**گزارش پروژه سوم**

**اشکان شکیبا (9931030)**

**بخش اول**

class ValueIterationAgent(ValueEstimationAgent):  
 *"""  
 \* Please read learningAgents.py before reading this.\*  
  
 A ValueIterationAgent takes a Markov decision process  
 (see mdp.py) on initialization and runs value iteration  
 for a given number of iterations using the supplied  
 discount factor.  
 """* def \_\_init\_\_(self, mdp, discount=0.9, iterations=100):  
 *"""  
 Your value iteration agent should take an mdp on  
 construction, run the indicated number of iterations  
 and then act according to the resulting policy.  
  
 Some useful mdp methods you will use:  
 mdp.getStates()  
 mdp.getPossibleActions(state)  
 mdp.getTransitionStatesAndProbs(state, action)  
 mdp.getReward(state, action, nextState)  
 mdp.isTerminal(state)  
 """* self.mdp = mdp  
 self.discount = discount  
 self.iterations = iterations  
 self.values = util.Counter() # A Counter is a dict with default 0  
 self.runValueIteration()  
  
 def runValueIteration(self):  
 # Write value iteration code here  
  
 iterations = self.iterations  
 while iterations:  
 current\_value = util.Counter()  
 for state in self.mdp.getStates():  
 if not self.mdp.isTerminal(state):  
 max\_value = -sys.maxsize  
 for action in self.mdp.getPossibleActions(state):  
 action\_value = 0  
 for next\_state, probability in self.mdp.getTransitionStatesAndProbs(state, action):  
 reward = self.mdp.getReward(state, action, next\_state)  
 action\_value += probability \* (reward + self.discount \* self.values[next\_state])  
 if action\_value > max\_value:  
 max\_value = action\_value  
 current\_value[state] = max\_value  
 self.values = current\_value  
 iterations -= 1  
  
 def getValue(self, state):  
 *"""  
 Return the value of the state (computed in \_\_init\_\_).  
 """* return self.values[state]  
  
 def computeQValueFromValues(self, state, action):  
 *"""  
 Compute the Q-value of action in state from the  
 value function stored in self.values.  
 """* action\_value = 0  
 for next\_state, probability in self.mdp.getTransitionStatesAndProbs(state, action):  
 reward = self.mdp.getReward(state, action, next\_state)  
 action\_value += probability \* (reward + self.discount \* self.values[next\_state])  
 return action\_value  
  
 def computeActionFromValues(self, state):  
 *"""  
 The policy is the best action in the given state  
 according to the values currently stored in self.values.  
  
 You may break ties any way you see fit. Note that if  
 there are no legal actions, which is the case at the  
 terminal state, you should return None.  
 """* if self.mdp.isTerminal(state):  
 return None  
 else:  
 max\_value = -sys.maxsize  
 best\_action = self.mdp.getPossibleActions(state)[0]  
 for action in self.mdp.getPossibleActions(state):  
 Q\_value = self.computeQValueFromValues(state, action)  
 if Q\_value > max\_value:  
 max\_value = Q\_value  
 best\_action = action  
 return best\_action  
  
 def getPolicy(self, state):  
 return self.computeActionFromValues(state)  
  
 def getAction(self, state):  
 *"Returns the policy at the state (no exploration)."* return self.computeActionFromValues(state)  
  
 def getQValue(self, state, action):  
 return self.computeQValueFromValues(state, action)

در تابع runValueIteration فرایند value iteration انجام شده و با محاسبه ارزش هر عمل در هر حالت، ماکسیمم ارزش هر حالت تعیین و ذخیره می‌شود.

در تابع computeQValueFromValues مقادیر Q value به ازای هر عمل در هر حالت و با استفاده از ارزش حالت بعدی محاسبه و بازگردانی می‌شوند.

در تابع computeActionFromValues با در نظر گرفتن ارزش‌های حالت‌ها، عمل متناسب برای هر حالت انتخاب و بازگردانی می‌شود تا سیاست کلی پاسخ تعیین شود.



خروجی برنامه پس از ۱۰ iteration، که مطابق انتظار است.