Title: README ML-Agents

Document Number: nnn-nnn

CTI One Corporation

Table 1a. Document History

2022-03-20	Establish this document, document archive: /media/harry/easystore/backup-2020-2-15/CTI0/3proejcts/3-8-smart-tech/3-8-4-CTI/3-8-4-6-products/AIV200/103-app/103-1e-streamVideoLAN-hls	YY (Please add the company's master archive location)

Table 1b. Testing and Release Approval Form

2022-03-??	Tested by ??? and approved for release by ???	Pending for testing and approval

Table 2. References

Number	Name and URL	Note
1.	Unity ML-Agents Toolkit https://github.com/Unity-Technologies/ml-agents	
2.	Getting Started with Unity https://learn.unity.com/course/getting-started-with-unity	

3.	Karting Mod: Smart Karts Training Guide https://learn.unity.com/tutorial/karting-mod-smart-karts-training-guide	
4.	PyPi.org ML-Agents https://pypi.org/project/mlagents/	

Table 3. Prerequisite

Software Prerequisite No.	Description and Version	Note
1.	Ubuntu 18.04	
2.	Python version 3.7	
3.	Anaconda version 4.7.12	
4.	Unity 2020.3.26	
5.	ML-Agents Unity package version 1.0.8	
6.	ML-Agents Python package version 0.16.1	
7.	Barracuda Unity Package version 1.0.4	
8.	Karting Microgame version 3.1.0	
Hardware Prerequisite No.	Description and Version	

1.		

1. Setup a Python environment

- The `com.unity.ml-agents` package is verified for Unity 2020.1 and later. Verified packages releases are numbered 1.0.x.

Version	Release Date	Source	Documentation	Download	Python Package	Unity Package
main (unstable)	--	source	docs	download	--	--
Release 19	January 14, 2022	source	docs	download	0.28.0	2.2.1
Verified Package 1.0.8	May 26, 2021	source	docs	download	0.16.1	1.0.8

Figure 1: ML-Agents Unity and Python Packages

1.1. Create a Python environment

conda create --name unity-mlagents python=3.7

1.2. Activate the Python environment

conda activate unity-mlagents

1.3. Install Python ML-Agents package

pip3 install mlagents==0.16.1

https://pypi.org/project/mlagents/

2. Create a Kating Microgame on Unity

2.1. Create a Kating Microgame on Unity Hub

Project Name: Karting-Microgame-2022-3-19

Select “Kating Microgame” template

Push “CREATE” button

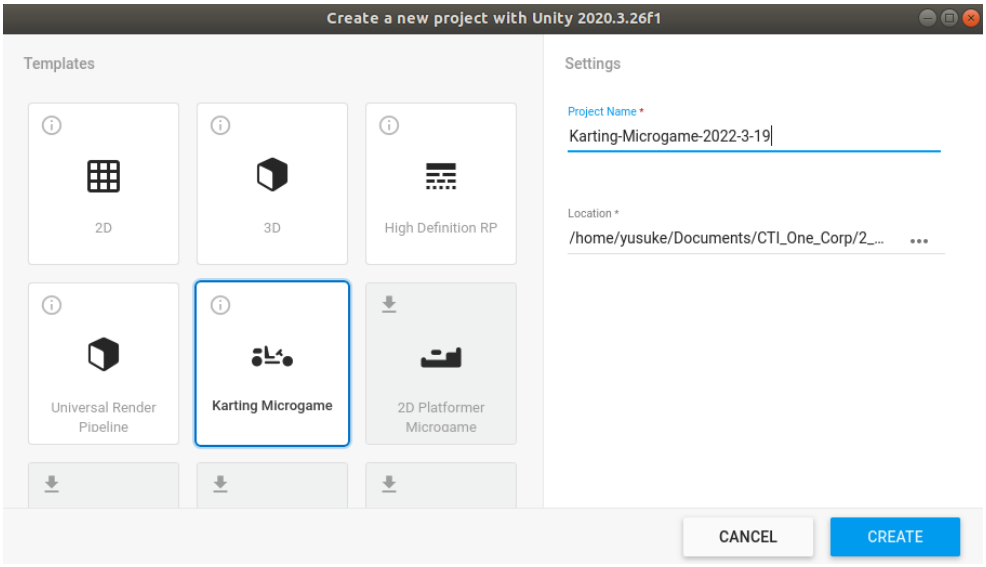

Figure 2: Creating Karting Microgame

2.2. Change Layout to default

At top right of window, select the “Default” on the list

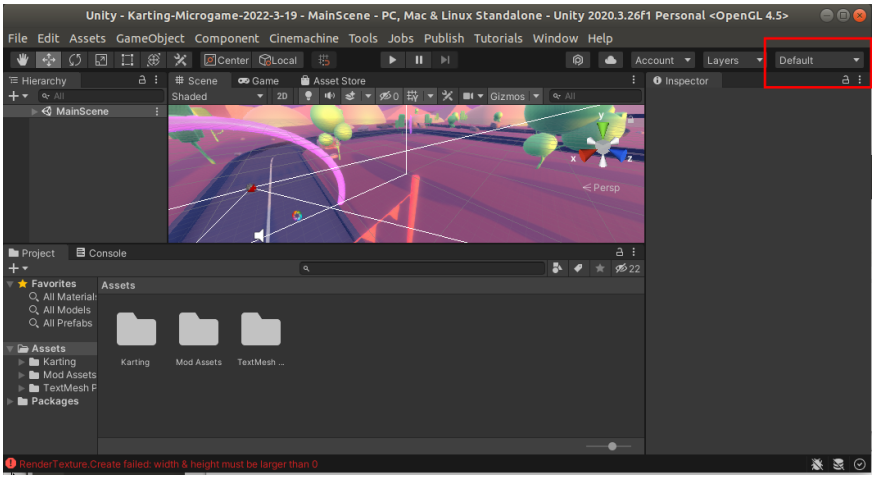

Figure 3: Chage Layout

3. Kart Classic Training

3.1. Open “Kart Classic Training”

Assets > Karting > Scenes > MLTraining > KartClassic_Training

3.2. Push play button. Push play button again to stop

3.3. Change the “Mode” from “Inferencing” to “Training”

3.3.1. Choose “KartClassic_MLAgent” object in Hierarchy window

3.3.2. Change the “Mode” to “Training” in Inspector window

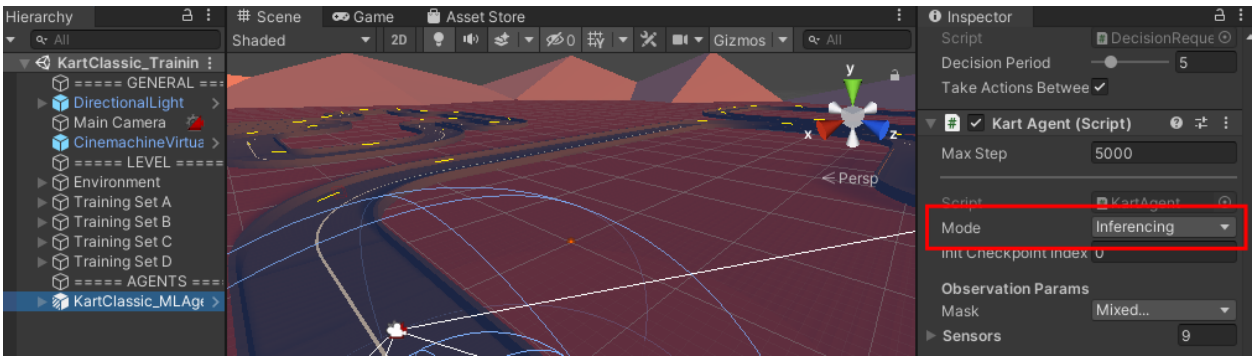

Figure 4: Kart Mode

3.4. Run the ML-Agents Python program

3.4.1. Open a terminal in the Unity Karing Microgame folder

3.4.2. Activate the ML-Agents Anaconda environment

conda activate unity-mlagents

3.4.3. Run the ML-Agents Python program

mlagents-learn Assets/Karting/Prefabs/AI/kart_mg_trainer_config.yaml --train --run-id=kart-1

3.5. Push “Play” button to start training

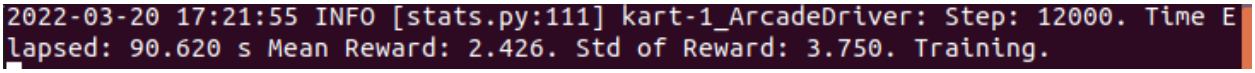

Figure 5: Python AL-Agents outputs

3.6. Push “Play” button to stop training

Model file will be exported.

```
2022-03-20 17:22:39 INFO [model_serialization.py:76] Exported ./models/kart-1/Ar
cadeDriver.nn file
```

Figure 6: Python AL-Agents result

3.7. Copy “ArcadeDriver.nn” to Unity folder: Assets → Karting → Prefabs → AI

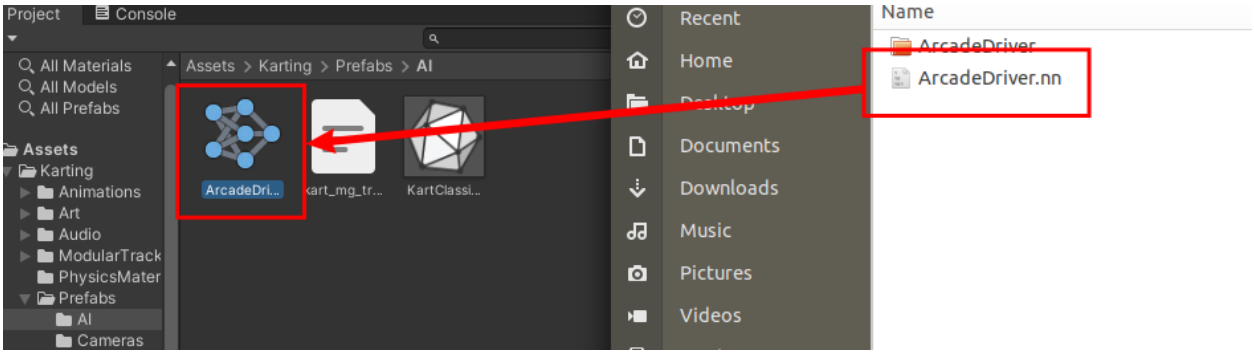

Figure 7: Copy NN model file to the Unity environment

3.8. Set new NN model and play

3.8.1. Choose “KartClassic_MLAgent” object in Hierarchy window

3.8.2. Change the “Mode” from “Training” to “Inferencing” in Inspector window

3.8.3. Drag “ArcadeDriver” in Assets window and drop to “Model” in Insepector window

Figure 8: Set NN model to the Kart object

3.9. Push “Play” button to start inferencing

4. Import CAPP Track 1 Unity Scene

4.1. Import CAPP Track 1 Scene

(Menu) Assets → Import Package → Custom Package…

Select CAPP_Track_1.unitypackage

4.2. Open CAPP_Track_1 Scene

In Project windows, Assets → Karting → Scenes → MLTraining

Note: Increasing the number of KartClassic_MLAgent makes the training speed faster

(END)