San José State University
Computer Science Department
CS156, Introduction to Artificial Intelligence, Spring 2021

Homework #13

Objective:

This homework's objective is to implement a Q-learning reinforcement learning algorithm for a frozen lake game.

Details:

For this assignment you will implement the Q-learning algorithm for the game called *FrozenLake* available through ***gym*** library. Load this game in using the following line of code:

env = gym.make("FrozenLake-v0", is_slippery=False).env

You can read more about this game here:
https://gym.openai.com/envs/FrozenLake-v0/

Use the default map configuration and run a Q-learning algorithm to learn the navigation through this map. Use the version of the algorithm that adds stochasticity, allowing to explore the action space for new potentially beneficial actions as well as utilize already learned actions. In my experience, the performance of the game will benefit from a large number of episodes (e.g. 10000). Print out the Q-table after running the Q-learning algorithm to make sure action values were updated and the algorithm "learned" the action sequence.

In a new cell, reset the environment state and iterate over the state/action space until done (reached the goal destination). At each step print out the rendering of the frozen lake map.

You can utilize any code examples shown in the following Jupyter notebooks:
- RL.Q-learning.taxi_game.ipynb

Submission:

Email your assignment submission to me at Yulia.Newton@sjsu.edu and the grader (Akshay Kajale) at akshay.kajale@sjsu.edu. Make sure to email this submission by 11:59pm on the due date listed in Canvas. Your sent email is the proof of submission. The subject of the email should say "CS156 Assignment 13". In the body of the email list your name as it appears on the class roster and your student ID. Attach to this email both the pdf of your Jupyter notebook, which contains the solution for this homework assignment, as well as the notebook itself (the notebook

file with .ipynb extension). Make sure to submit both files, otherwise the submission will not be considered complete.

Grading:

I will return the grades as fast as we can grade this homework. Normally it should not take more than a few weeks.

A total of 10 points are possible for this homework assignment.