

DA-IICT, IT 567, Winter 2024-2025
Lab Exercise 1
Date: 13/01/2025, Expected by: 19/01/2025
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References for perusal:

- [1] *Deep Reinforcement Learning Hands-On*, 2nd edition, M. Lapan, Packt Publishing Ltd., 2020.
- [2] *Reinforcement Learning Algorithms with Python*, A. Lonza, Packt Publishing Ltd., 2019.
- [3] *Reinforcement Learning: An Introduction*, 2nd edition, Richard S. Sutton, and Andrew G. Barto, The MIT Press, 2018.

References (online) for perusal:

- {a} *Getting Started With OpenAI Gym*, TheComputerScientist, available on: <https://www.youtube.com/watch?v=8MC3y7ASoPs>
- {b} *OpenAI Gym: How to Start an Environment and Visualize it*, Dibya Chakravorty, available on: <https://www.youtube.com/watch?v=XFqGBnXzAoE>

Disclaimer: For the video links above, I, or DA-IICT, do not endorse any of the online learning platforms and the video creators. Links are provided since the content is freely available and I assume that it might help in learning.

- The lab exercise comprises of 3 problems. First two are analytical and the last one is to be done using Python.
 - All the problems need to be solved individually. However, collaboration is encouraged for building an initial understanding of the problem, and subsequently, for creating the solution strategy.
 - All the required soft copies of the texts referred to in the exercises are available in the lecture folder of the instructor.
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1. From [3], read example 3.3 (Recycling Robot). Analyze the state transition diagram and the table for transition probabilities and reward function. See the instructions below for preparing the report. Simulate the model in Python and show the output for 10 time steps.
2. From [3], based on the knowledge gained from solving the above problem, solve exercise 3.4
3. The task is to get a working knowledge of OpenAI Gym. For the same, refer to pgs. 25 - 33 from [2] and chapter 2 from [1]. For a quick reference, you can see {a} and {b}.

Instructions for Preparing Lab Report:

- For analytical problems, either create a digital copy of your solution (through latex/Word/etc.), or write it on a paper and scan, whichever choice you make, send it to the instructor through email.
- For problems solved in simulations environments (python/Visual studio/etc.), send the code file along with the snapshot of the result.

General Instructions:

- The lab is intentionally made from the references given above so that you have ample resources to refer to and learn.
- For the final evaluation, we may have a quiz/lab test which will test if you have read through the references and solved the problems yourself.