

# ***DQN for Banana collection game environment***

## ***Report***

### **I. Environment**

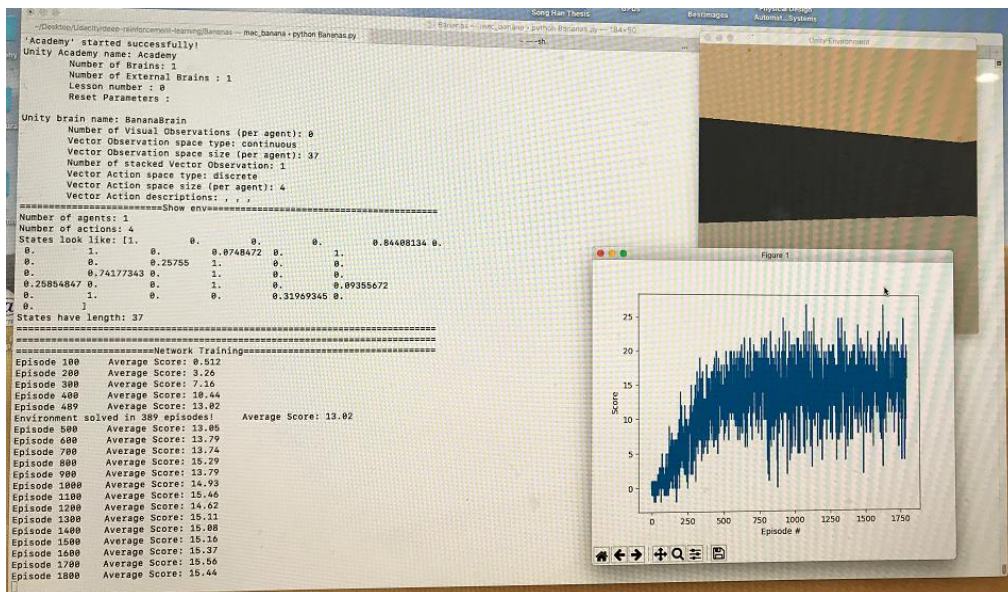
A reward of +1 is provided for collecting a yellow banana, and a reward of -1 is provided for collecting a blue banana. Thus, the goal of your agent is to collect as many yellow bananas as possible while avoiding blue bananas. The state space has 37 dimensions and contains the agent's velocity, along with ray-based perception of objects around the agent's forward direction. Given this information, the agent must learn how to best select actions. Four discrete actions are available, corresponding to:

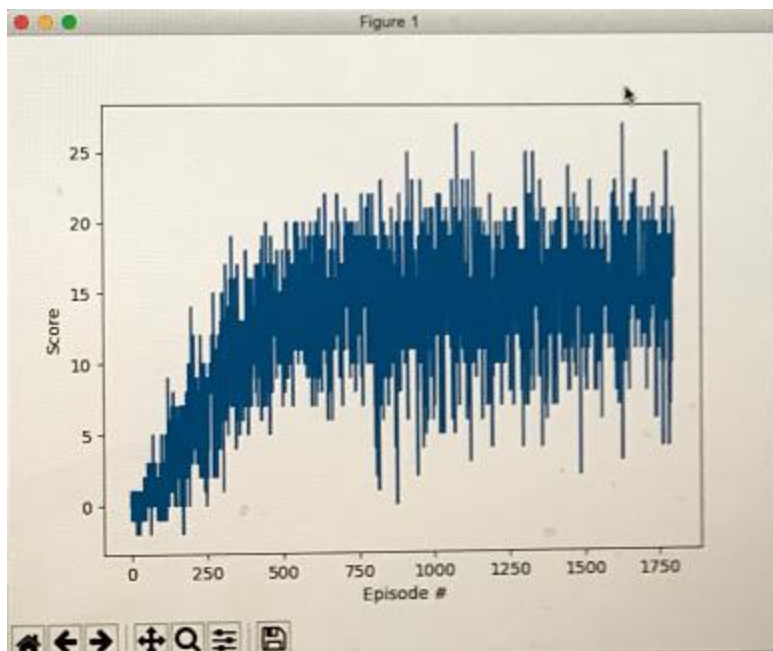
- 0 - move forward.
- 1 - move backward.
- 2 - turn left.
- 3 - turn right.

The task is episodic, and in order to solve the environment, the agent must get an average score of +13 over 100 consecutive episodes.

### **II. Results**

The DQN network was an MLP with 2 hidden layers. The input layer has 37 neurons as there were 37 observations from the environment and the output layer has 4 neurons. The network achieved an average of 13+ over 100 consecutive episodes within 600 iterations of training. The training report screen shots are below.





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Number of agents: 1
Number of actions: 4
States look like: [1.          0.          0.          0.          0.84408134 0.
 0.          1.          0.          0.0748472 0.          1.
 0.          0.          0.25755 1.          0.          0.
 0.          0.74177343 0.          1.          0.          0.
 0.25854847 0.          0.          1.          0.          0.09355672
 0.          1.          0.          0.          0.31969345 0.
 0.          ]
States have length: 37
=====
=====Network Training=====
Episode 100    Average Score: 0.512
Episode 200    Average Score: 3.26
Episode 300    Average Score: 7.16
Episode 400    Average Score: 10.44
Episode 489    Average Score: 13.02
Environment solved in 389 episodes!
Episode 500    Average Score: 13.05
Episode 600    Average Score: 13.79
Episode 700    Average Score: 13.74
Episode 800    Average Score: 15.29
Episode 900    Average Score: 13.79
Episode 1000   Average Score: 14.93
Episode 1100   Average Score: 15.46
Episode 1200   Average Score: 14.62
Episode 1300   Average Score: 15.11
Episode 1400   Average Score: 15.08
Episode 1500   Average Score: 15.16
Episode 1600   Average Score: 15.37
Episode 1700   Average Score: 15.56
Episode 1800   Average Score: 15.44
Average Score: 13.02

```