

ASSIGNMENT-2

DEEP EIGEN	COURSE: RL-1.0Y: Reinforcement Learning	YEAR: 2022	INSTRUCTOR: SANJEEV SHARMA
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1 Problem Statement

Consider a multi-armed bandit with 15 arms. True action value ($q^*(a)$) for each arm is sampled from a Gaussian distribution with mean = 0 and variance = 1. Rewards are sampled from normal distribution with mean = $q^*(a)$ and variance 0.1. Following sample averages method for bandit problems, implement following problems

1.1 Tasks

- Draw a violin plot for reward distribution of each arm with mentioned reward statistics and true action values.
- Consider epsilon-greedy methods for action selection, implement greedy action selection with different values of epsilon=0, 0.01, 0.1. Compare average performance and optimal action selection for each of these methods for number of steps = 10000.
- Compare Incremental Implementation for epsilon-greedy Bandit problem with Sample Averages method by estimating optimal action values for each arm. Mention differences in magnitude following each method.
- Implement an Optimistic Initial Values method for greedy and epsilon-greedy method, where optimistic initial value of $q^*(a) = 5$ is provided for greedy bandit and $q^*(a) = 0$ for epsilon-greedy. Compare the differences between both of these methods.

2 To Submit

- **violin_plot.jpg** : Rewards Distribution for all arms
- **average_performance_epsilon_greedy.jpg** : Average Performance for Epsilon-Greedy Bandits for epsilon=0, 0.10, 0.01
- **optimal_actions_epsilon_greedy.jpg** : Optimal Action Selection for Epsilon-Greedy Bandits for epsilon=0, 0.10, 0.01
- **incremental_vs_sample_averages.txt** file with comments on comparison of both methods.
- **optimal_actions_epsilon_greedy.jpg** : Optimal Action Selection for Epsilon-Greedy Bandits for epsilon=0, 0.10, 0.01
- **optimistic_initials_vs_epsilon_greedy.jpg** : Plot of average performance for epsilon greedy method and optimistic initials greedy method.

You should share with us:

Put all files in a folder named **username** where username is your username with which you signed up in Deep Eigen, e.g. **username_assignment_rl10y_2.zip**