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Fundamentals in artificial Intelligence.

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Part 2 Written Problem Solving.

Question 1 given the grid below

Consider the **4x3** world shown in table1. There is an impassable wall/obstacle at state (2,2). The state **(4,3)** is a terminal state with a reward of **+1**, **and state (4,1) is a terminal state with a reward of -1.** All other states yield a reward of **-0.04** upon exiting them.

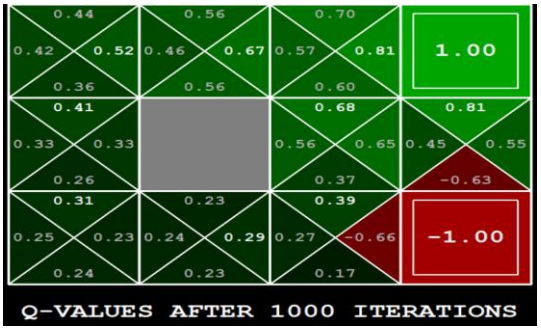
Note: Added this new gride to gridworld.py

Execute iterations with command.

python gridworld.py -a value -i 1000 -g BookGridWrittenQ1 -r -0.04 -p 0.8

			+1
	#		
			-1

State **(4,1)** is a terminal state with a reward of **-1**.



Results after 1000 iterations

a. What us the optimal values for states (1,1), (2,1) ,(1,2)?
   (1,1) =0.31
   (2,1)=0.29
   (1,2)=0.41
b. What is the optimal policy for (1,1)(2,1),(1,2)?
   (1,1)=North
   (2,1)=East
   (1,2)=North

Question 2

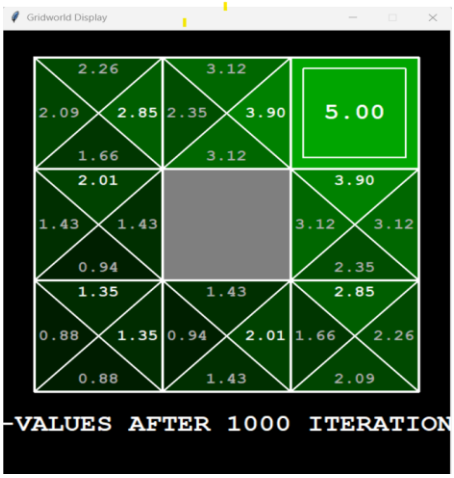
Consider the following 3 x 3 grid world:

Note: Added Grid to gridworld.py and executed 1000 iterations

Execute iterations with command:

python gridworld.py -a value -i 1000 -g ThreebyThree -r -0.4 -d 0.9 -p 0.8

A		B
	#	



A is the starting state and B is the terminal state with reward +5. The middle square contains a wall. The agent receives a reward of –0.04 in all other states. The discount factor γ is 0.9.

Execute iterations with command

python gridworld.py -a value -i 1000 -g ThreebyThree -r -0.4 -d 0.9 -p 0.8

After 1000 iterations

a. What is the optimal value of each state (excluding B)?
   (1,1) = 1.35
   (2,1) =2.01

   (3,1) =2.85
   (1,2) =2.01
   (1,3) [A] = 2.85
   (2,3) = 3.90
   (3,2) =3.90

b. What is the optimal policy from each state?
   (1,1) = North
   (2,1) =East

   (3,1) =North
   (1,2) =North
   (1,3) [A] = East
   (2,3) = East
   (3,2) =North