This project contains **three** folders: MADDPG, MARLENV and MARLENV\_baseline.

MADDPG is the algorithm folder, MARLENV is the simulation folder with the algorithm, MARLENV\_baseline is the one without the algorithm.

To use the project, you may need to **install those repositories**:

python, tensorflow, gym, numpy, pandas, time, random, sklearn, matplotlib, openpyxl

If you’re using TensorFlow 2, then no need to change the import codes/lines in “MARLENV”

Then **install MADDPG**, in the command line, type: > pip install -e [your MADDPG directory]

Third, go to your MARLENV folder and type: > python train.py to train the model.

Last, after training, type:> python test.py to test the model.

Within **MARLENV\_baseline**:

If you want to change the number of nodes (line 13 in test.py), then you need to change their x\_axis position in line 101 of env\_fortest0.py

Output: 10 times testing results about the delay, lost packets amount, throughput amount and throughput percentage.

Figures: 10 times environment observations. The upper left subfigure is the whole observation before noises, the upper right subfigure is the single observation from node 3 before noises, the lower left subfigure is the whole observation after noises, the lower right subfigure is the single observation from node 3 after noises.

Within **MARLENV**:

The major differences between env\_fortrain7.py and env\_fortest7.py are the size of the waiting transmitted data of the source node.

The major differences between train.py and test.py are save\_model or load\_model.

If you want to **change the number of nodes** (line 22 in train.py), then you need to change their x\_axis position in line 108 of env\_fortrain.py. If you want to **change the area size of degree of traffic load**, please also change the observation size (line 54 in env\_fortrain.py and env\_fortest.py)

**Training** Output: “Episodes/saving rate” times training results and last 10 models:

Training results contains throughput and throughput percentage within last saving rate episodes; Rewards of agents within last saving rate episodes; Lost packets within last saving rate episodes and Delays of agents within last saving rate episodes.

How to switch ‘surrounding pixels’ to ‘pixels in specific quadrant’?

Command all lines include ‘Get\_drone\_obs’ and ‘Check\_surrounding’

Uncommand all lines include ‘Get\_drone\_obs\_toward’ and ‘Check\_surrounding\_toward’

**Before testing**:

Change your favorite saved model’s file names to format ones, for example:

-500.data-00000-of-00001 | -500.index | -500.meta ======> .data-00000-of-00001 | .index | .meta

**Testing** Output: Testing results about the delay, lost packets amount, throughput amount and throughput percentage.