in red on the left figure **`path = [(2, 0), (1, 0), (0, 0), (0, 1), (1, 1),`** **`(2, 1), (3, 1), (4, 1), (5, 1), (6, 1),`** **`(6, 2), (6, 3), (6, 4), (6, 5), (6, 6)]`**

We want you to write two discrete planners as described below.

- **Random planner**

The random planner tries to find a path to the goal by randomly moving in the environment (only orthogonal moves are legal). If the planner can not find an acceptable solution in less than `max_step_number`, the search should fail. The random planner, while being erratic, has a short memory, and it will never attempt to visit a cell that was visited in the last `sqrt(max_step_number)` steps except if this is the only available option.

- **Optimal planner:** A planner that goes to the goal with the shortest (non-colliding) path. Again, only orthogonal moves are legal.

Compare the performance of the two planners.

You are expected to **write documentation** and **test correctness** for your code. You should also indicate the complexity of each solution in the documentation. You can either use Python 2.7 and/or C++. For Python, Numpy library may be used. For C++, boost and stl libraries may be use**.**