

1. Install ML Agent to Anaconda

Anaconda Navigator

File Help

ANACONDA NAVIGATOR

The screenshot shows the Anaconda Navigator application window. On the left is a sidebar with navigation icons for Home, Environments, Learning, and Community. The main area displays the 'Environments' tab, which includes a search bar, a filter dropdown set to 'Installed', and a table of environments. The 'PyTorch-MLAgent' environment is selected, and a context menu is open over it, with the 'Open Terminal' option highlighted by a red circle. Below the environment list, there are checkboxes for installed packages like 'attrs', 'babel', and 'backcall'.

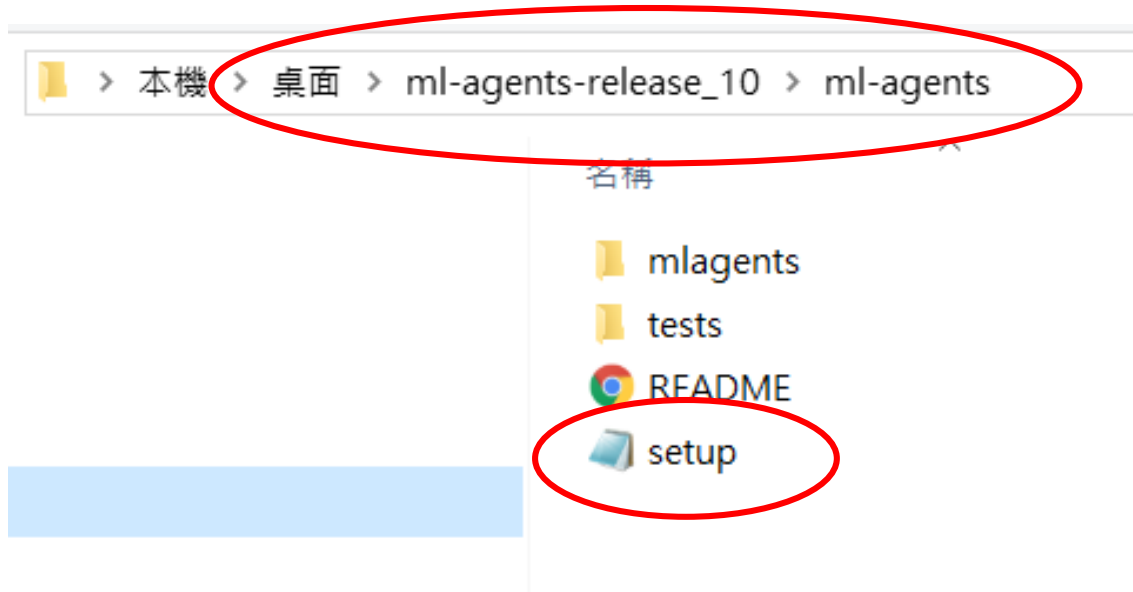
Name	Description
base (root)	
PyTorch-MLAgent	
attrs	Abseil python common libraries, see https
babel	Configurable, python 2+3 compatible sphin
backcall	Read, rewrite, and write python asts nicel

1. Install ML Agent to Anaconda

```
C:\WINDOWS\system32\cmd.exe

(PyTorch-MLAgent) C:\Users\admin>cd C:\Users\admin\Desktop\ml-agents-release_10\ml-agents
(PyTorch-MLAgent) C:\Users\admin\Desktop\ml-agents-release_10\ml-agents>pip install .
```

1. cd to the directory where the setup.py is located
2. pip install .



1. Install ML Agent to Anaconda

Type "pip freeze" to confirm

C:\WINDOWS\system32\cmd.exe

```
(PyTorch-MLAgent) C:\Users\admin\Desktop\ml-agents-release_10\ml-agents>pip freeze  
absl-py==0.9.0  
alabaster==0.7.12  
astor==0.8.1  
astroid==2.4.2  
attrs==19.3.0  
Babel==2.8.0  
backcall==0.1.0  
bleach==3.1.1  
boto3==1.14.33  
botocore==1.17.33  
brotlipy==0.7.0  
cachetools==4.0.0  
cattr==1.0.0
```

C:\WINDOWS\system32\cmd.exe

```
Keras-Applications==1.0.8  
Keras-Preprocessing==1.1.0  
keyring==21.2.1  
kiwisolver==1.1.0  
lazy-object-proxy==1.4.3  
lxml==4.5.2  
Markdown==3.2.1  
MarkupSafe==1.1.1  
matplotlib==3.1.3  
mccabe==0.6.1  
mistune==0.8.4  
mkl-fft==1.0.15  
mkl-random==1.1.0  
mkl-service==2.3.0  
mlagents==0.22.0  
mlagents-envs==0.22.0  
nbconvert==5.6.1  
nbformat==5.0.4
```

(Update PyTorch to 1.6.0 or later)

```
toml==0.10.1  
torch==1.7.0  
torchaudio==0.7.0  
torchvision==0.8.1  
tornado==6.0.3  
tqdm==4.47.0  
traitlets==4.3.3
```

(Update PyTorch to 1.6.0 or later)

The screenshot shows the PyTorch website's installation guide. The browser address bar shows `pytorch.org`. The navigation bar includes links for Get Started, Ecosystem, Mobile, Blog, Tutorials, Docs, Resources, and GitHub. The main content area is titled "met the prerequisites below (e.g., numpy)" and mentions Anaconda as a recommended package manager. Below this is a table for selecting installation options. The "CUDA" row shows versions 9.2, 10.1, 10.2 (highlighted), and 11.0. Below the table, a red circle highlights the command: `conda install pytorch torchvision torchaudio cudatoolkit=10.2 -c pytorch`. A link for "Previous versions of PyTorch" is at the bottom left of the content area.

PyTorch Build	Stable (1.7.0)		Preview (Nightly)	
Your OS	Linux	Mac	Windows	
Package	Conda	Pip	LibTorch	Source
Language	Python		C++ / Java	
CUDA	9.2	10.1	10.2	11.0
				None

Run this Command:

```
conda install pytorch torchvision torchaudio cudatoolkit=10.2 -c pytorch
```

[Previous versions of PyTorch >](#)

(Update PyTorch to 1.6.0 or later)

```
C:\WINDOWS\system32\cmd.exe - conda install pytorch torchvision torchaudio cudatoolkit=10.2 -c pytorch
(PyTorch-MLAgent) C:\>
(PyTorch-MLAgent) C:\>
(PyTorch-MLAgent) C:\>
(PyTorch-MLAgent) C:\>
(PyTorch-MLAgent) C:\>conda install pytorch torchvision torchaudio cudatoolkit=10.2 -c pytorch
Collecting package metadata (repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 4.8.2
  latest version: 4.9.2

Please update conda by running

  $ conda update -n base -c defaults conda

## Package Plan ##

environment location: C:\Users\admin\Anaconda3\envs\PyTorch-MLAgent

added / updated specs:
- cudatoolkit=10.2
- pytorch
- torchaudio
- torchvision
```

(Update PyTorch to 1.6.0 or later)

C:\WINDOWS\system32\cmd.exe - conda install pytorch torchvision torchaudio cudatoolkit=10.2 -c pytorch

The following NEW packages will be INSTALLED:

dataclasses	pkgs/main/win-64::dataclasses-0.7-py36_0
libuv	pkgs/main/win-64::libuv-1.40.0-he774522_0
torchaudio	pytorch/win-64::torchaudio-0.7.0-py36
typing_extensions	pkgs/main/noarch::typing_extensions-3.7.4.3-py_0

The following packages will be UPDATED:

ca-certificates	2020.6.24-0	-->	2020.12.8-haa95532_0
certifi	2020.6.20-py36_0	-->	2020.12.5-py36haa95532_0
cudatoolkit	10.1.243-h74a9793_0	-->	10.2.89-h74a9793_1
openssl	1.1.1g-he774522_1	-->	1.1.1i-h2bbff1b_0
pytorch	1.4.0-py3.6_cuda101_cudnn7_0	-->	1.7.0-py3.6_cuda102_cudnn7_0
torchvision	0.5.0-py36_cu101	-->	0.8.1-py36_cu102

The following packages will be DOWNGRADED:

cudnn	7.6.5-cuda10.1_0	-->	7.6.5-cuda10.2_0
-------	------------------	-----	------------------


Proceed ([y]/n)? y

Downloading and Extracting Packages










torchaudio-0.7.0	2.7 MB	#####	100%
torchvision-0.8.1	7.2 MB	#####	100%
dataclasses-0.7	31 KB	#####	100%
pytorch-1.7.0	768.1 MB	###7	5%

2. Prepare training configure file

main ▾ [RL-Mobile-Robot](#) / [ReachGoalAvoidObstacles](#) /

 **TienLungSun** Delete test env.unitypackage

..

 2020.12.19 PPO.unitypackage	Add files via upload
 2021.4.28 Test scene.unitypackage	Add files via upload
 Car_Agent_s7.cs	Add files via upload
 Car_Agent_s8.cs	Add files via upload
 HW1 Build a training VE in Unity	Update HW1 Build a training VE in Unity
 HW2 ML Agent	Update HW2 ML Agent
 HW3 Train and test ML Agent	Update HW3 Train and test ML Agent
 MobileRobot.yaml	Add files via upload
 ReadMe	Update ReadMe

2. Prepare training configure file

26 lines (26 sloc) | 593 Bytes

```
1 behaviors:
2   MobileRobot:
3     trainer_type: ppo
4     hyperparameters:
5       batch_size: 2048
6       buffer_size: 20480
7       learning_rate: 0.0003
8       beta: 0.005
9       epsilon: 0.2
10      lambda: 0.95
11      num_epoch: 3
12      learning_rate_schedule: linear
13    network_settings:
14      normalize: true
15      hidden_units: 512
16      num_layers: 3
17      vis_encode_type: simple
18    reward_signals:
19      extrinsic:
20        gamma: 0.995
21        strength: 1.0
22    keep_checkpoints: 5
23    max_steps: 5000000
24    time_horizon: 1000
25    summary_freq: 30000
26    threaded: true
```

Copy to a text file and rename the text file as
"MobileRobot.yaml"

2. Prepare training configure file

本機 > 桌面 > ml-agents-release_10 > config > ppo

名稱	修改日期	類型
3DBall	2020/11/20 上午 ...	YAML 檔案
3DBall_randomize	2020/11/20 上午 ...	YAML 檔案
3DBallHard	2020/11/20 上午 ...	YAML 檔案
Basic	2020/11/20 上午 ...	YAML 檔案
Bouncer	2020/11/20 上午 ...	YAML 檔案
CrawlerDynamic	2020/11/20 上午 ...	YAML 檔案
CrawlerDynamicVariableSpeed	2020/11/20 上午 ...	YAML 檔案
CrawlerStatic	2020/11/20 上午 ...	YAML 檔案
CrawlerStaticVariableSpeed	2020/11/20 上午 ...	YAML 檔案
FoodCollector	2020/11/20 上午 ...	YAML 檔案
GridFoodCollector	2020/11/20 上午 ...	YAML 檔案
GridWorld	2020/11/20 上午 ...	YAML 檔案
Hallway	2020/11/20 上午 ...	YAML 檔案
Match3	2020/11/20 上午 ...	YAML 檔案
MobileRobot	2020/11/20 上午 ...	YAML 檔案
PushBlock	2020/11/20 上午 ...	YAML 檔案
Pyramids	2020/11/20 上午 ...	YAML 檔案
PyramidsRND	2020/11/20 上午 ...	YAML 檔案
Reacher	2020/11/20 上午 ...	YAML 檔案
SoccerTwos	2020/11/20 上午 ...	YAML 檔案

Place "MobileRobot.yaml" to ML agent folder/config/ppo

3. Start train

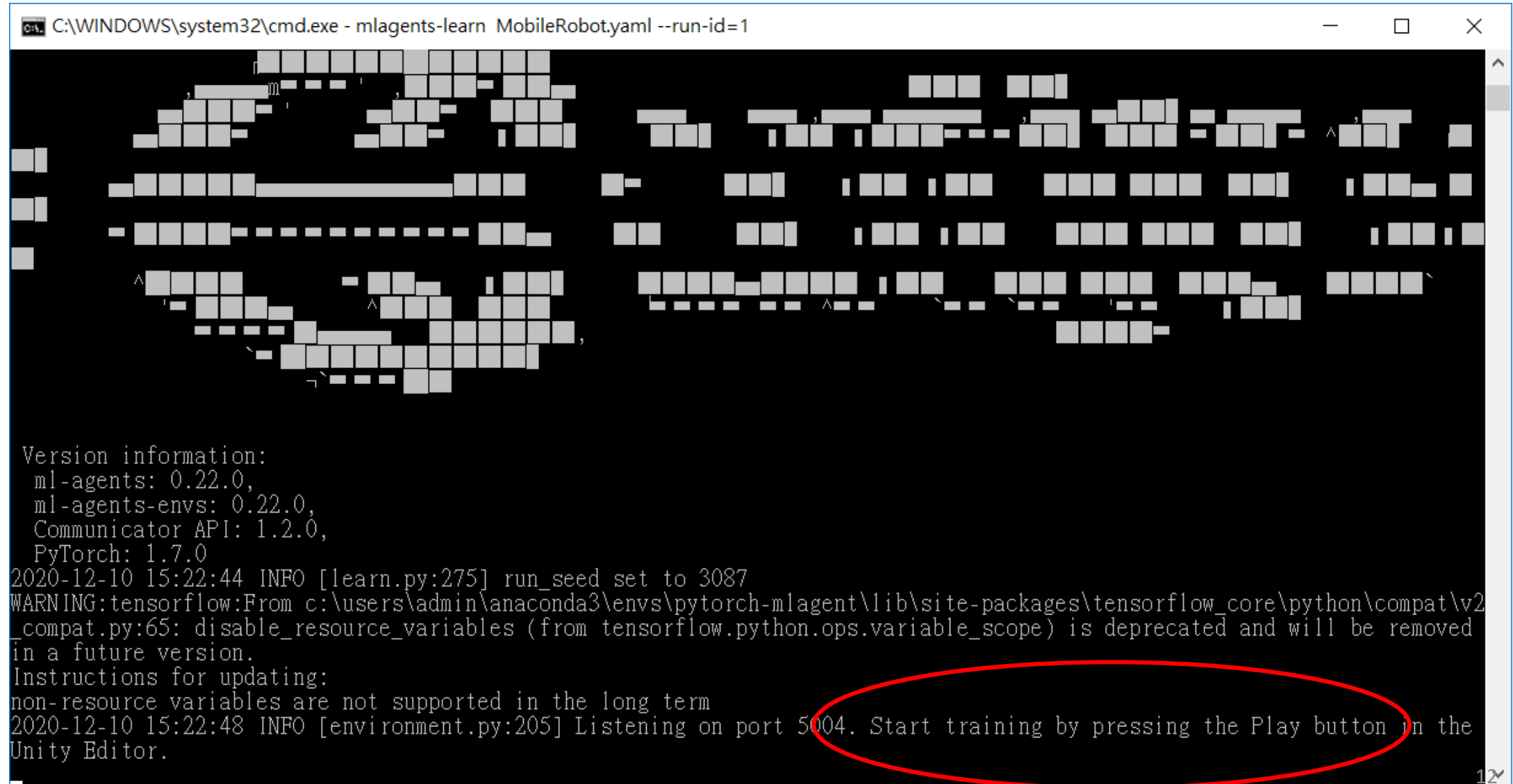
1. `cd C:\...\ml-agents-release_10\config\ppo` (the folder of your configuration file)
2. `mlagents-learn MobilRobot.yaml --run-id=1 --force`

C:\WINDOWS\system32\cmd.exe

```
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>  
(PyTorch-MLAgent) C:\>cd C:\Users\admin\Desktop\ml-agents-release_10\config\ppo  
(PyTorch-MLAgent) C:\Users\admin\Desktop\ml-agents-release_10\config\ppo>mlagents-learn MobileRobot.yaml -run-id=1
```

3. Start train

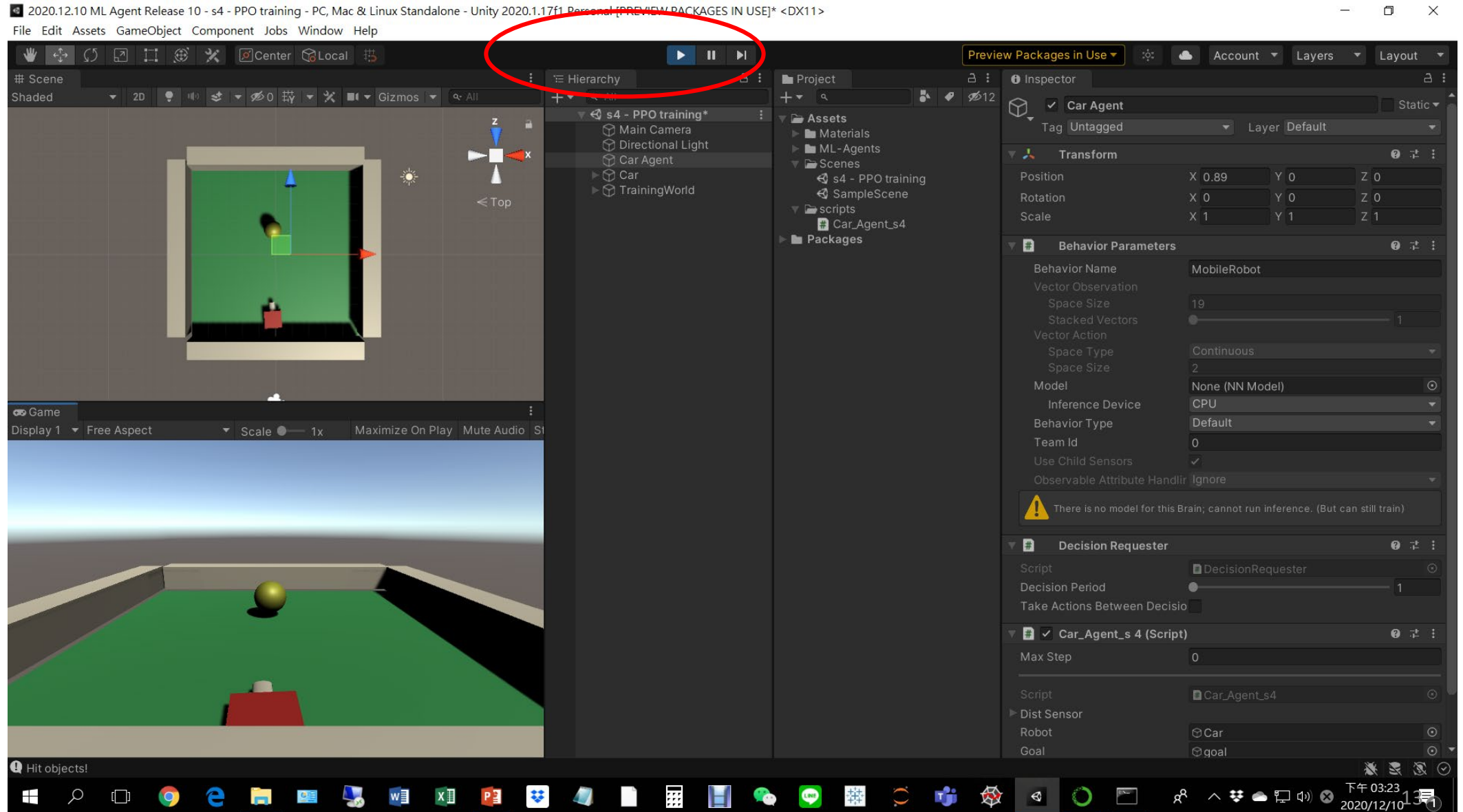
```
C:\WINDOWS\system32\cmd.exe - mlagents-learn MobileRobot.yaml --run-id=1
```



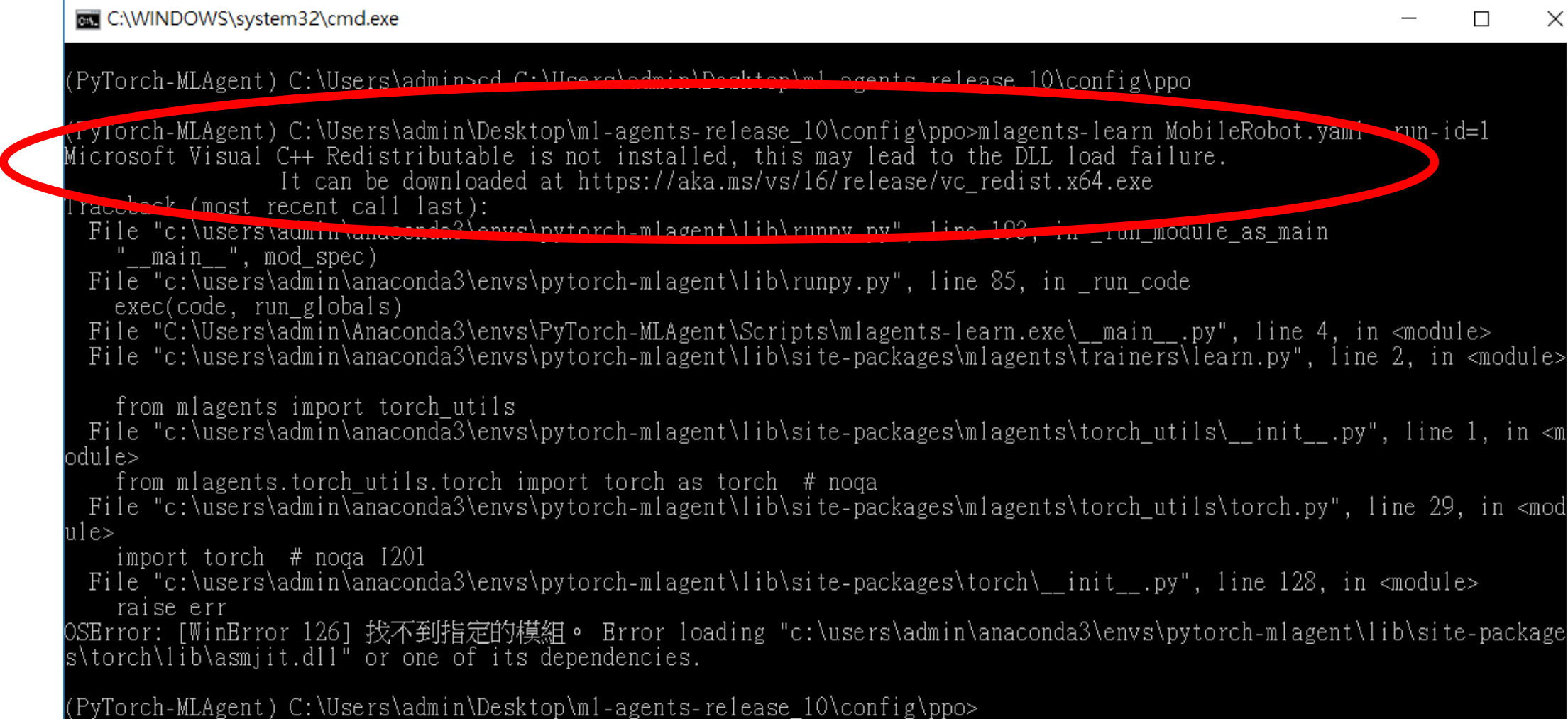
```
Version information:  
ml-agents: 0.22.0,  
ml-agents-envs: 0.22.0,  
Communicator API: 1.2.0,  
PyTorch: 1.7.0  
2020-12-10 15:22:44 INFO [learn.py:275] run_seed set to 3087  
WARNING:tensorflow:From c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\site-packages\tensorflow_core\python\compat\v2_compat.py:65: disable_resource_variables (from tensorflow.python.ops.variable_scope) is deprecated and will be removed in a future version.  
Instructions for updating:  
non-resource variables are not supported in the long term  
2020-12-10 15:22:48 INFO [environment.py:205] Listening on port 5004. Start training by pressing the Play button in the Unity Editor.
```

12

3. Start train



(You might need to download MS VC redistributable)



```
C:\WINDOWS\system32\cmd.exe

(PyTorch-MAgent) C:\Users\admin>cd C:\Users\admin\Desktop\ml-agents-release_10\config\ppo
(PyTorch-MAgent) C:\Users\admin\Desktop\ml-agents-release_10\config\ppo>mlagents-learn MobileRobot.yaml --run-id=1
Microsoft Visual C++ Redistributable is not installed, this may lead to the DLL load failure.
It can be downloaded at https://aka.ms/vs/16/release/vc_redist.x64.exe
Traceback (most recent call last):
  File "c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\runpy.py", line 193, in _run_module_as_main
    "__main__", mod_spec)
  File "c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\runpy.py", line 85, in _run_code
    exec(code, run_globals)
  File "C:\Users\admin\Anaconda3\envs\PyTorch-MAgent\Scripts\mlagents-learn.exe\__main__.py", line 4, in <module>
  File "c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\site-packages\mlagents\trainers\learn.py", line 2, in <module>

    from mlagents import torch_utils
  File "c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\site-packages\mlagents\torch_utils\__init__.py", line 1, in <module>
    from mlagents.torch_utils.torch import torch # noga
  File "c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\site-packages\mlagents\torch_utils\torch.py", line 29, in <module>
    import torch # noga 1201
  File "c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\site-packages\torch\__init__.py", line 128, in <module>
    raise err
OSError: [WinError 126] 找不到指定的模組。 Error loading "c:\users\admin\anaconda3\envs\pytorch-mlagent\lib\site-packages\torch\lib\asmjit.dll" or one of its dependencies.

(PyTorch-MAgent) C:\Users\admin\Desktop\ml-agents-release_10\config\ppo>
```

4. Training

```
C:\Windows\system32\cmd.exe - mlagents-learn MobileRobot.yaml --run-id=2

beta: 0.005
epsilon: 0.2
lambda: 0.95
num_epoch: 3
learning_rate_schedule: linear
network_settings:
  normalize: True
  hidden_units: 512
  num_layers: 3
  vis_encode_type: simple
  memory: None
reward_signals:
  extrinsic:
    gamma: 0.995
    strength: 1.0
  init_path: None
keep_checkpoints: 5
checkpoint_interval: 500000
max_steps: 7000000
time_horizon: 1000
summary_freq: 30000
threaded: True
self_play: None
behavioral_cloning: None
framework: pytorch

2020-12-12 11:39:12 INFO [stats.py:139] MobileRobot. Step: 30000. Time Elapsed: 56.278 s. No episode was completed since
last summary. Training.
2020-12-12 11:39:49 INFO [stats.py:139] MobileRobot. Step: 60000. Time Elapsed: 93.340 s. Mean Reward: -14.130. Std of Re
ward: 10.538. Training.
```

```
vis_encode_type: simple
reward_signals:
  extrinsic:
    gamma: 0.995
    strength: 1.0
keep_checkpoints: 5
max_steps: 7000000
time_horizon: 1000
summary_freq: 30000
threaded: true
```

5. Monitor training performance

Anaconda Navigator

File Help

ANACONDA NAVIGATOR

Upgrade Now Sign in to Anaconda Cloud

Home

Environments

Learning

Community

Documentation

Developer Blog

Create Clone Import Remove

233 packages available

base (root)

PyTorch-MLAgent

Open Terminal

Open with Python

Open with IPython

Open with Jupyter Notebook

Name Description Version

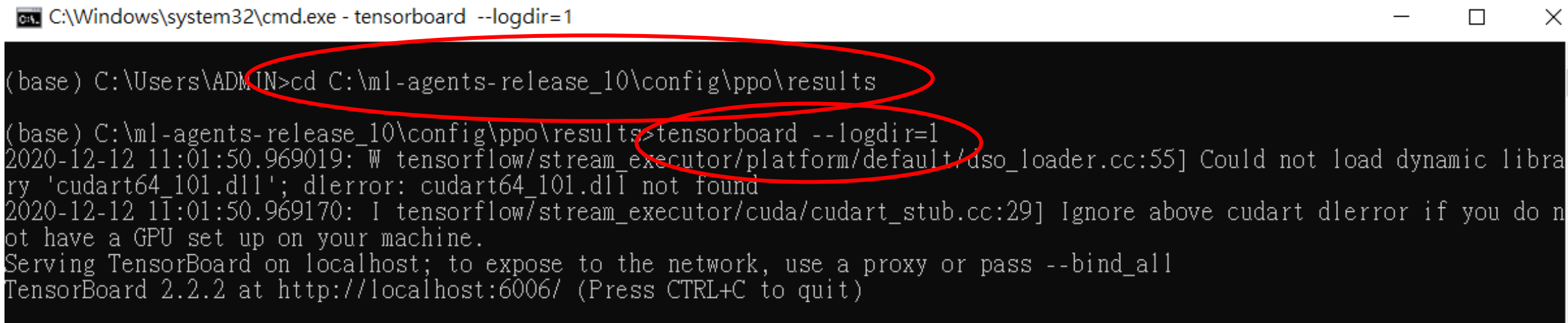
Abseil python common libraries, see https://github.com/abseil/abseil-py.	0.9.0
Configurable, python 2+3 compatible sphinx theme.	0.7.12
Read, rewrite, and write python asts nicely	0.8.1
A abstract syntax tree for python with inference support.	2.4.2
Attrs is the python package that will bring back the joy of writing classes by relieving you from the drudgery of implementing object protocols (aka dunder methods).	19.3.0
Utilities to internationalize and localize python applications	2.8.0
Specifications for callback functions passed in to an api	0.1.0
	1.0
	3.1.0
Amazon web services sdk for python	1.14.33
Low-level, data-driven core of boto 3.	1.17.33
	0.7.0
Certificates for use with other packages.	2020.12.8
	4.0.0
	1.0.0
Python package for providing mozilla's ca bundle.	2020.12.5
Foreign function interface for python calling c code.	1.14.0
Universal character encoding detector	3.0.4
Python composable command line interface toolkit	7.1.2

Open another terminal window

下午 02:04 2020/12/11

5. Monitor training performance

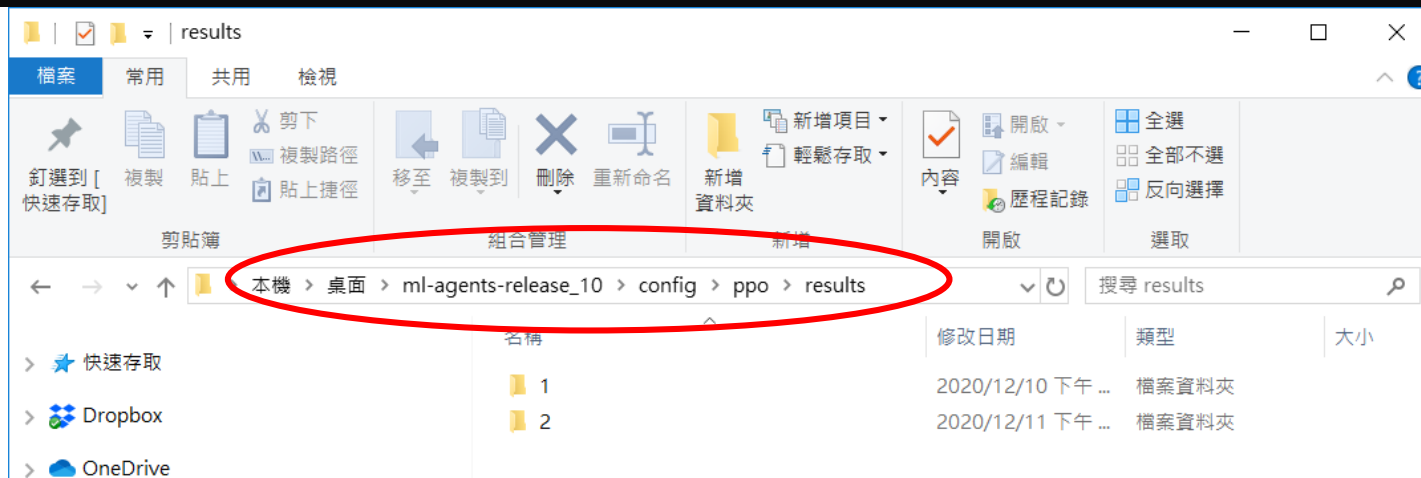
1. cd C:\ml-agents-release-10\config\ppo\results (The results folder)
2. tensorboard --logdir=1



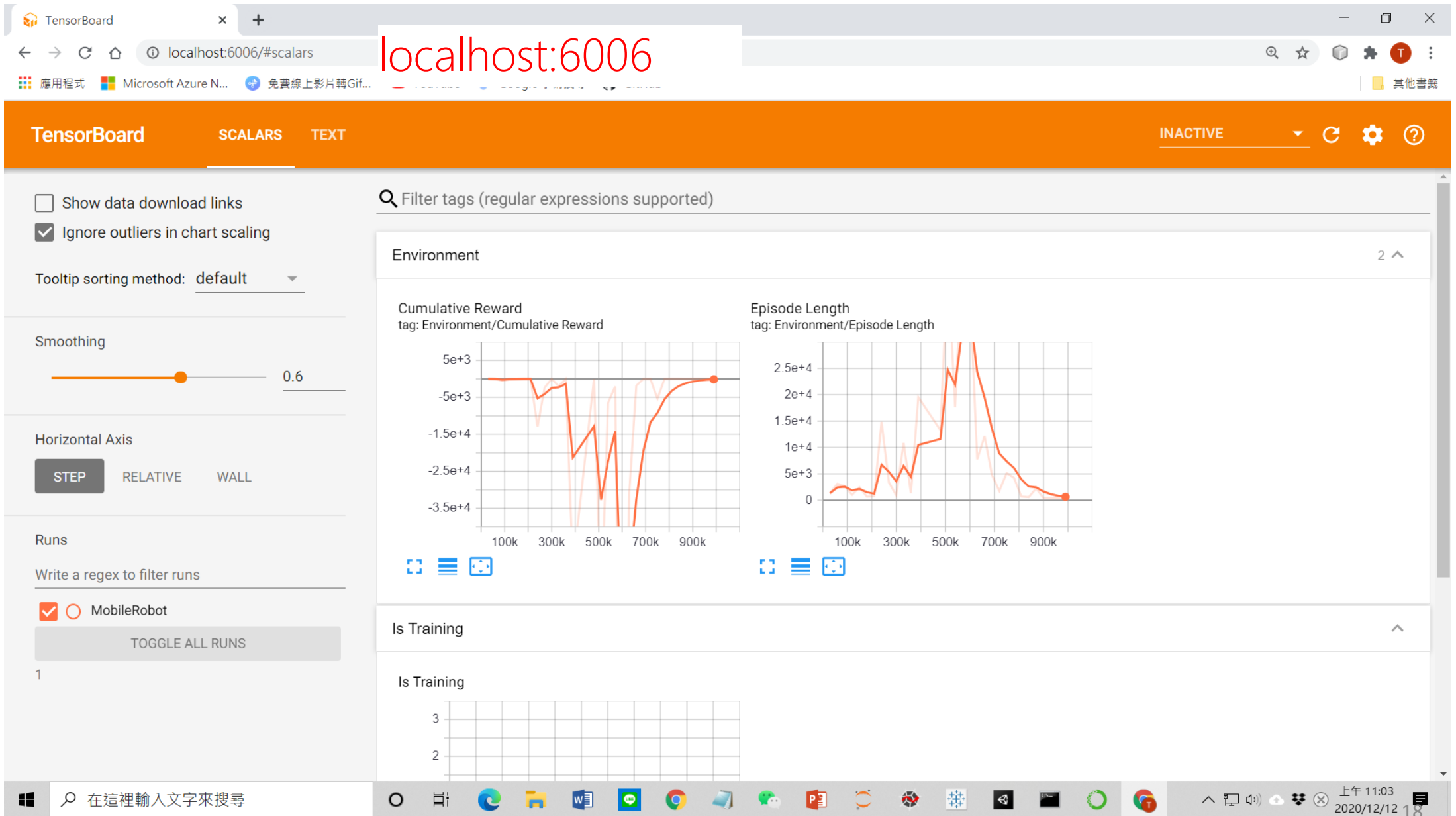
```
C:\Windows\system32\cmd.exe - tensorboard --logdir=1

(base) C:\Users\ADMIN>cd C:\ml-agents-release_10\config\ppo\results

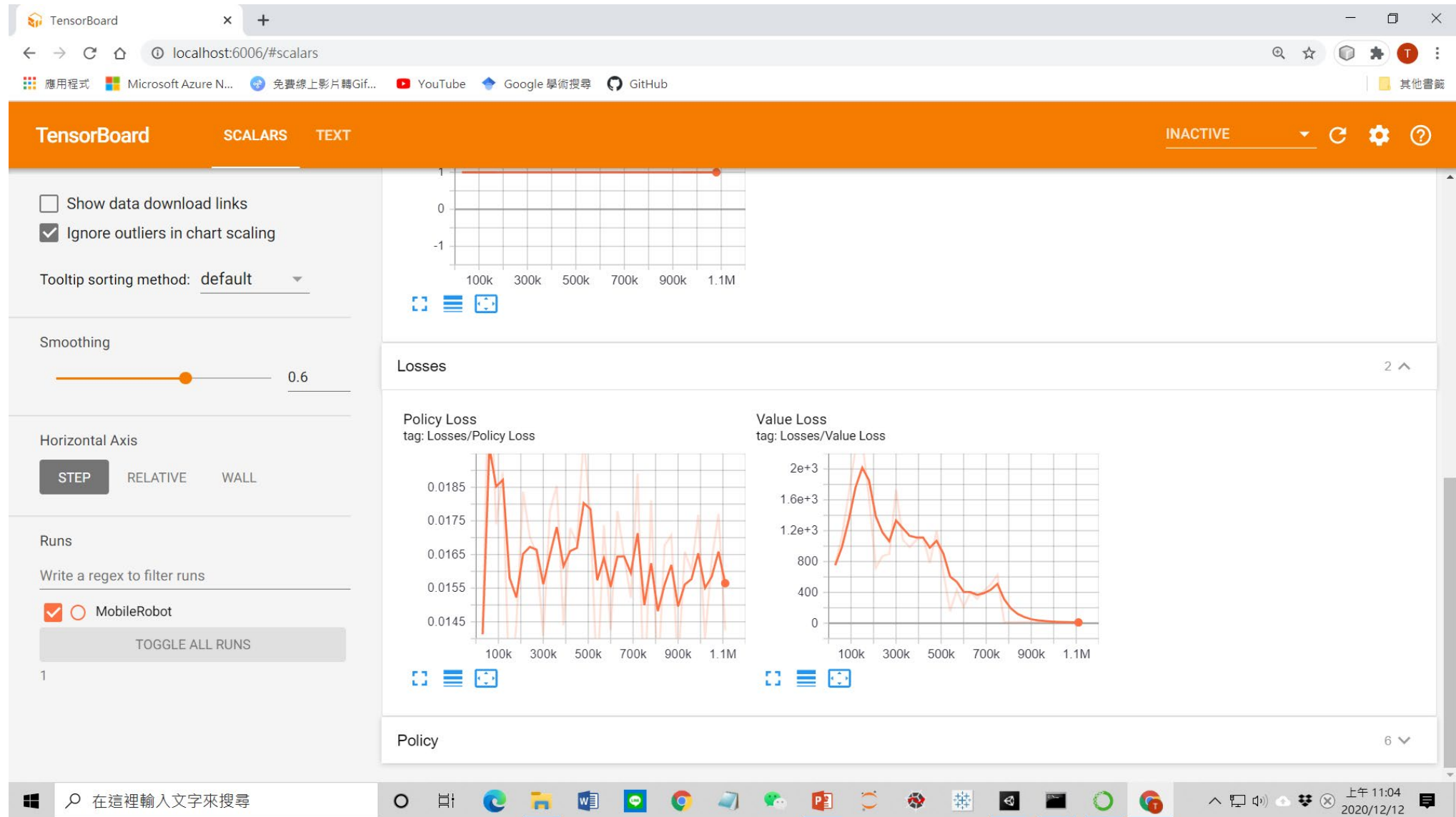
(base) C:\ml-agents-release_10\config\ppo\results>tensorboard --logdir=1
2020-12-12 11:01:50.969019: W tensorflow/stream_executor/platform/default/dso_loader.cc:55] Could not load dynamic library 'cudart64_101.dll'; dlderror: cudart64_101.dll not found
2020-12-12 11:01:50.969170: I tensorflow/stream_executor/cuda/cudart_stub.cc:29] Ignore above cudart dlerror if you do not have a GPU set up on your machine.
Serving TensorBoard on localhost; to expose to the network, use a proxy or pass --bind_all
TensorBoard 2.2.2 at http://localhost:6006/ (Press CTRL+C to quit)
```



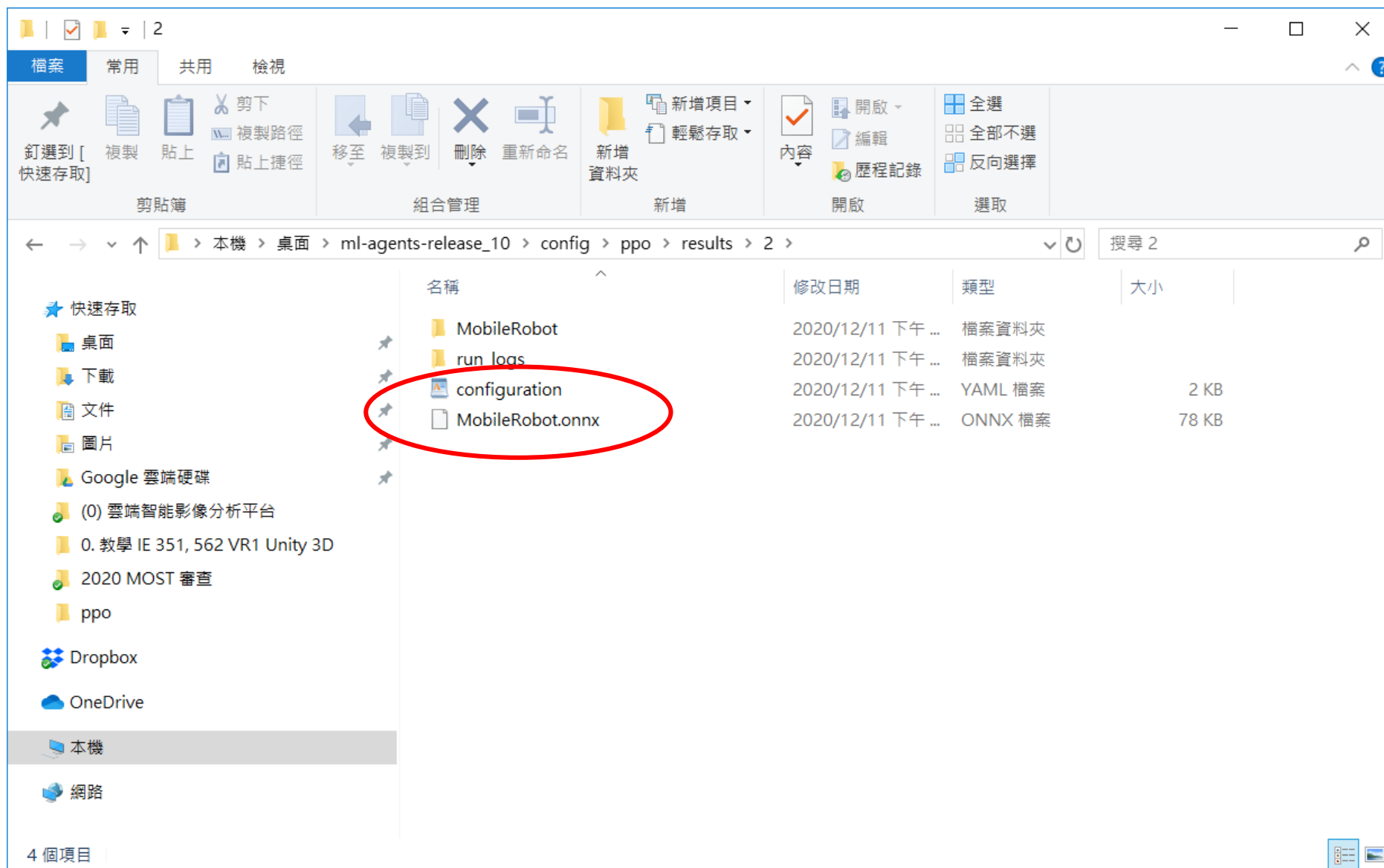
5. Monitor training performance



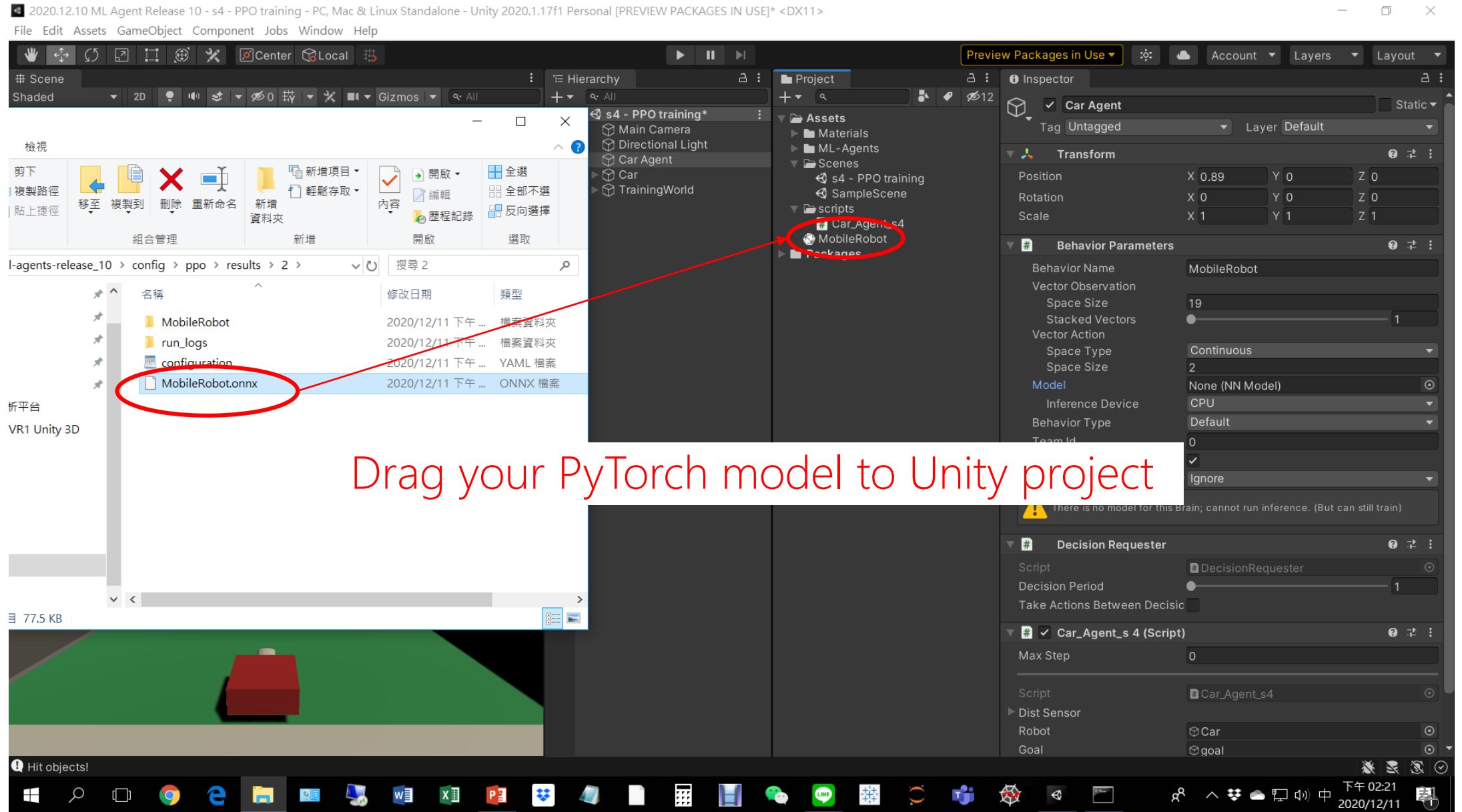
5. Monitor training performance



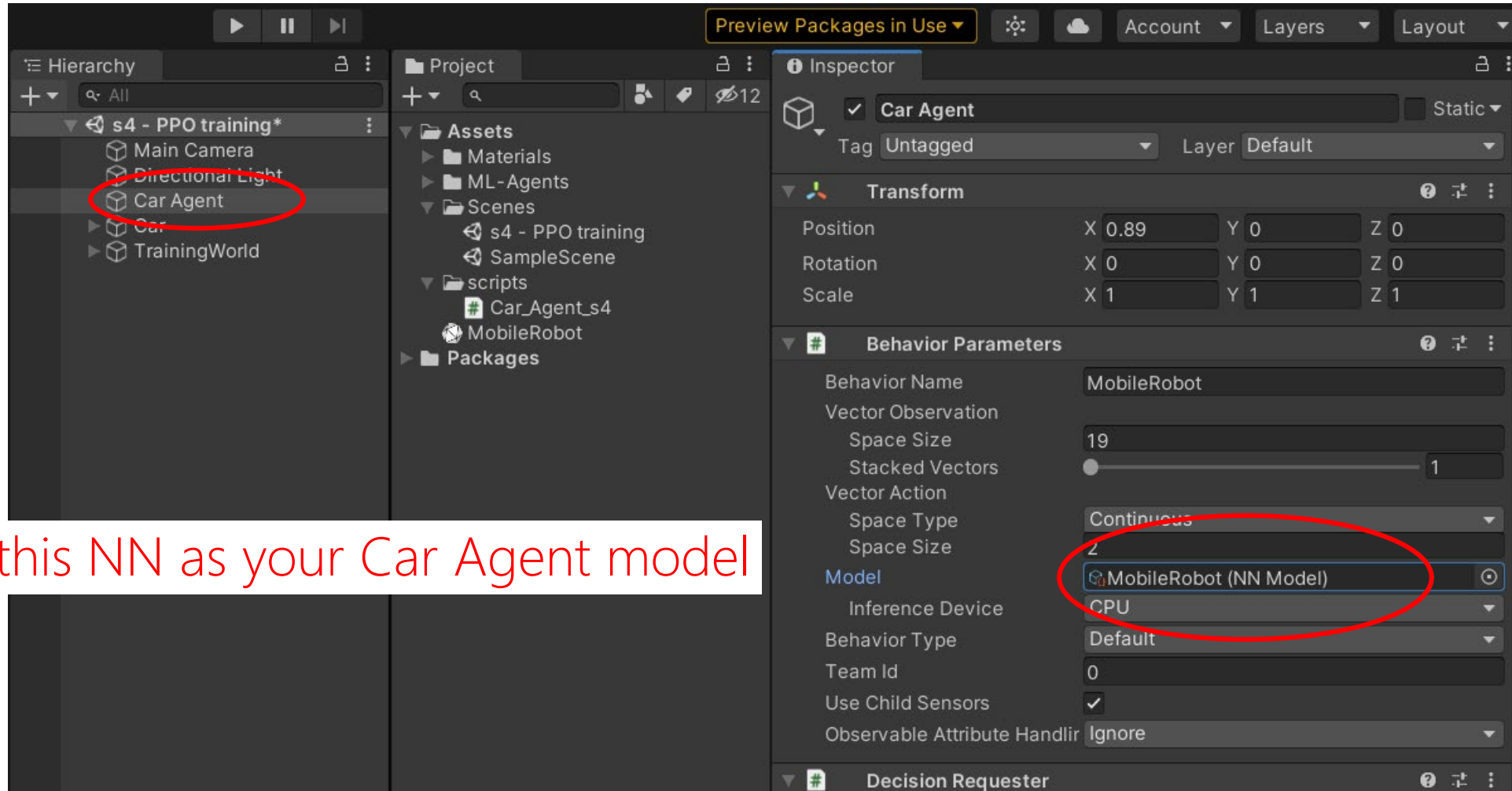
6. Finish training



7. Test



7. Test



Select this NN as your Car Agent model

7. Test

