

# Tactical Autonomous Language-Operated Network

Noah Syrkis  
IT University of Copenhagen  
Mar. 3, 2024

1 | Overview

2 | SMAX

3 | Behavior trees

4 | Atomic functions

5 | Mistral

# 1 | Overview

- ▶ Focus on real-time strategy (RTS) game.

# 1 | Overview

- ▶ Focus on real-time strategy (RTS) game.
- ▶ Specifically SMAX, the JAX based StarCraft II copy.

# 1 | Overview

- ▶ Focus on real-time strategy (RTS) game.
- ▶ Specifically SMAX, the JAX based StarCraft II copy.
- ▶ Units are controlled by behavior trees (BT).

# 1 | Overview

- ▶ Focus on real-time strategy (RTS) game.
- ▶ Specifically SMAX, the JAX based StarCraft II copy.
- ▶ Units are controlled by behavior trees (BT).
- ▶ The BTs are constructed by our large language model (LLM).

# 1 | Overview

- ▶ Focus on real-time strategy (RTS) game.
- ▶ Specifically SMAX, the JAX based StarCraft II copy.
- ▶ Units are controlled by behavior trees (BT).
- ▶ The BTs are constructed by our large language model (LLM).
- ▶ User interacts with system through the LLM...

# 1 | Overview

- ▶ Focus on real-time strategy (RTS) game.
- ▶ Specifically SMAX, the JAX based StarCraft II copy.
- ▶ Units are controlled by behavior trees (BT).
- ▶ The BTs are constructed by our large language model (LLM).
- ▶ User interacts with system through the LLM...
- ▶ ... or directly while being advised by the LLM.

## 2 | SMAX

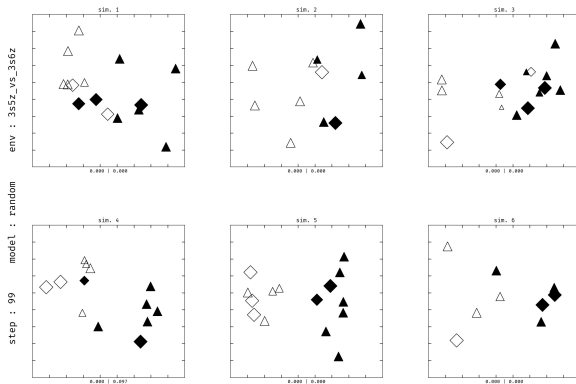


Figure 1: Running parallel SMAX environments



## 2 | SMAX (cont.)

- ▶ Trying to get SMAX [2] to work.
- ▶ SMAX is something something something something
- ▶ Focus on unitcontrol (no buildings, resources, etc).

### 3 | Behavior trees

- ▶ Currently trying to get BT to work.
- ▶ LLM should make structured output.
- ▶ This output must be BT, following a grammar.

- ▶ Tools:

- ▶ Overview by Lin [1]
- ▶ Grammar maker <sup>a</sup>.
- ▶ Pydantic <sup>b</sup>.

---

<sup>a</sup><https://grammar.intrinsiclabs.ai/>

<sup>b</sup><https://github.com/pydantic/pydantic>

### 3 | Behavior trees (cont.)

- ▶ BT output should follow a grammar.
- ▶ Military people like formal systems.
- ▶ BT should be formalized and validated.
- ▶ BT should be used for unit control and command issuing.
- ▶ Current approach is to represent behaviors trees as

## 4 | Atomic functions

- ▶ Manually written.
- ▶ Should written with genetic programming?

## 5 | Mistral

- 1 - LLM should output (or select) BT.
- 2 - BT should be used for unit control.

## References

- [1] Timothy Lin. *Generating Structured Output from LLMs*.  
<https://www.timlrx.com/blog/generating-structured-output-from-llms>. Nov. 2023.
- [2] Alexander Rutherford et al. *JaxMARL: Multi-Agent RL Environments in JAX*. Dec. 2023. DOI:  
**10.48550/arXiv.2311.10090**. arXiv: 2311.10090 [cs].