AI5001: Introduction to Modern AI, Fall 2019 (12)

Indian Institute of Technology Hyderabad

HW 1, Assigned: Friday 30.08.2019.
Due: Friday 06.09.2019 at 11:59 pm.

Note: The programming exercise(s) must be solved in Python.

1. Derive the Bellman's equation for the following:
   (a) State-value function $v_\pi(s)$. (5)
   (b) Action-value function $q_\pi(s, a)$. (5)
2. Recall the two examples of MDPs discussed in class. Answer the following:
   (a) For each example, write the state transition table. The columns of the table include $s, s', a, p(s'|s, a), r(s, a, s')$. (3)
   (b) Draw the state-space diagram from each example. (2)
   (c) For the can collecting robot example, assume $r_{\texttt{search}} = 2, r_{\texttt{wait}} = 1, \alpha = 0.3, \beta = 0.2, \gamma = 0.5$. Implement the value iteration algorithm and find a policy. (10)
   (d) Implement the value iteration algorithm for the second MDP example using the parameters specified in class. Also, find a policy. (5)