C2SIM

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1 | Overview

- SMAX
- Extensive work on visual playback of trajectory fig. **??**.
  - ☒ Costum SMAX vizualization.
  - ☒ Show unit type, team, health, attacks, and reward.
  - ☒ Runnning 10K+ parallel environments.

2 | Formal grammar

- We've defined a formal grammar (language) for behavior trees.

```
1 S (C (see enemy_0) :: C (see enemy_1) :: C (see enemy_2))
2 F (C (see ally_0 ) :: C (see ally_1) :: C ( see ally_2 ))
3 F (S (1 :: 2 :: A (attack any)) :: F (A (move center) :: A (stand)))
```

3 | Atomics

- Behavior Trees (BTs) are a way to model AI behavior.
- Instead of linear control flow, BTs use a tree structure.
- The leaves of the tree are atomic actions or conditions.
- Atomics are hand written JAX functions.

3 | DSL grammar

```
1 tree      : sequence | fallback | decorator | atomic
2 atomic    : action | condition
3 nodes     : tree ( :: tree )*
4 sequence  : S ( nodes )
5 fallback  : F ( nodes )
6 decorator : D ( nodes )
7 action    : A ( STRING+ )
8 condition : C ( STRING+ )
```

3 | DSL example

```
F (
  S (
    C ( see enemy_0 ) :: A ( attack enemy_0 )
  ) ::
  F (
    C ( see_enemy ) :: A ( find_enemy )
  ) ::
  A ( attack_enemy )
)
```

3 | Atomics

- Atomics are the leaves (actions/conditions) of the tree.
- They are JAX functions.
- Keep them simple and fast (complex behavior should come from the tree).
  - E.g. `move`, `attack`, `is_enemy`, `is_dead`, `n_in_range`, etc.
  - Maybe map out desired atomic functions.

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