

Lunar Lander

Georgia Institute of Technology
CS 7642 – Reinforcement Learning
Summer 2017
James Chan



Source code sharing subject to Georgia Tech Honor Code restriction.
Available for private viewing upon request.
Lunar Lander is intellectual property of OpenAI

Overview



CS7642 – Reinforcement Learning has adopted the Lunar Lander problem on OpenAI Gym as one of its three projects. The Lander has 3 states: X position, Y position, and orientation. It has also 3 possible actions: left throttle, right throttle, and up throttle. In each episode the lander will start randomly above the ground. The episode restarts when the lander has crashed. Once the lander has landed successfully in the flagged zone for , the problem is considered solved.



Solution



Approach:

Q-Learning with experience replay and neural network as non-linear function approximator. Q-learning portion implemented in python and neural network implemented using Keras.

Result:

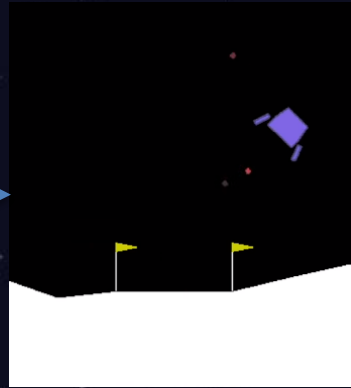
Converged in approximately 900 steps. A steady climb in total reward is observed.



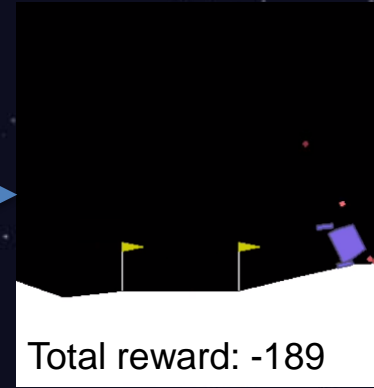
Model Training – Before vs. After



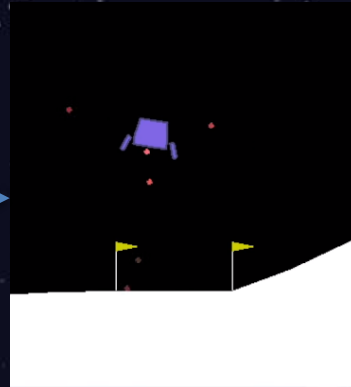
Episode 1 - Start



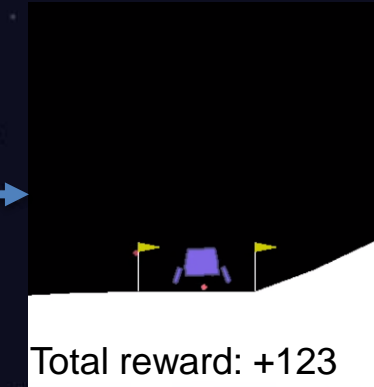
Episode 1 – End



Episode 377 - Start



Episode 377 – End



Unsuccessful Attempts



- The following algorithms were attempted and unable to solve the Lunar Lander problem. It is concluded that the solution may not be modeled by linear estimators.
 - SARSA with linear function estimator
 - Q-learning with linear function estimator