Programming Assignment 4

1. Install and configure OpenAI's Gym from here.
2. Clone the environment repo of a 2D Maze from here and get familiar with various parameters defining the environment.

3. In the first phase of the assignment is to implement Q- Learning with the objective to find the optimal path to move from Source to Goal. Implement Q-Learning for a static environment(5x5), ie. fix the Maze you are going to train your agent upon.

a. Train an agent on the environment. Include learning curve showing the performance of your implementation.

b.Study and reason the impact of various hyperparameters of Q-learning.

c.For this part, initialize the Q-table such that each action has an equal probability of occurrence. Select a state and observe the changes upon the probabilistic occurrence of each action as the learning proceeds.

d. Modify the Q-Learning algorithm to add random exploration regulated by parameter (say α) where α lies between 0 and 1. Vary the parameter and report the effect upon learning with respect to the best parameters found in part (b).

e. Train an agent with the parameters resulting in the best agent, reason and observe the state value of 2 separate intermediate states.

4. Create a new 5x5 Maze and use the agent trained in 3. Report and reason upon the performance. If you see any problem how can you solve this problem?

(Bonus) Implement State-Action-Reward-State-Action(SARSA) and train the agent on environment made in 3.

Assessment Criteria

The assessment will be done on basis of the following components:
1. Working codes
2. Analysis and clarity of results (drawing comparisons across different parts) & clarity of the report
3. Understanding the theoretical concepts and the choice of hyperparameters.