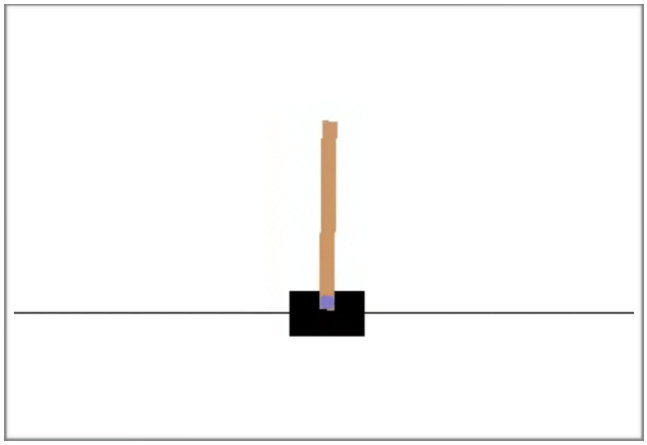
Machine Learning Summer School 2018 - Reinforcement Learning Workshop - Assignment 2

World Description

A pole is attached by an un-actuated joint to a cart which moves along a frictionless track. The system is controlled by applying a force of +1 or -1 to the chart. The pendulum start upright, and the goal is to prevent it from falling over. A reward of +1 is provided from every tilmestep that the pole remains upright. The episode ends when the pole is more then 15 degrees from vertical, or the cart moves more then 2.4 from the center. At every time step, the agent observes its position, velocity, angle and angular velocity. These are the observable states of this world. At any state, the cart only has two possible actions: move to the left (0) and move to the right (+1). In other words, the state-space has four dimensions of continues values and the action space has one dimension of two discrete values.



Questions

The first question covers the basic aspects of Reinforcement Learning and should be implemented. The other questions are optional, as they illustrate challenges and ways to improve RL algorithms.

CartPole environment described above is provided in OpenAI Gym an open-source library for developing and comparing reinforcement learning algorithms.

1. Implement Q-Learning on the CartPole environment. Discretize state space and use tabular Q-learning algorithm. Plot the learning curve and record videos of policies during training process.

2. Implement Q-Learning on the CartPole environment. Plot the learning curve and record videos of policies during training process.

3. Implement Deep Q-Learning with Experience Reply and compare it to original Deep Q-Learning algorithm.