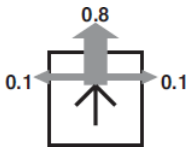
Assignment 3 - Markov Decision Processes

1 Problem Statement

Consider the 3x3 world shown in the following figure:

r	-1	+10
-1	-1	-1
-1	-1	-1

The agent has four actions Up, Down, Right and Left.
The transition model is: 80% of the time the agent goes in the direction it selects; the rest of the time it moves at right angles to the intended direction. A collision with a wall results in no movement.



1.1 Requirements

1.Implement value iteration for this world for each value of ***r*** below:

- r=100
- r=3
- r=0
- r=-3

2. Use discounted rewards with a discount factor of 0.99

3.Show the policy obtained in each case.

4.Explain intuitively why the value of ***r*** leads to each policy.

1.2 Bonus

Find the optimal policy for each of the previous cases of $\boldsymbol{r}$ using Policy Iteration algorithm. You may start the algorithm with a randomly generated policy.

2 Notes

- You should work on this project in teams of 3 members.
- You must submit a report showing your commented source code, results and required questions answers.
- You can refer to AIMA 3rd edition: Sections 17.1, 17.2 and 17.3. You might also find Berkely AI Lectures 8 and 9 useful.

Good Luck