Reinforcement Learning

Games

Two games were tried from gym library(python)

1. ***Taxi***
   Description: There are four designated locations in the grid world indicated by R(ed), B(lue), G(reen), and Y(ellow). When the episode starts, the taxi starts off at a random square and the passenger is at a random location. The taxi drive to the passenger's location, pick up the passenger, drive to the passenger's destination (another one of the four specified locations), and then drop off the passenger. Once the passenger is dropped off, the episode ends.
   Observations: There are 500 discrete states since there are 25 taxi positions, 5 possible locations of the passenger (including the case when the passenger is the taxi), and 4 destination locations.
   Actions: There are 6 discrete deterministic actions:

   - 0: move south
   - 1: move north
   - 2: move east
   - 3: move west
   - 4: pickup passenger
   - 5: dropoff passenger

   Rewards: There is a reward of -1 for each action and an additional reward of +20 for delivering the passenger. There is a reward of -10 for executing actions "pickup" and "dropoff" illegally.

2. ***Frozen Lake***
   Description: The game consist of 4×4 grid where each tile can be frozen(safe to stand) and hole(not safe to stand). So if you land on a hole you lose. Your task is to reach the defined destination without stepping on holes. **Actions**: There are 4 discrete non-deterministic actions:

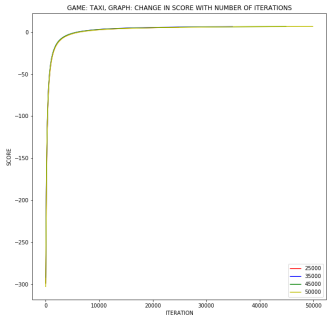
   - 0: move left
   - 1: move down
   - 2: move right
   - 3: move up

   The actions are non-deterministic because the surface is slippery and there is a possibility that the action you intended will take you some other direction.

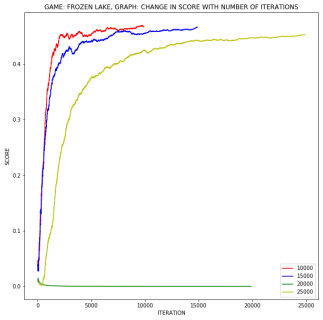
Comparing Different Parameters

Parameters

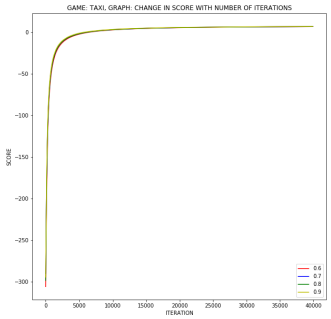
1. **Number of Episodes**: Equivalent to number of iterations
   Taxi



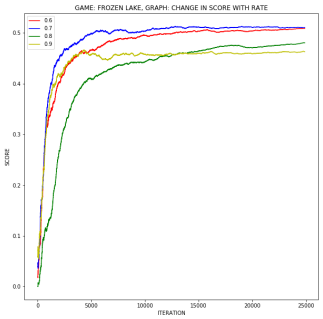
   Frozen Lake



2. **Learning Rate**
   Taxi



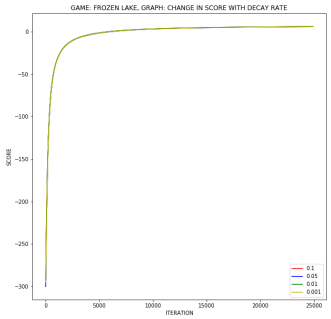
   Frozen Lake



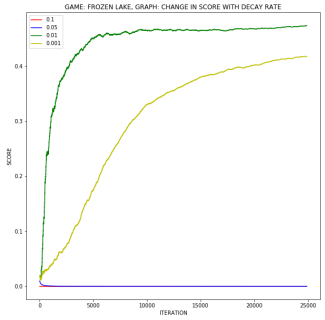
Comparing Different Parameters

Parameters

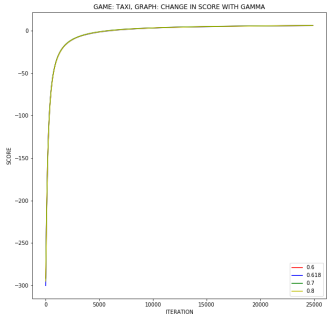
1. **Decay Rate**
   Taxi



   Frozen Lake



2. **Gamma Value**
   Taxi



   Frozen Lake