SLIIT
Discover Your Future

BSc (Hons) in Information Technology
Software Engineering Specialization

Year 4

SE4050 – Deep Learning

Reinforcement Learning Lab 1

Question 1: Markov Decision Process and Q-Learning

Objective:
Students are expected to gain coding experience in two approaches to Reinforcement Learning,

- Markov Decision Process
- Q-Learning.

Tasks

1. Upload the attached **Markov_Decision_Process (PolicyIteration)** notebook and the **GridWorld (QLearning)** notebook to **Google Colab**.
2. Go through both codes and understand how it works.
3. Complete the incomplete parts in each notebook (indicated by **'#type your code here'**).
4. Run the notebooks.
5. In the **GridWorld** notebook, increase the grid size to a large value to observe execution time and the time to converge change.
6. Take **screenshots** of the completed parts (from step 3) in both notebooks and insert that into the **last section of each notebook**.

Question 2: Model-Based vs Model-Free Reinforcement Learning

Objective:
Deepen the understanding of the difference between Model-Based and Model-Free Reinforcement Learning.

Tasks:

1. In the MDP (**Markov Decision Process**) notebook, modify the code to compare the execution time and convergence between
   - A **Model-Based** approach (e.g., Policy Iteration or Value Iteration)
   - A **Model-Free** approach (e.g., Q-Learning).
2. Briefly explain the difference between **Model-Based** and **Model-Free** algorithms.
3. **Add screenshots** of the results for both approaches in last section of the notebook.

Submission:

1. Download the final modified notebooks after completing the tasks.
2. Upload both notebooks to GitHub.
3. Submit the GitHub link via the provided submission link.