

LAB LOG

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1 | Gemma

2 | Nebellum

3 | MIII

4 | AIGS

1 | Gemma

- ▶ Comes in 1b, 4b, 12b, and 27b (and all in 4int)
- ▶ 99 custom tokens (using <pos> and <hp>)
- ▶ We can now vmap across pieces of intel...
- ▶ ... and use Gemma inside jit, scan and vmap

```
<start_of_turn>user  
{instruction}  
{intel}<end_of_turn>  
<start_of_turn>model  
{response}
```

Listing 1: Gemma intel template

2 | Nebellum

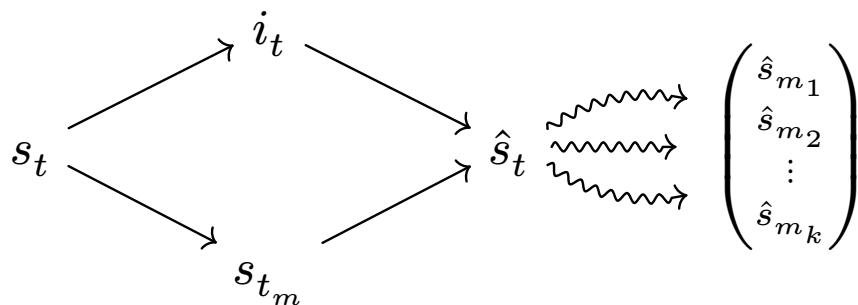


Figure 1: At time $t \in \{1, 2, \dots, n\}$ we have state s_t , intel i_t and, masked state s_{t_m} . We combine these into \hat{s}_t . Simulating k trajectories $\vec{\hat{s}}_m$, \hat{s}_t is used to estimate the importance of different aspects of \hat{s}_t .

- encode maps s_t to intel i_t and masked state s_m
- decode maps i_t and s_m to estimated state \hat{s}_t
- sample maps \hat{s}_t to k potential final states $\vec{\hat{s}}_n$

2 | Nebellum

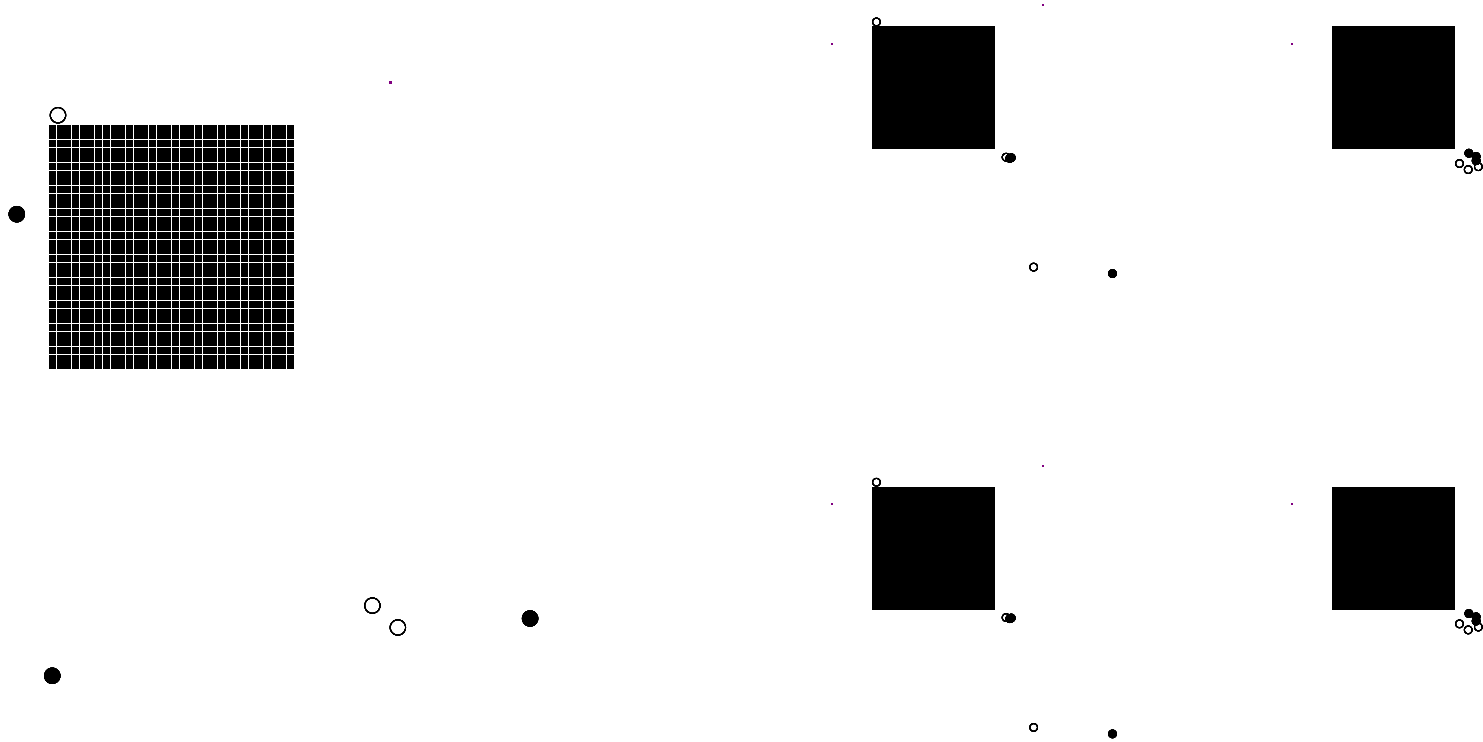


Figure 2: A 100 step trajectory (left) and four associated imagined trajectories (right) with starting at time points 1, 25, 50, and 75

2.1 | Intel

- ▶ Recall distance was *increasing* in previous map
- ▶ Map dictates convergence vs. divergence?
- ▶ Relationship between masks and dynamics

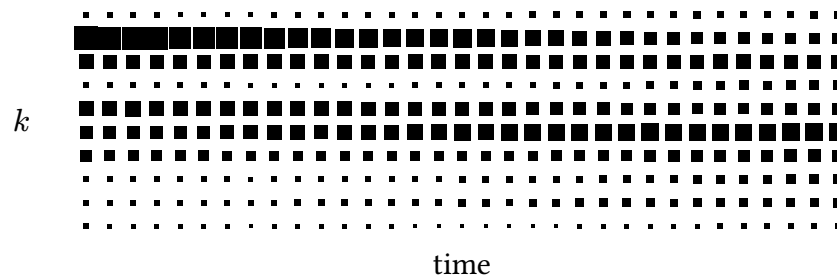
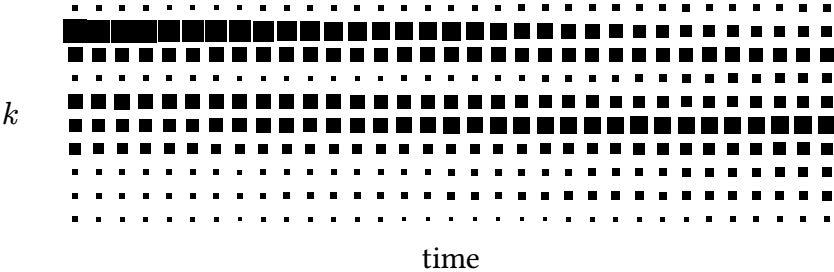
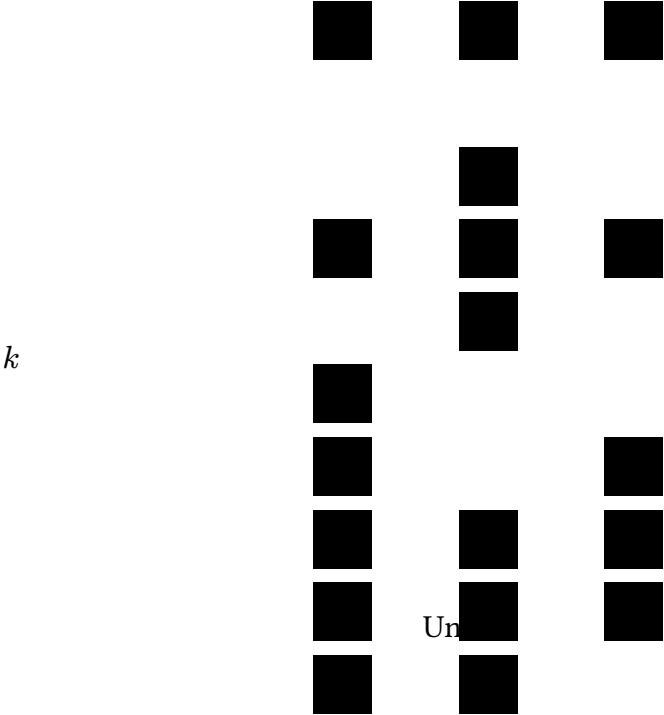


Figure 4: Distance between \hat{s}_{i_k} and s_i over time

2.1 | Intel



2.2 | `detel_fn(intel_fn(s))`

- ▶ Using gamma (jax native and easy fine tuning)
- ▶ As per Figure 6 we:
 1. We generate language intel i_t from state s_t
 2. Mask away some (maybe all) of state (s_{mt})
 3. Decode i_t and s_{mt} to get estimate $s_{\hat{t}}$
- ▶ See Appendix A for intel string templates
- ▶ Status: did `intel_fn` and doing `detel_fn`

```
1 Function IntelFunction( $s_t$ )
2   Generate mask for units not in sight
3   Generate  $i_t$  from  $s_t$  (could be lies)
4   Hide parts of  $s_t$  using mask to produce  $s_{mt}$ 
5   return  $i_t, s_{mt}$ 
6 end
7 Function DetelFunction( $i_t, s_{mt}$ )
8   Create prompt requesting indices to update
9   Use model to interpret  $i_t$  and  $s_{mt}$ 
10  Update  $s_{mt}$  with interpreted values
11  return updated state estimate  $\hat{s}_t$ 
12 end
13  $\hat{s}_t$ ) = DetelFunction(IntelFunction( $s_t$ ))
```

Figure 6: Pseudo code

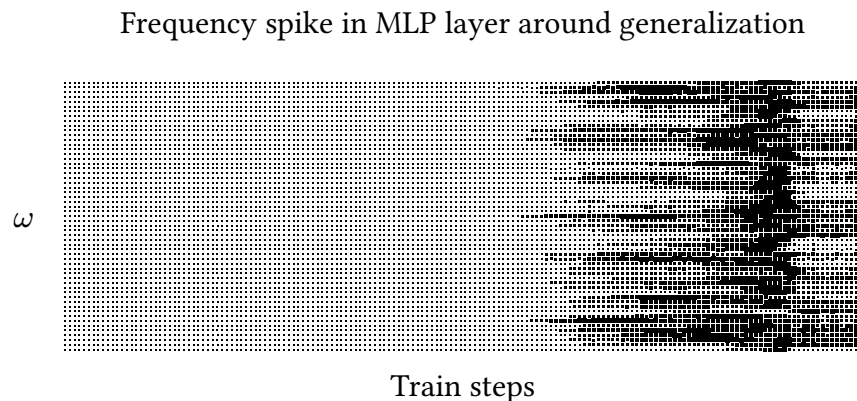


Figure 7: The spike in active frequencies during generalization indicate the presence of a non-generalizing and non-overfitting gradient component

- ▶ Grads have leaning and memory comps [1]
- ▶ Figure 7 Indicate a third, support-wheel comp
- ▶ Goal: publish in ICLR (better establish comp?)
- ▶ Now: chaning to better show spike across runs

4 | AIGS

MCTS

- ▶ Connect 4 pettingZoo [2]
- ▶ Implement MCTS
- ▶ Tweak params and compete

DRL

- ▶ Get unity ml-agent to run
- ▶ pick game. Use PPO.
- ▶ play against

QD

- ▶ implement map elite
- ▶ generate dataset of levels
- ▶ Play lebel with drl bot

Index of Sources

- [1] J. Lee, B. G. Kang, K. Kim, and K. M. Lee, “Grokfast: Accelerated Grokking by Amplifying Slow Gradients,” no. arXiv:2405.20233. Jun. 2024.
- [2] J. Terry *et al.*, “Pettingzoo: Gym for Multi-Agent Reinforcement Learning,” *Advances in Neural Information Processing Systems*, vol. 34, pp. 15032–15043, 2021.

A | Intel templates

```
> "Breaking news from the battlefield: Allied forces report enemy combatant spotted at {pos} with approximately {hp} health remaining."
> "Hey, did you hear? My cousin saw someone lurking around {pos} yesterday. They looked pretty beat up, maybe only {hp} health left. Be careful out there."
> "URGENT DISPATCH: Target acquired at coordinates {pos}. Visual assessment indicates {hp} vitality points. Proceed with caution."
> "Journal Entry, Day 47: Today I encountered a strange figure at {pos}. They appeared wounded, perhaps {hp} strength remaining.."
> "According to reliable sources, an individual was recently sighted at {pos} in poor condition, estimated at {hp} health. Local authorities knows."
> "Overheard at the tavern: 'I'm telling you, I saw them clear as day at {pos}! Could barely stand, maybe {hp} health at most. Something's not right.'"
> "Scout's Log: Entity detected at position {pos}. Current status: {hp} hit points. Monitoring situation closely."
> "My grandmother always said to watch out for strangers at {pos}. Well, I just saw one there, and they only had about {hp} health by the looks of it."
> "MEDICAL REPORT: Patient last seen at location {pos} with critical injuries. Estimated {hp} health remaining. Immediate assistance required."
> "Text message received: 'omg just saw someone at {pos}!! they look hurt bad, maybe like {hp} health?? should we call someone???'"
```