

Homework #3

Due date 2023-1st-May-

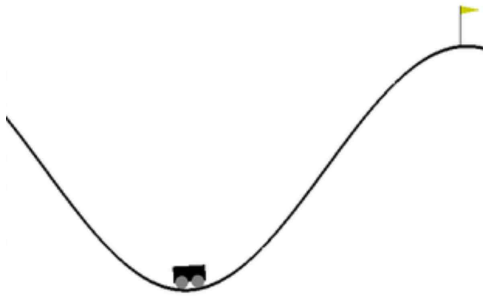
Task : Solving mountain car task with toolkit in OpenAI gym

Consider the task of driving an underpowered car up a steep mountain road, as suggested by the diagram in the Figure below. The difficulty is that gravity is stronger than the car's engine, and even at full throttle the car cannot accelerate up the steep slope. There are three possible actions: full throttle forward to right direction, full throttle to leftward, and zero throttle (0). The car moves according to a simplified physics.

– **Condition : discount rate = 1, and**

– **The reward is -1 on all time steps until the car moves past its goal position at the top**

Use all other conditions given at Example 10.1 @ page 198 and 199 of the text book.



Q) Obtain approximated action-value function(defined as equation 10.3 in TEXTBOOK) until convergence.

1) Draw cost-to-go function ($\max_a \hat{q}(s; a; w)$) learned during one run.

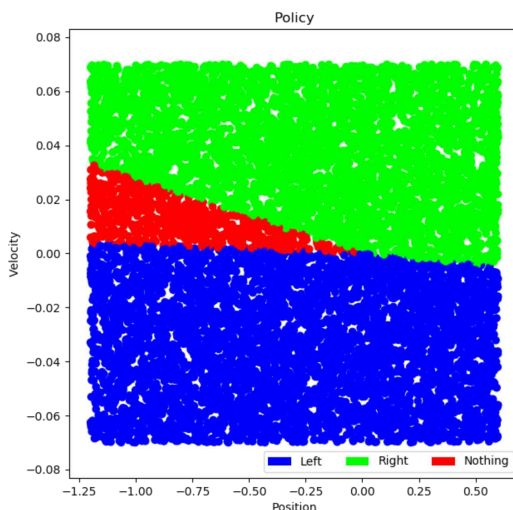
A. You must explain learning method you applied to training w parameters of action-value function $\hat{q}(s; a; w)$. (30 points)

B. Draw for 10, 100, 1000 d iterations, and final shape after convergence (20 points).

2) How many episodes do we need until convergence. (20 points).

Must Include simulated animations for several steps like this video
(<https://www.youtube.com/watch?v=RIkjCwA6DvA>)

3) Obtain optimum policy using the cost-to-go function, and visualize the optimum policy as shown in below 2-dimensional graph. (30 points)



The End of Question