ML-Agents Toolkit

enabling games and simulations to serve as environments for training intelligent agents

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Technologie programistycze

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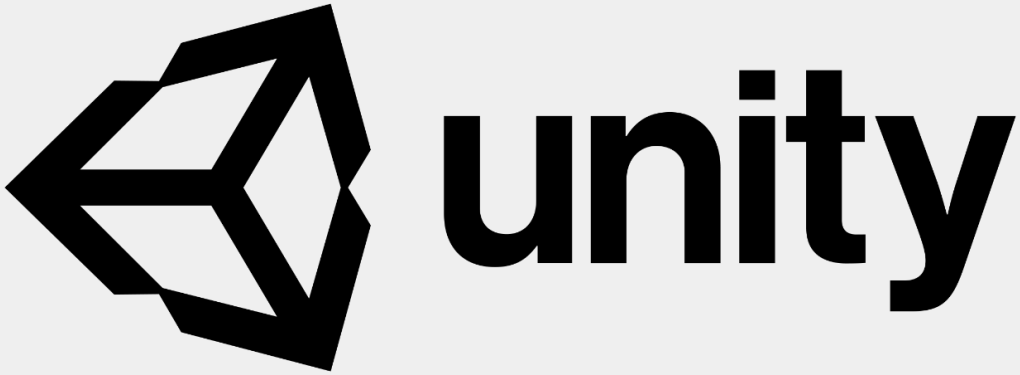


Introduction

About Unity


CUPHEAD
"DON'T DEAL WITH THE DEVIL"


BILL MURRAY
BEN KINGSLEY
IDRIS ELBA
LUPITA NYONG'O
SCARLETT JOHANSSON
GIANCARLO ESPOSITO
CHRISTOPHER WALKEN
NEEL SETHI
Disney
THE JUNGLE BOOK
APRIL 15
IN 3D, REAL D 3D AND IMAX 3D

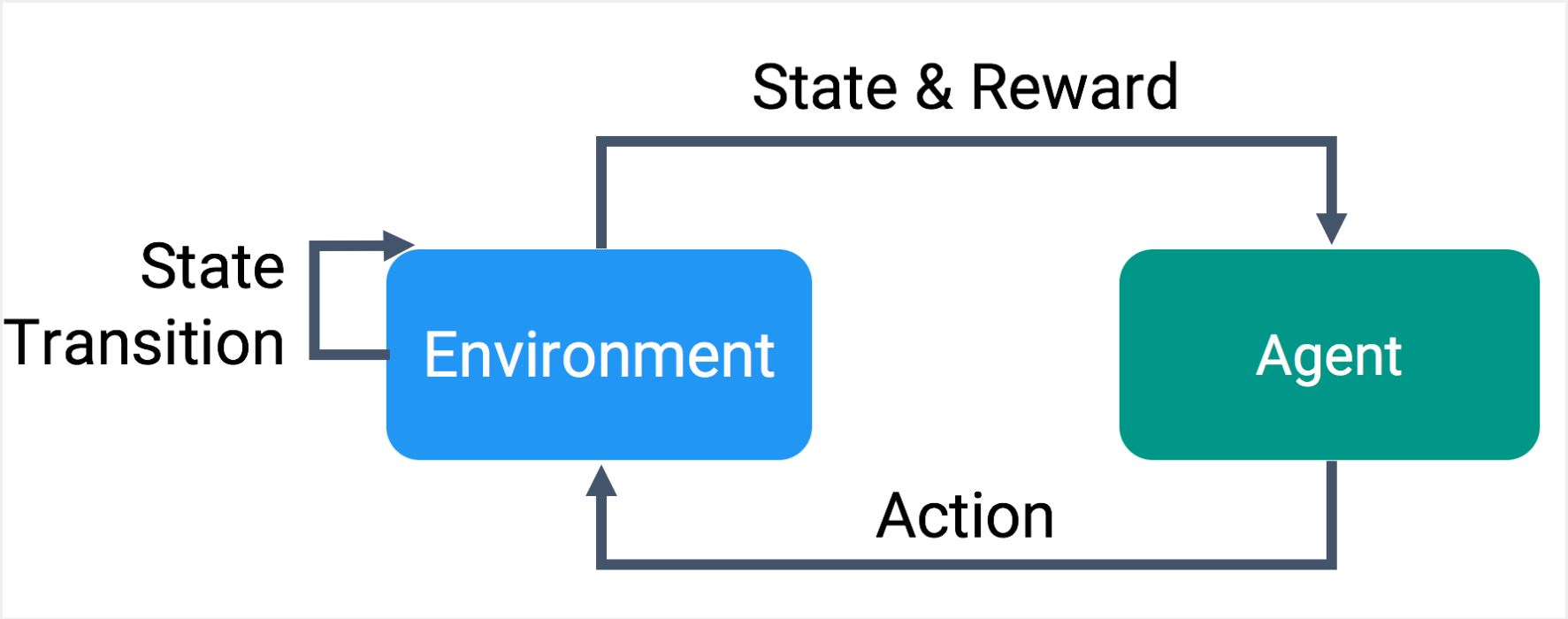

sven
END TURN
Manischewitz
10:18 AM

Other ML Training Platforms

http://vizdoom.cs.put.edu.pl

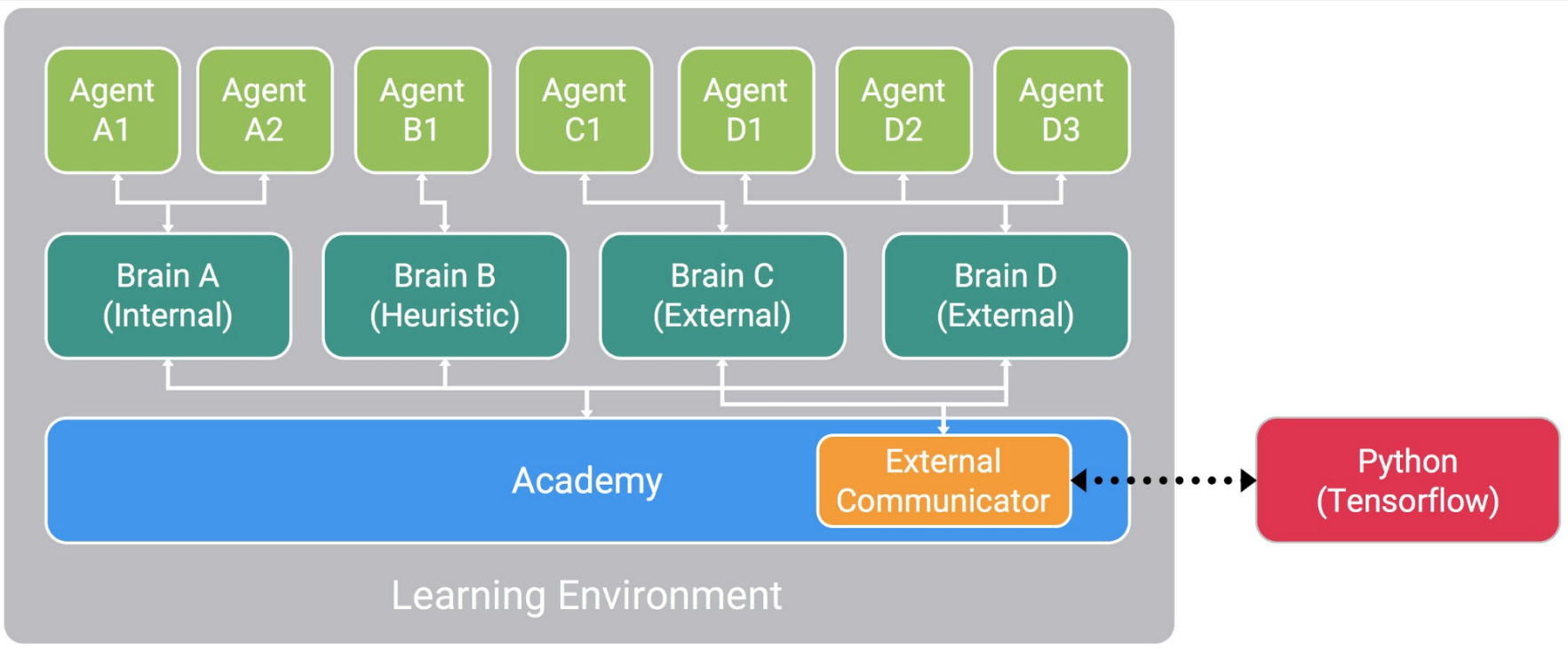
How does it work?

ML AGENT



Workflow

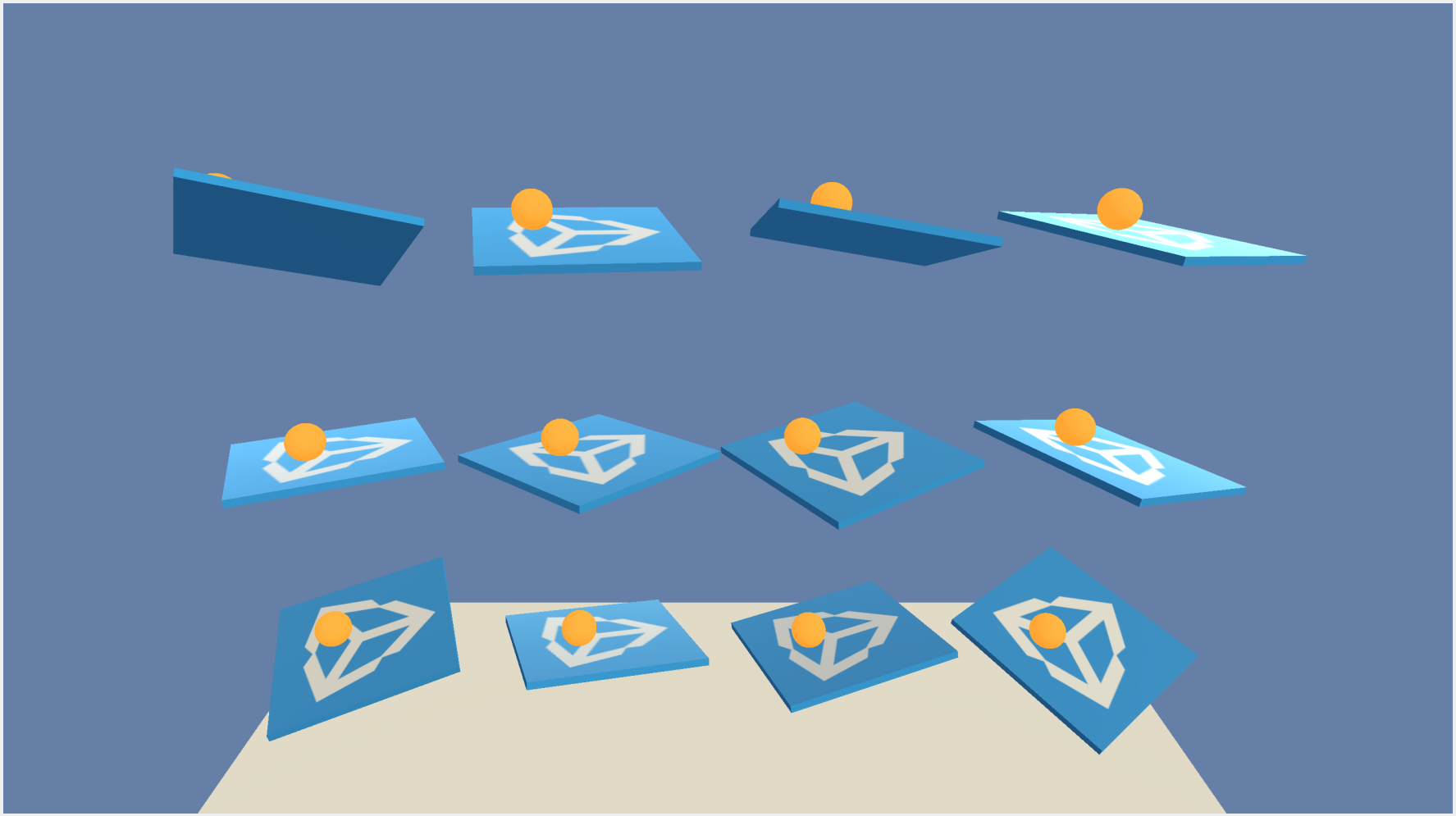
Architecture



Brains

- **Player** — Actions are decided by user input through keyboard or gamepad.
- **Heuristic** — Actions are decided by C# script using state input.
- **External** — Actions are decided using Tensorflow via Python interface.
- **Internal** — Actions are decided using Tensorflow model embedded into project.

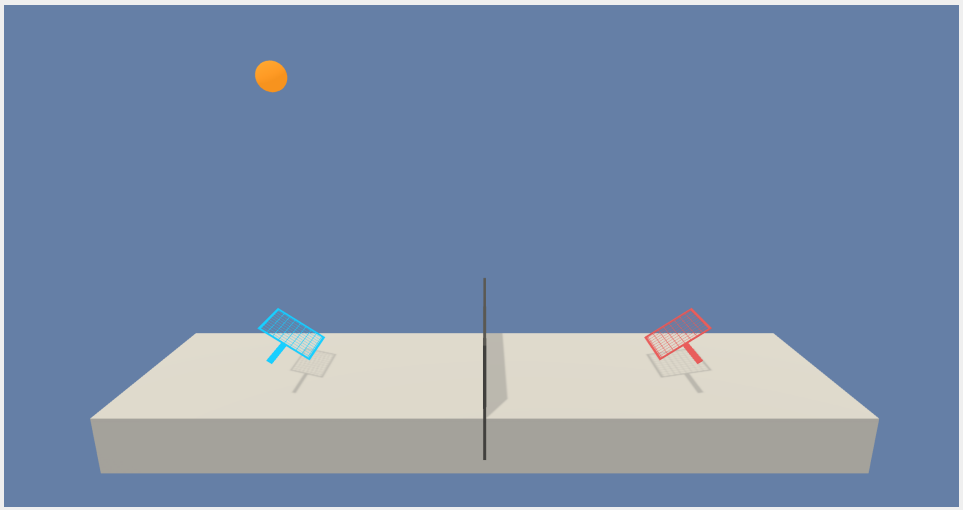
3D Balance Ball



Examples

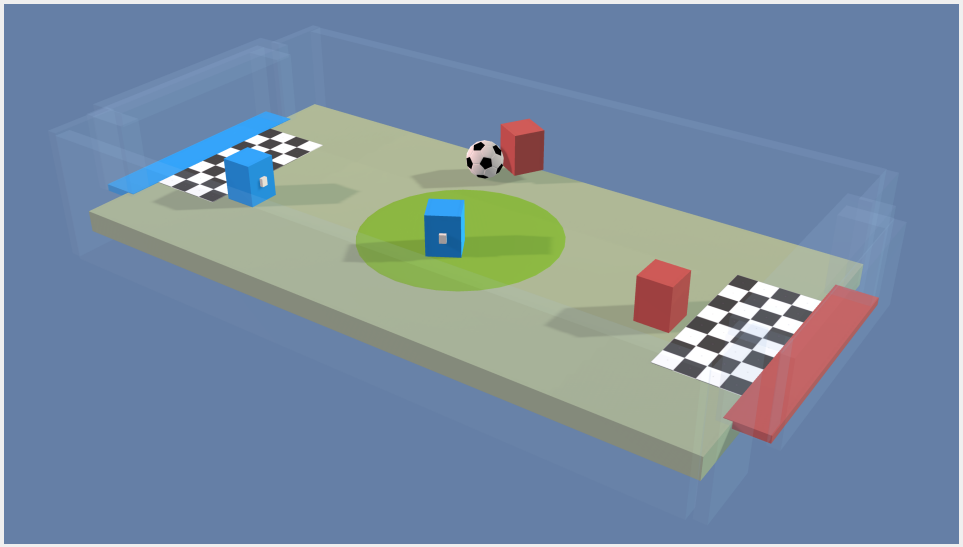
Tennis

- Competitive task - train normally
- Imitation learning - teacher and student brain
- Model tries to replicate behaviour of a human player



Soccer Twos

- 4 Agents, 2 team
- Cooperative/ competitive environment
- 2 different brains



Questions?

Monitors

```
using MLAgents;

public class YourAcademy : Academy {
    public override void InitializeAcademy()
    {
        Monitor.SetActive(true);
    }
}
...
Monitor.Log(key, value, target)
```

- string,
- float,
- float[]

TensorBoard

```
tensorboard --logdir=summaries
```

Using API

- **gym wrapper** — wrapper provided by OpenAI called gym. (Multiple brains and vector stacking is not supported)
- **mlagents.envs** — controlling environment through Python.

```
from mlagents.envs import UnityEnvironment
env = UnityEnvironment(file_name="3DBall",
 ↪  worker_id=0, seed=1)
action = {'brain1':[1.0, 2.0], 'brain2':[3.0,4.0]}
info = env.step(action)
brainInfo = info['brain_name']
observations = brainInfo.vector_observations
env.reset(train_model=True, config=config)
env.close()
```

Current state of ML-agents framework

- still in Beta, limited functionality,
- past contests: https://connect.unity.com/challenges/ml-agents-1
- latest contests: https://blogs.unity3d.com/category/machine-learning/, https://www.youtube.com/watch?v=3BK2CEDiBLo

Questions?

References

Get to grips on the latest ai power in unity.
https://unity3d.com/how-to/unity-machine-learning-agents.

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Machine learing.
https://unity3d.com/machine-learning/.

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Unity machine learning agents toolkit.
https://github.com/Unity-Technologies/ml-agents.

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