

### **Assignment-3 – Q-Learning & Deep-Q Networks**

**Environment:** Please use the CartPole-v1 gym environment for this project.

**Task:** Goal is to perform Q-Learning & Deep-Q Learning on the agent in the CartPole-v1 gym environment. It is advisable to use Google Colab for this project.

#### **Implementation:**

1. Implement the Q-Learning Reinforcement Learning Algorithm on CartPole-v1 environment
  - a. Display the performance of the random agent
  - b. Compare the performance of the random agent to the RL-Agent
2. Implement the Deep-Q Network Algorithm using Keras RL library on CartPole-v1 environment
  - a. Compare the performance of the random agent to the RL-Agent

#### **Note:**

- A) Train for at least 3000 episodes and test on at least 1000 episodes
- B) For checking the performance calculate the average reward per move and Cumulative reward vs number of episodes. Plot the charts for both the metrics.
- C) Discussion: Please include insights from the charts and results you obtain and critically analyze the agent's performance.

Note: Please submit a Jupyter notebook and name your file as  
"Assignment 3student\_id\_Firstname\_Lastname.ipynb"

### Grading Criteria:

- Implement the Q-Learning Reinforcement Learning Algorithm on CartPole-v1 environment: 15pts
- Display the performance of the random agent: 10pts
- Compare the performance of the random agent to the RL-Agent: 10pts
- Implement the Deep-Q Network Algorithm using Keras RL library on CartPole-v1 environment: 15pts
- Compare the performance of the random agent to the RL-Agent : 10 pts