

CMPSCI 687 Homework 3

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This assignment has been implemented in Python Language.

1 Code Dependencies

Python 2.7.12 :: Anaconda has been used for this project.

Pip version 9.0.1

Installing matplotlib: pip install matplotlib

Installing numpy: pip install numpy

Installing joblib: pip install joblib

Installing dill: pip install dill

Installing scipy: pip install scipy

Installing argparse: pip install argparse

2 Build and Run the Code

Code structure :

The code structure has been divided into 5 codes: MountainCar.py , Mc_Sarsa.py , sarsa_parallel_wrapper.py, Mc_Qlearning_parallel.py, Qlearning_wrapper.py

1. SARSA : python sarsa_parallel_wrapper.py -n 500 -e 0.5 -a 0.005 -g 1 -fo 1
2. Qlearning : python Qlearning_wrapper.py -q -n 500 -e 0.06 -a 0.005 -g 1 -fo 1

Here, various arguments passed while running the SARSA or Qlearning wrapper are :

1. **-n** specifies number of trials
2. **-e** specifies epsilon
3. **-a** specifies alpha
4. **-g** specifies gamma
5. **-fo** specifies fourier order

3 Hyperparameters for SARSA

Hyperparameters found for SARSA are :

1. **-n** Trials run for SARSA are 500 and number of episodes : 200

2. **-e** epsilon - 0.5
3. **-a** alpha - 0.005
4. **-g** gamma - 1
5. **-fo**fourier order - 1

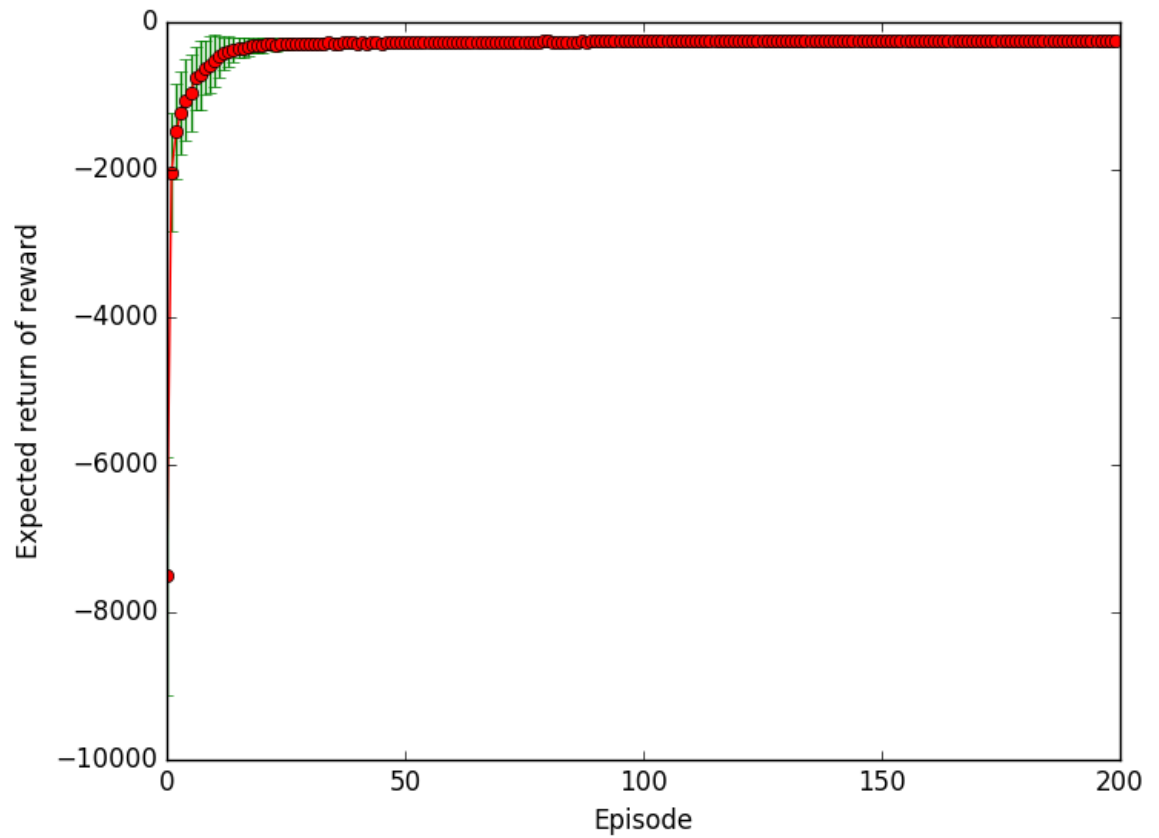


Figure 1: Sarsa-optimized,epsilon = 0.5, alpha = 0.005, gamma = 1, fourier order = 1

4 Hyperparameters for Qlearning

1. **-n** Trials run for SARSA are 500 and number of episodes : 200

2. **-e** epsilon - 0.06
3. **-a** alpha - 0.005
4. **-g** gamma - 1
5. **-fo** fourier order - 1

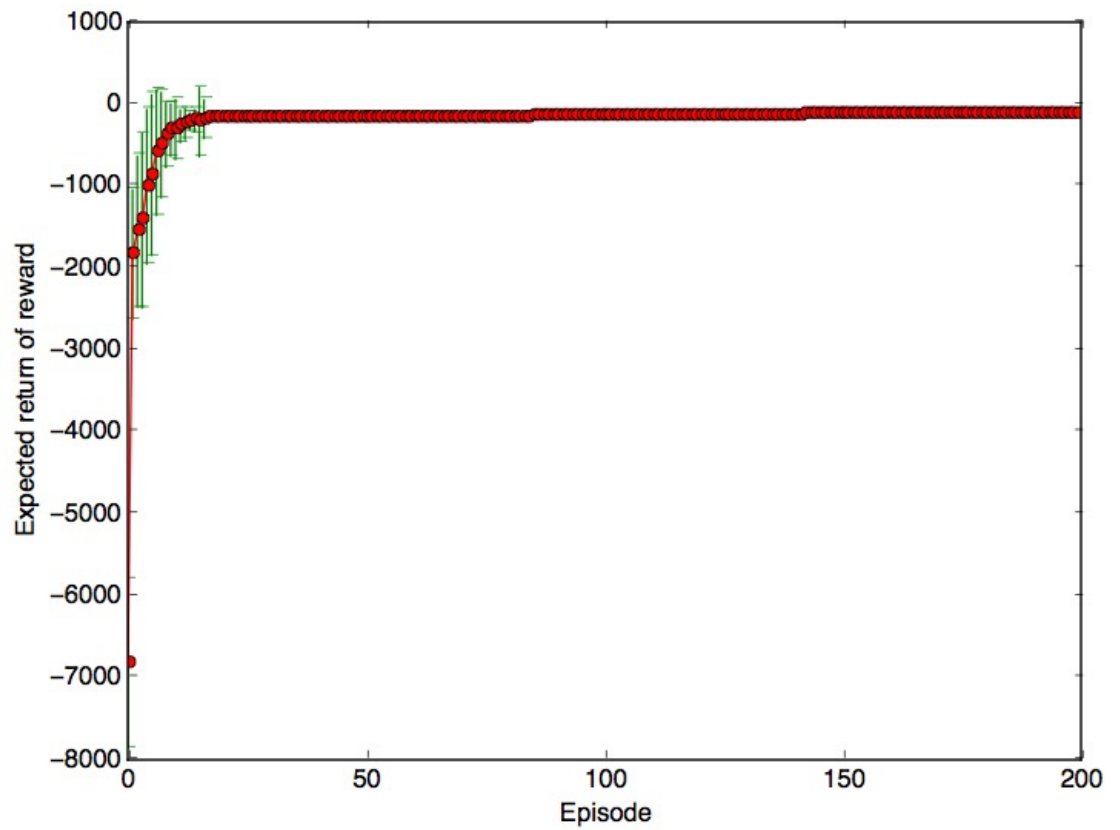


Figure 2: Qlearning-optimized,epsilon = 0.06, alpha = 0.005, gamma = 1, fourier order = 1

5 SARSA and Qlearning plots for $\epsilon = 0.5$, $\alpha = 0.05$, $\gamma = 1$, fourier order = 1

Plot for SARSA

1. **-n** Trials run for SARSA are 10000 and number of episodes : 200
2. **-e** epsilon - 0.5
3. **-a** alpha - 0.05
4. **-g** gamma - 1
5. **-fo** fourier order - 1

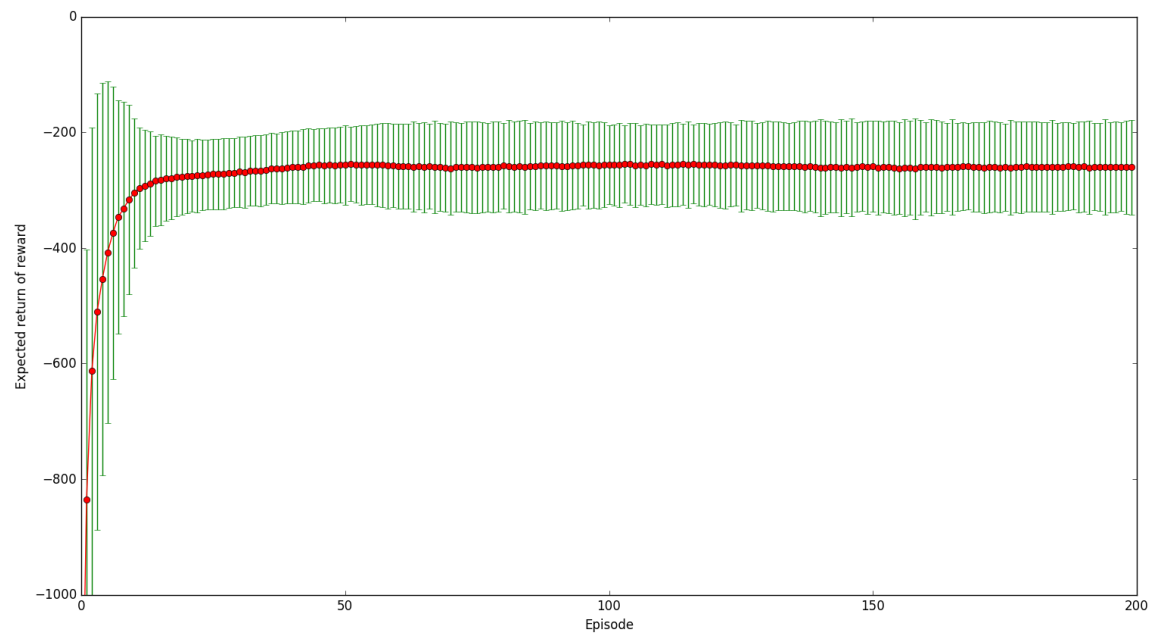


Figure 3: SARSA : epsilon = 0.5, alpha = 0.05, gamma = 1, fourier order = 1

Plot for Qlearning

Below is the plot after running Qlearning algorithm for 10000 trials and 60 episodes :

1. **-n** Trials run for Qlearning are 10000 and number of episodes : 60
2. **-e** epsilon - 0.5
3. **-a** alpha - 0.05
4. **-g** gamma - 1
5. **-fo** fourier order - 1

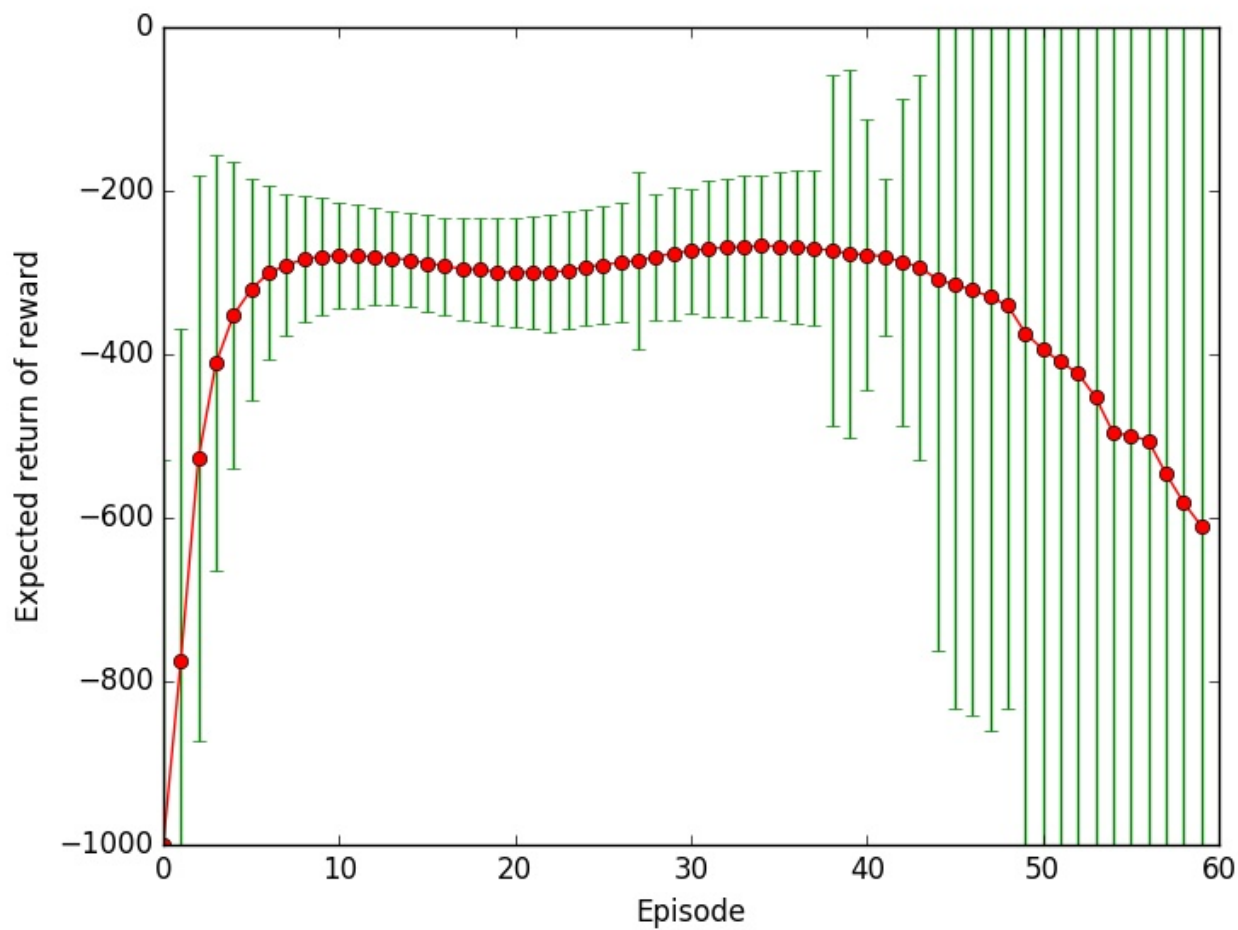


Figure 4: Qlearning: epsilon = 0.5, alpha = 0.05, gamma = 1, fourier order = 1

Below is the plot after running Qlearning algorithm for 10000 trials and 200 episodes :

1. **-n** Trials run for Qlearning are 10000 and number of episodes : 200
2. **-e** epsilon - 0.5
3. **-a** alpha - 0.05
4. **-g** gamma - 1

5. -fo fourier order - 1

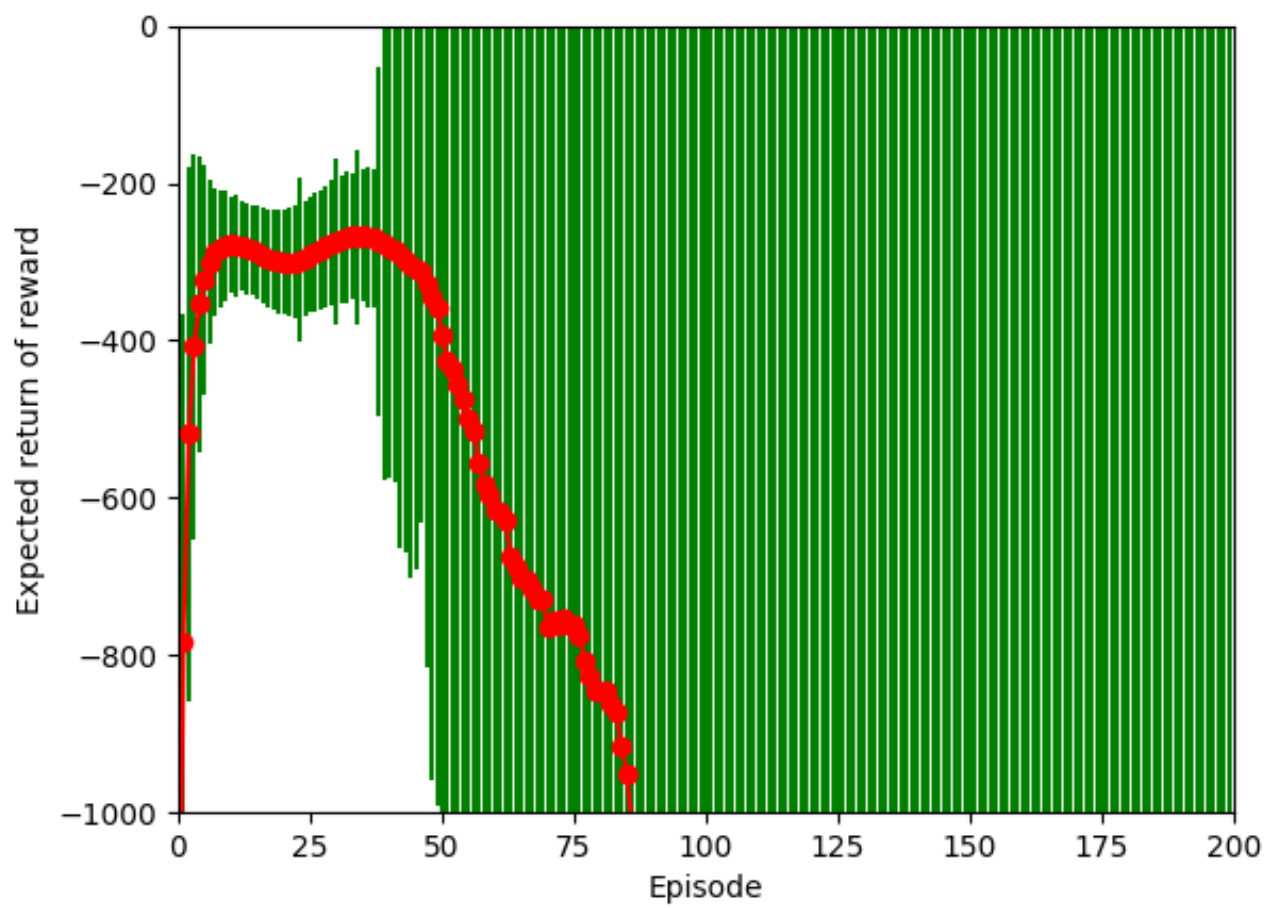


Figure 5: Qlearning: epsilon = 0.5, alpha = 0.05, gamma = 1, fourier order = 1