C2SIM

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1 | Overview

The project[1] uses JAX[2] throughout, with JaxMARL's[3] SMAX as the main environment. The agents are modelled using behaviour trees (BT) stored in a sqlite3 database (we call it BTBank). The ollama[4] library is used for the language modelling to map game states to human language and BTs, and vice versa.

[1] https://github.com/syrkis/c2sim/

[2] https://github.com/google/jax/

[3] https://blog.foersterlab.com/jaxmarl/

[4] https://ollama.com/

1 | Overview (cont.)

- ☒ SMAX visual playback (`src/{plot,smax}.py`).
- ☒ BT function constructor (`src/{bt,atomics}.py`).
- ☐ BT based trajectory (`src/smax.py`). (almost done)
  - ▶ Must traverse all leafs always (for array programming)[5].
- ☐ Implement the BTBank (`src/bank.py`).
- ☐ Language out (`src/llm.py`).
- ☐ Language in (`src/llm.py`).
- ☐ Smart way to generate atomics (gentic programming)?

[5] Has no effect on performance, as we are always as slow as slowest action

2 | SMAX

- Extensive work on visual playback of trajectory fig. 1.
  - ☒ Costum SMAX [1] vizualization.
  - ☒ Show unit type, team, health, attacks, and reward.
  - ☒ Successfully runnning 10K+ parallel environments.

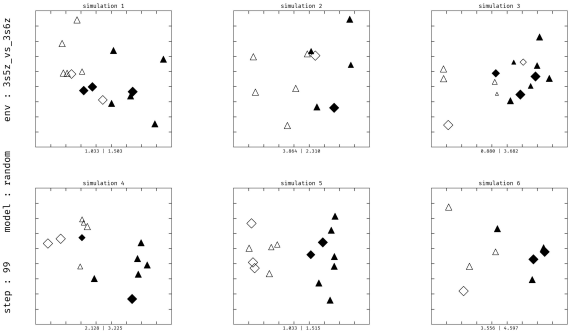

Figure 1: SMAX in parallel

2 | SMAX (cont.)

```
key = random.PRNGKey(0).split(num_envs)
env = make('SMAX', num_allies=n, num_enemies=m)
obs, state = vmap(env.reset)(key)
for _ in range(num_steps):
    act = vmap(act_fn)(rng, env, obs, state)
    obs, state, (_) = vmap(env.step)(act, state)
```

3 | Behaviour trees

- Behaviour trees (BT) are a way to model the behaviour of agents.
- They are used in games and robotics.

3 | Atomics

- Atomics are the leaves of the tree.
- They are the actions that the agent can take.

3 | BTBank

- BTBank is a library for creating and running BTs.
- It is written in Python.
- sqlite3 is used to store the trees.

4 | Language model

- The language model is a transformer model.
- I/O architecture.
- The output is a sequence of tokens.

References

[1] Alexander Rutherford et al. *JaxMARL: Multi-Agent RL Environments in JAX*. Dec. 2023. DOI: 10.48550/arXiv.2311.10090. arXiv: 2311.10090 [cs].