Kiel University
Christian-Albrechts-Universität zu Kiel

Assignment 3
Autonomous Learning
June 15, 2020

Upload your video solution and your code to the Team folder on NextCloud until Sunday, the 28th of June until 23:55 pm.

IMPORTANT: Use for **ALL** Tasks a *screen_size* of 16

Task 1 - DDQN

A. Train your DQN agent with a double deep Q network.

B. Visualise the training as usual.

C. The trained DDQN agent shall be started by running the Python file `RunDDQN.py`. The agent shall use the trained weights without further training.

D. The training of the DDQN agent shall be implemented in `TrainDDQN.py`. Hereby, the agent shall initialise a new network.

Task 2 - Dueling DQN

A. Train your DQN agent with a dueling deep Q network.

B. Do this by using a Lambda layer.

C. Visualise the training as usual.

D. The trained DDQN agent shall be started by running the Python file `RunDuelDQN.py`. The agent shall use the trained weights without further training.

E. The training of the DDQN agent shall be implemented in `TrainDuelDQN.py`. Hereby, the agent shall initialise a new network.

Task 3 - CNN Dueling DDQN mit Prioritzed experience Replay

A. Extend your agent with a convolutional neural network consisting of the following layers:

(a) 1 Input Layer
(b) 1 Hidden Convolution Layer with 16 filters of the size 5x5 and Stride 1 + ReLu
(c) 1 Hidden Convolution Layer with 32 filters of the size 3x3 and Stride 1 + ReLu
(d) 1 hidden Layer (64 nodes + ReLu)

(e) 1 Output Layer (8 nodes + Linear)

B. As input layer we strongly suggest to use an *unity_ density*-Layer

- You can find all layers provided by pysc2 at:
  timesteps[0].observation.feature_screen
- Make sure that your input has the correct format: shape=(x, y, channels)

C. The agent shall use double Q learning.

D. Extend your network to a dueling DQN.

E. Use prioritized experience replay.

(a) For this you can use the existing PER by baselines:
https://github.com/openai/baselines

(b) To install baselines on Windows, follow this guide:
https://arztsamuel.github.io/en/blogs/2018/Gym-and-Baselines-on-Windows.html

F. Visualise the training as usual.

G. The trained CNN agent shall be started by running the Python file `RunCNN.py`. The agent shall use the trained weights without further training.

H. The training of the CNN agent shall be implemented in `TrainCNN.py`. Hereby, the agent shall initialise a new network.