**PROGRAM INSTRUCTIONS:**

Program Arguments:

**-e**: environment – provide the agent with an environment to learn.

**-a**: agent – provide the program the agent algorithm.

**--experiment** – provide the program the experiment name.

**--****epsilon** – provide the program the epsilon size (optional, default set to 0).

**--****epsilon\_decay\_factor** – provide the program with the epsilon decay factor size (optional, default set to 1).

**--****epsilon\_decay\_steps** – provide the program the number of steps until decay (optional, default set to 1).

**--****min\_epsilon** – provide the program with the minimal size of the epsilon (optional, default set to 2e-3).

**--episodes** – provide the program the number of episodes to learn from (optional, default set to 5000).

**--steps** – provide the program the number of steps to take in each episode (optional, default set to 100).

**--****discount\_factor** – gamma, provide the program with the discount factor (optional, default set to 0.95).

**--****learning\_rate** – provide the program with learning rate (optional, default set to 0.1).

**--****batch\_size** – provide the program with batch size for the DQN algorithm (optional, default set to 512).

**--****layers** – provide the program with architecture for the neural net (optional, default set to [32, 32, 32].

**--****target\_update\_episodes** – provide the program with the number of episodes to update the target upon (optional, default set to 2).

**--****experience\_replay\_capacity** – provide the program with the amount of experience to cache   
(optional, default set to 100000)

**--****lr\_decay\_factor** – provide the program with the learning rate decay factor (optional, default set to).

**--min\_lr** – provide the program the minimal value for the learning rate (optional, default set to 1e-6)

Environment types:

1. frozen\_lake
2. cart\_pole

Agent types:

1. lookup
2. dqn\_cart
3. deuling\_dqn\_cart

Experiment types:

1. section1
2. section2

Program activation:

1. for the first part of the assignment, the command that will start the program correctly is this:

**python q\_learning.py -e frozen\_lake -a lookup --epsilon 0.2 -v section1 --epsilon\_decay\_factor 0.1 --epsilon\_decay\_steps 1000**

1. for the second part of the assignment, the command that will start the program correctly is this for 3 layers network:

**Python q\_learning.py -e cart\_pole -a dqn\_cart --epsilon 0.5 --epsilon\_decay\_factor 0.9995 --epsilon\_decay\_steps 1 --experiment section2 --steps 1000 --episodes 5000 --learning\_rate 0.004 --discount\_factor 0.97 --lr\_decay\_factor 0.98**

And this for 5-layers network:

**Python q\_learning.py -e cart\_pole -a dqn\_cart --epsilon 0.5 --epsilon\_decay\_factor 0.9995 --epsilon\_decay\_steps 1 --experiment section2 --steps 1000 --episodes 5000 --learning\_rate 0.005 --discount\_factor 0.97 --lr\_decay\_factor 0.995 --layers 16 32 32 16 16**

1. for the third part of the assignment, the command that will start the program correctly is

**Python q\_learning.py -e cart\_pole -a double\_td1 --epsilon 0.7 --epsilon\_decay\_factor 0.9991 --epsilon\_decay\_steps 1 --experiment section2 --steps 1000 --episodes 5000 --learning\_rate 0.004 --discount\_factor 0.97 --lr\_decay\_factor 0.99 --layers 16 32 32 64 --target\_update\_episodes 3**