

CS 3793 - Lab 4

Option 1: Reinforcement Learning

Name: Bryan Burkhardt

UTSA ID: xmv643

Lab Overview

This application uses reinforcement learning and a neural network to play CartPole. For this lab, failure to me would look like a program that does not learn and makes no advancement in score. Success would look like an agent that learns and improves its score over many iterations.

Environment Setup & Installation

| Dependency | Version |
|------------|---------|
| Python | 2.7 |
| TensorFlow | 1.7 |
| Gym | 0.10.5 |
| NumPy | 1.14.2 |
| Statistics | 1.0.3.5 |
| TFLearn | 0.3.2 |

| Step | Dependency Name(s) | Link or command |
|------|--------------------|---|
| 1 | Python 2.7 | https://www.python.org/downloads/ |
| 2 | Tensorflow 1.7 | https://www.tensorflow.org/install/ sudo pip install tensorflow |
| 3 | TFLearn | http://tflearn.org/installation/ sudo pip install tflearn |
| 4 | NumPy | https://www.scipy.org/scipylib/download.html |
| 5 | Statistics | sudo pip install statistics |
| 5 | gym | https://gym.openai.com/docs/#installation sudo pip install gym |

Implementation

Input: A random action from a set of all possible actions the agent can take.

Output: The output is the random action the agent took and the results/score resulting from that action.

Environment: Classic Control > CartPole-v0

Algorithm Type: Action-based

Algorithm: Neural Network / Reinforcement learning

Activation Function(s): relu and softmax

of Hidden Layers: 2

of Hidden Units Per Layer: 64

of Episodes: 10,000

of Steps: 500 per episode

Results & Analysis

For the first couple of runs, the AI was averaging around 70-100 for its score. As I kept running it, later iterations started getting higher and higher scores and eventually capped out at 200 (which I am assuming is max). I would say the AI is learning extremely well.

References

Part 1 – <https://www.youtube.com/watch?v=3zeg7H6cAJw>

Part 2 – <https://www.youtube.com/watch?v=RVt4EN-XdPA>

Part 3 – <https://www.youtube.com/watch?v=G-KvpNGudLw>

Part 4 – <https://www.youtube.com/watch?v=HCBX2cuA5UU>