## CAP 5610: Introduction to Machine Learning Homework 4

HW 4 is due Monday December 9, at Midnight. Check the policy on Homeworks.

Chapter 18. Reinforcement Learning

Consider the case of a house with four connected rooms (starting from west to east  $s_1, s_2, s_3, s_4$ ), and a yard y. Each room has east and west doors that connect it to its neighbors. The east door of  $s_4$  and the west door of  $s_1$  lead to the yard. In each room, the agent may take either of two actions: east (e) or west (w). Let  $P(s_{i+1}|s_i, e) = 1$  for  $1 \le i \le 3$ ;  $P(s_{i-1}|s_i, w) = 1$  for  $2 \le i \le 4$ ;  $P(y|s_4, e) = P(y|s_1, w) = 1$ . The reward function is defined as follows:  $R(s_1, w) = 10$ ;  $R(s_4, e) = 5$ ; all other rewards are 0. The interaction terminates when the agent reaches the yard. Let  $\gamma = .9$ .

- 1. Compute the optimal policy using value iteration. After each iteration, show the current value function and policy.
- 2. Compute the optimal policy using policy iteration. After each iteration, show the current value function, policy, and system of linear equations that was solved.

Chapter 16. Graphical Models Alpaydin, Exercises: 2,3

Chapter 11. Multilayer perceptrons Alpaydin, Exercises: 1,2.