**How to use ML Framework**

**(v2.5)**

* Download the .zip file from GitHub. Select the folder with the latest stable version.
* In the selected folder, you have access to three C# scripts. Upload all in your Scripts folder inside your Unity project.
* Create the following GameObjects :
* Your own AI agent prefab and add *Agent.cs* as component.
* One empty GameObject called Trainer and *Trainer.cs* add as component.
* [Optional] One empty GameObject called Environment. (parent it to all moving environmental objects in the scene, the purpose of it is to reset the position of the environment at the beginning of each Episode, you can to this manually too by overriding Trainer.cs)
* [Optional] One TMP text (used for realtime statistics)
* Override *Agent.cs* Script:
* [Optional but highly recommended] Override Manual() in order to test your AI behavior by keyboard (Manual() is a method called in Update(), so use Time.deltaTime if needed). When testing, set Behaviour to *Manual*.

Tip: Always keep agent Behaviour to Static. When training, the behavior is auto set to Learning.

* Decide your AI’s observations number. Override CollectObservations() by fullfiling SensorBuffer argument with specific data (data must be float type, this method is called in Update(), so you can use realtime data)
* Decide your AI’s actions. Override OnActionReceived() by assigning actions depeding

on values received from ActionBuffer. (outputs are in [-1f,1f] range, same as above, this method is called in Update(), use Time.deltaTime if needed)

* Create a Rewarding System. Use AddReward() or SetReward() to deprive or grant your agents performance. Use EndAction() to stop your agents from doing action. (use these methods in OnCollisionEnter/OnTriggerEnter when your AI touches a goal or a trap)
* Create a Header(“=== Stats ===”) and use variables like speed, rb, etc.

Note: Update is used in *AgentBase*. Update is virtual, if you need to useit, override it and call base.Update()

* Create a brain model:
* Go back in UnityEditor and **Play**. Select your agent and take a look on *Agent (Script)* Component. Set *SpaceSize* by agent’s observations number and *ActionSize* by agent’s action number (as decided in the previous step). Modify *Deep* and *NeuronsPerLayer* depending on your preference regarding on the NeuralNetwork structure. (larger the variables, smarter the AI but more time needed to train)
* Press *SaveBrain* checkbox once (don’t worry if it doesn’t modify to check sign) and turn **Stop**.
* Look in Assets\StreamingAssets\Neural\_Networks folder. There was created a .txt file with a brain model assigned with randomized weights. Right click on the file and select CopyPath.
* Set your Trainer:
* Drag and drop your prefab/agentInHierarchy in *AI Model*.
* Paste Path copy in *BrainModelPath*.
* [Optional] Drag and drop Environment GameObject in *Environment*.
* [Optional] Drag and drop TMP GameObject from Canvas in *StatisticsDisplay*. (don’t forget to adjust the text area – best on left half of the screen)
* Set *=== Training Settings ===* at your preference. In the beginning, use Strategy1 for TrainingStrategy. (when your AI’s will decrease their performance comparing to the best score, switch to Strategy2)
* [Optional] Override Trainer.cs Script:
* Add Environment movement by overriding EnvironmentAction()
* Override OnEpisodeBegin() if needed.
* Override OnEpisodeEnd() if needed. (this method is called for each individual AI)
* Awake(), Start() and SetupTeam() are virtual, don’t forget to call their base if you need to use them.
* Run the simulation:
* Turn On Trainer GameObject and press **Play**.
* Check console to see the results of each generation.
* Best AI’s brain is always overwritten over the .txt file placed in Trainer.
* Use the NeuralNetwork post-training:
* In Agent.cs, delete any AddReward(), SetReward() or EndAction() calls.
* Copy the path of the brain model and paste inside *Path* (from *=== Network Properties ===*).
* Set Behaviour to *Self*.
* Your AI’s is now ready.
* TIPS SECTION

Remains to be completed.