

SLM Lab: modular deep RL framework

github.com/kengz/SLM-Lab

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SLM Lab is a modular deep reinforcement learning framework in PyTorch. It implements a number of canonical algorithms using modular and reusable components, provides an automated experiment and analytics framework focusing on reproducibility, introduces a multi-dimensional fitness metric, and integrates with OpenAI Gym and Unity ML-Agents.

Algorithms

All algorithms can be distributed hogwild-style using the lab's unified API.

- *SARSA, DQN, DDQN, DuelingDQN*
- *Prioritized Exp. Replay, CER*
- *REINFORCE, A2C, A3C, PPO, DPPO*
- *Self-Imitation Learning on A2C, PPO*

Network

Auto-infers input/output dims; supports (Hydra) multi-head/tail.

- *MLPNet, HydraMLPNet*
- *RecurrentNet, ConvNet*
- *DuelingMLPNet, DuelingConvNet*

Memory

- *Off-policy Replay, ConcatReplay, AtariReplay, PrioritizedReplay, AtariPrioritizedReplay, ...*
- *On-Policy OnPolicyReplay, OnPolicySeqReplay, OnPolicyAtariReplay...*

Env

- *OpenAI Gym & Unity ML-agents*
- *more to come using standard API*

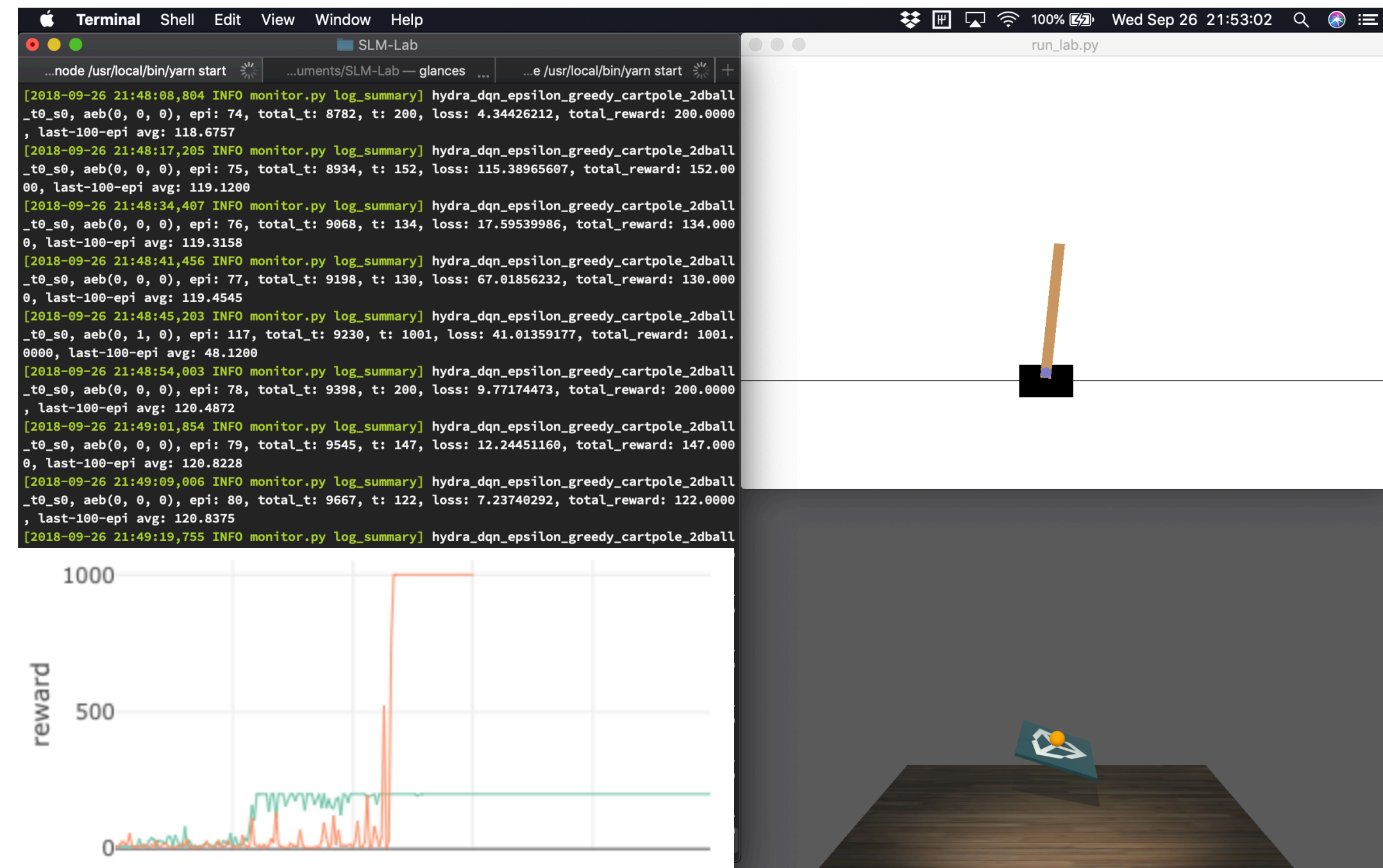
Fitness Metric

Introduces a richer vectorial fitness metric to measure agent's performance.

- ***fitness** = [strength, speed, stability, consistency]*

Benchmark

- *CartPole, LunarLander, ..., soon Atari*
- *in-progress: check Github for results*



SLM Lab allows multi-task learning with arbitrary set of environments: HydraDQN simultaneously solves Gym-CartPole and Unity-2DBall

Modularity focus from component reuse, hence less code, more tests, and fewer bugs

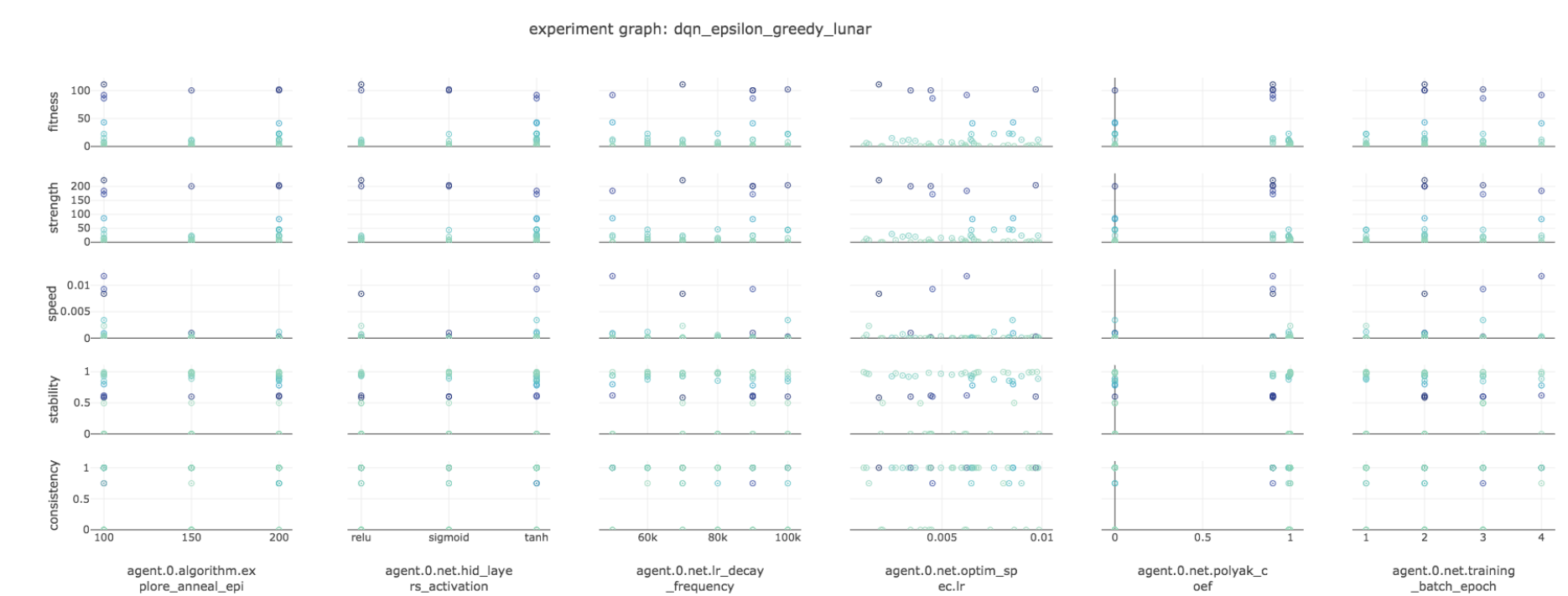
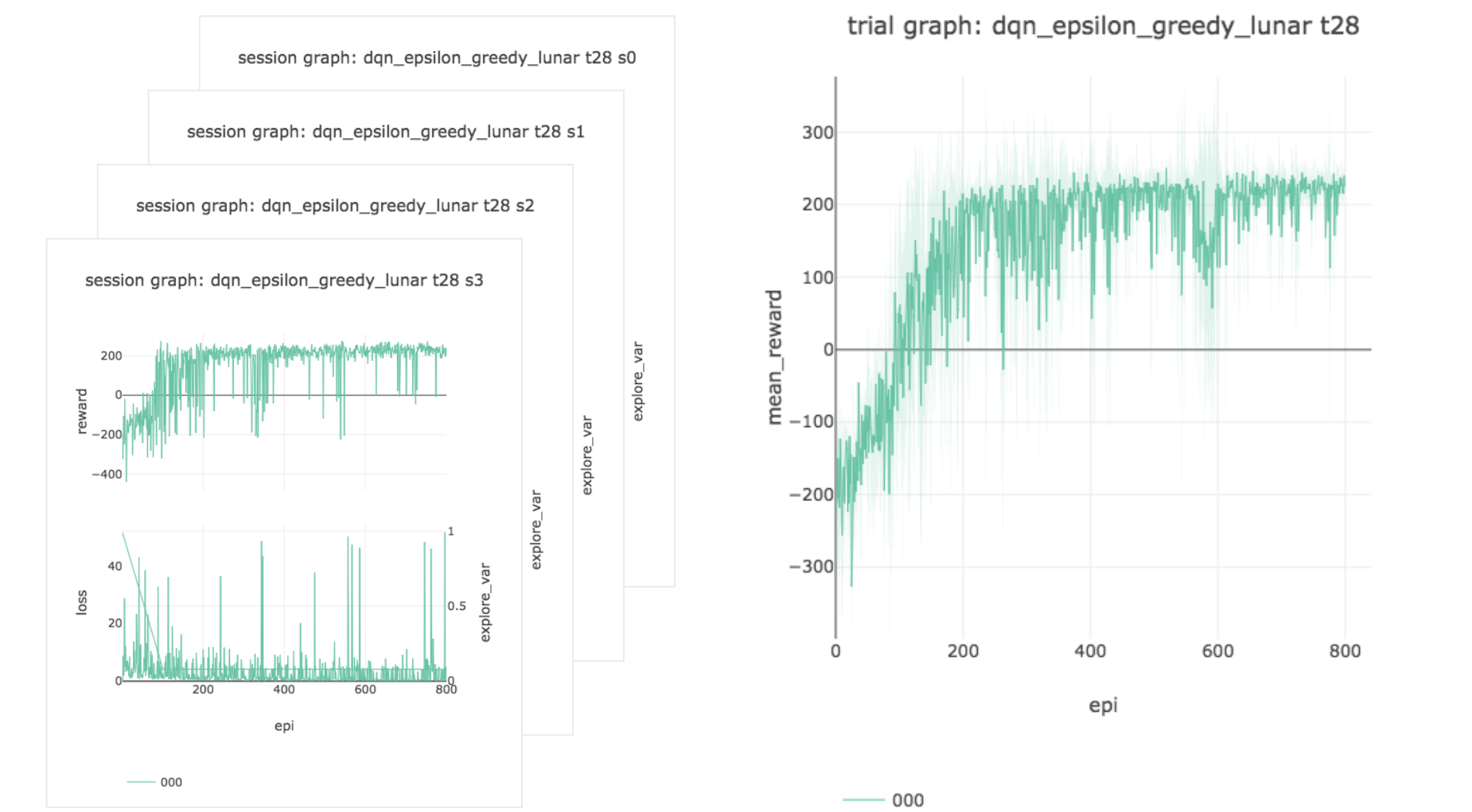
Simplicity component design closely corresponds to how papers discuss RL

Analytical clarity hyperparameter search: results automatically analyzed by Session, Trial, Experiment

Reproducibility only the *spec file* and a git SHA are needed to fully reproduce an experiment. Data is open-access.

Experiments

- distributed hyperparam. search: Ray Tune
- replication with multiple random seeds
- graphs and fitness metric
- Pull Request with scientific report format
- **spec file + git SHA = reproducibility**



DQN lunar benchmark #191

