

RL Lab Assignment - 5
CS 414: Reinforcement Learning Lab
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INSTRUCTIONS: You have to give clear and detailed plots and solution to each of the questions. **Submit one single pdf file containing solutions to all problems in google class room before 13th Apr, 11.30 am. Submit the code as .py file or as python notebook along with the solution pdf. Submit the code as .py file or as python notebook along with the solution pdf. Only one member of the group has to submit the assignment. Name your pdf with rollno1_rollno2_rollno3.** For example 190010005_190010006_190010007.pdf. Late submissions will not be graded. Students can discuss but must write their solutions based on their understanding independently. Do not use web resources or answers from your peers to obtain solutions. If anyone is involved in malpractice of any sort, then suitable disciplinary action will be taken.

As part of your 5th assignment there are 3 subtasks. Note this assignment carries the highest weightage.

- Each group needs to compare RL algorithms namely SARSA, Q-learning with function approximation on 3 standard RL tasks. One of the RL tasks would be the mountain car task and the other two tasks would be any standard RL task of your choice. Ensure the other RL task that you choose do not overlap with others in your group. Choose task that has sufficiently large state space. Do not implement function approximation on tasks with small state space.

For Linear Function Approximators compare the performance of the algorithm with the following function approximators in each of the tasks :

- Multiple tile coding with offset
- Radial basis functions with suitable choice of centers and variance.
- Each student needs to study the performance of both variants of REINFORCE algorithm on the above three RL tasks. In this task, approximate the policy using neural network which uses non-linear activations.
- Compare Deep Q-Network (DQN) and Advantage Actor Critic (A2C) Algorithms on one of the Atari games or standard environments from gym. For this task, you could use an existing code. Use pytorch for automatic differentiation.

Based on the above 3 tasks make a clear report of your observations from the experiments.

Finally as a group, make couple of slides (1 or 2) summarizing the course connecting various RL algorithms that you have encountered in the course. Further,

make another slide on difficulty faced “while implementing” or “in the theory part” or “availability of resources” or any other feedback.

Each of you make a zip of all the five assignments in separate folders and mail me individually. Each assignment folder should have the report as well as the code related to that assignment.