
Assignment 1 - Defining Solving RL Environments

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Abstract

This report aims to define and analyse a grid environment which follows OpenAI Gym standards. The environment can be configured to be deterministic or a stochastic one.

1 Checkpoint 1: Defining RL environments

1.1 Describe the deterministic and stochastic environments, which were defined (set of actions/states/rewards, main objective, etc).

The deterministic environment is a 4x4 grid(16 states) with (0,0) as the start point and goal at (3,3). The action space is of size 4, i.e., down, up, left, right. The max allowed time-steps is 10.

Our agent is a farmer with a donkey, the goal of the farmer is to reach the shed while loading all the bales of hay along the way on the donkey. The farmer wants to reach the shed quickly so he wants to avoid any patches of grass the donkey might start grazing.

There are 3 bales of hay/rewards in the grid(worth +1 each) and the 4th reward is the shed/goal itself(worth +3). There are 2 grass patches/obstacles in the grid(worth -1 reward each), further, after max time-steps have elapsed the environment will generate a reward of -3 for every subsequent action.

In the stochastic env, the only difference is that sometimes the donkey doesn't listen to the farmer and the requested action/step doesn't execute.

1.2 Provide visualizations of your environments.

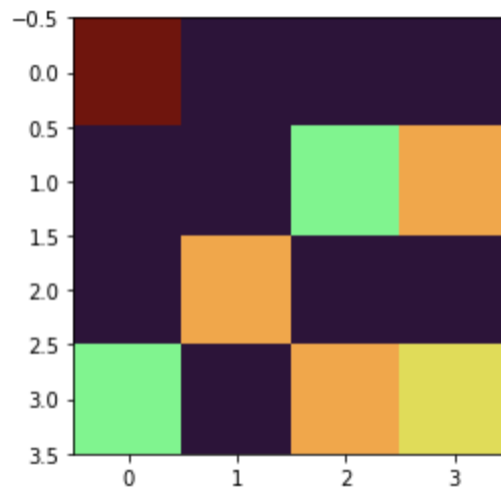
Red - Agent

Green - Obstacle

Orange - Reward

Yellow - Goal

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1.3 How did you define the stochastic environment?

The stochastic environment was defined by adding a 'stochastic' parameter to the environment. If this is set (self.stochastic = 1) there's 95% probability of the requested action being executed & a 5% probability that no action will be executed. The probabilities are based on what was recommended in the lectures.

1.4 What is the difference between the deterministic and stochastic environments?

In the stochastic env, sometimes the donkey doesn't listen to the farmer so a requested action doesn't execute and the farmer stays in the same state. If the farmer ends up remaining in the same state, he collects the reward of that state again.