Computer Engineering Department
CMPS458: Reinforcement Learning Fall 2025
Ayman AboElHassan, PhD

Assignment 4

The goal of this assignment is to <u>implement SOTA model-free algorithms</u> using PyTorch, <u>train</u> RL agents on multiple <u>continuous action-space environments</u>, and publish your trained agent to <u>Hugging Face</u> <u>RL leaderboard</u>.

Summary

1. Create Hugging Face account
2. Install needed Python libraries:
      ● Python, Gymnasium, PyTorch, Wandb, huggingface_hub
3. Implement continuous version of SAC, PPO, TD3 models
4. Setup needed hyperparameter tuning & Wandb
5. Train the 3 models in the following <u>Box2D environments</u>
      ● LunarLander-v3 (with continuous=True)
      ● CarRacing-v3 (with continuous=True)
6. Publish your result to Hugging Face DRL leaderboard
7. Answer the following questions

Questions

1. For each model:
    1. Explain how the model addresses the problem of continuous actions (infinite space).
    2. Explain your choice of hyperparameters to tune.
2. Discuss how action space dimensionality affects training stability and convergence. 3. Compare and contrast the performance of SAC, PPO, TD3 models. Which one would you recommend, and why?
4. Explain, from your point of view, how exploration affects the training and performance in continuous environments.
5. What is the best score you achieved on Hugging Face leaderboard?

Deliverables

Use this report template to deliver the following requirements
(https://www.overleaf.com/read/dsmwrcyzyyjs#ef6078)

1. GitHub repository with Python codes (Gym Environment, RL models)
2. The recorded video of the trained agent in action
    Tip: add the videos to Wandb as media and share them in a "wandb report"
3. The Experiment charts generated by Weights and Biases
    Tip: in wandb you can "create report", choose what graphs you want to add, and share its link
4. Report with the outcome summary and answers to the questions asked

Due date

11 Dec 2025

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Helping Materials

- https://spinningup.openai.com/en/latest/algorithms/td3.html
- https://www.geeksforgeeks.org/machine-learning/how-to-upload-and-share-model-to huggingface/
- https://huggingface.co/learn/deep-rl-course/en/unit1/hands-on#publish-our-trained model-on-the-hub-
- https://huggingface.co/learn/deep-rl-course/en/unit3/deep-q-network ● https://huggingface.co/spaces/huggingface-projects/Deep-Reinforcement-Learning Leaderboard