

# CSE 6392 - Reasoning with Uncertainty

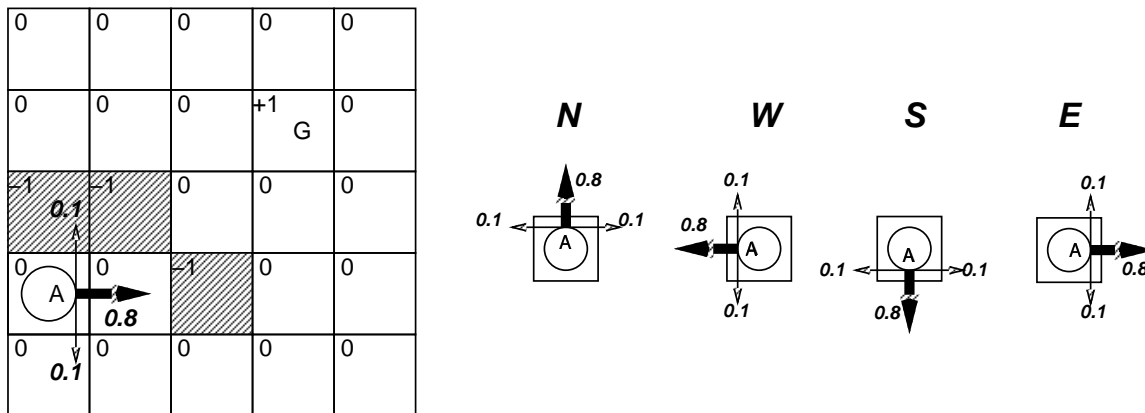
Project 2- Fall 2006

Due Date: Dec. 07 2006, 7:00 pm

## MDP

For this Project you have to implement a solution algorithm (either value iteration or policy iteration) for a simple grid-based navigation problem with a single goal location and an arbitrary configuration of obstacles.

In this problem an agent navigates on a  $5 \times 5$  grid using four actions,  $N, W, S, E$ . Each of the actions leads to the next square in the given direction with a probability of 0.8 and to each of the neighboring cells at a  $90^\circ$  angle with a probability of 0.1. If the action would lead across the grid boundary, the action will result in staying in the same grid cell. The following figure shows an example grid and illustrates the probabilistic actions.



The single goal location is indicated by a  $G$  and the obstacles are shown as shaded grid cells. The reward function for this problem is such that the agent receives a reward of 1 when it reaches the goal and a reward of  $-1$  every time it hits an obstacle.

1. Implement a solution algorithm for this MDP problem. The obstacle and goal configuration can be assumed to be known at compile time (i.e. you can initialize them in your code). However, your code has to be able to solve arbitrary obstacle and goal configurations. The goal is assumed to be absorbing (i.e. once the agent reaches the goal state the trial terminates.).

For this project you are to hand in your MDP code (make sure your code is documented) and example solutions for two different goal and obstacle configurations (you should present them by providing the best action and the corresponding value for each of the grid cells).

Everything should be submitted electronically to [huber@omega.uta.edu](mailto:huber@omega.uta.edu).