Cairo University

Faculty of computers and Artificial Intelligence

Reinforcement Learning (AI424)

Assignment 2

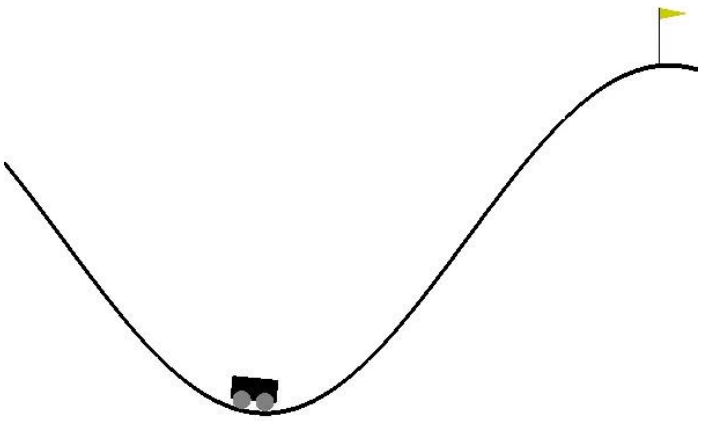
- **Assignment objective**

  The objective of this assignment is to learn:
  - How to use open AI gym environments.
  - How to understand a given RL problem parameters.
  - The implementation of Monte Carlo, Q_Learning and SARSA algorisms.
  - Comparing between the performances of the three algorisms.

- **Assignment Rules**
  - Due date is Tuesday May 2nd.
  - This assignment will be delivered in groups of 4 students.
  - Any cheats will got zero.

- **Assignment Description**

  In this assignment you are supposed to use another environment from Open AI gym classic environments, which is MountainCar-v0. The target of this game is to climb the hill and reach the yellow flag.



- **Environment Description**

  You have a car and a mountain hill and your goal is to get an under powered car to the top of the hill (top = 0.5 position).

  - **Observations**

Type: Box (2)

Num	Observation	Min	Max
0	position	-1.2	0.6
1	velocity	-0.07	0.07

- **Actions**

Type: Discrete (3)

Num	Action
0	push left
1	no push
2	push right

- **Reward**

Reward is -1 for each time step, until the goal position of 0.5 is reached. There is no penalty for climbing the left hill, which upon reached acts as a wall.

- **Starting State**

Random position from -0.6 to -0.4 with no velocity.

- **Episode Termination**

The episode ends when you reach 0.5 position, or if 200 iterations are reached.

- **Assignment Requirements**

You are required to deliver the following:

- An implementation in python for Monte Carlo, Q_Learning and SARSA algorithms based on the MountainCar-v0 environment. **(4Marks)**
- A comparison between the three algorithms in terms of accuracy and conversion time (in episodes). **(1Mark)**