Assignment 9

Applied Machine Learning

Please refer to the Reinforcement Learning Jupyter notebook in course materials.

Answer questions 1-3 below considering any Nim game reinforcement learning model.

1. [10 pts] Describe the environment in the Nim learning model.

2. [10 pts] Describe the agent(s) in the Nim learning model (Hint, not just the Q-learner). Is Guru an agent?

3. [10 pts] Describe the reward and penalty in the Nim learning model.

4. [10 pts] How many possible states there could be in the Nim game with a maximum of 10 items per pile and 3 piles total?

5. [10 pts] How many possible unique actions there could be for player 1 in the Nim game with 10 items per pile and 3 piles total?

6. [50 pts] Find a way to improve the provided Nim game learning model. Do you think one can beat the Guru player? (Hint: How about penalizing the losses? Hint: It is indeed possible to find a better solution, which improves the way Q-learning updates its Q-table).

   Do not use a Guru player inside the learning module as this would defeat the purpose of reinforcement learning (why?). However, playing with a Guru is permitted and the game can be used in reinforcement.