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Shengyi "Costa" Huang

Summary

I am a PhD candidate at Drexel University working on deep reinforcement learning (RL), with a special focus on creating efficient algorithms and reproducible research. My advisor is Santiago Ontañón. I am the creator of CleanRL, a top 30 most popular deep RL library in the world.

Education

Ph.D. in Computer Science
Drexel University, Philadelphia, PA **Expected May 2023**

B.S in Computer Science, B.S in Mathematics
Furman University, Greenville, SC **May 2018**

Experience

Data Scientist Intern
Riot Games, Los Angeles, CA **Jun 2022 – Sep 2022**

- Conducted research at the AI Accelerator team, with a focus on applying cutting-edge multi-agent deep reinforcement learning algorithms to the next generation of games.
- Led the technical discussions on algorithm design and iterated hundreds of research experiments to create playful and intelligent game-playing agents.
- Implemented an automated pipeline that saved 80% human labor spent on the evaluation process.
- Prototyped a novel visualization tool to accelerate novel strategy discovery via T-SNE.

Deep Learning Algorithm Engineering Intern
NVIDIA, Santa Clara, CA **Mar 2022 – Jun 2022**

- Built better utilities in NVIDIA's Isaac Gym robotic simulation environment, which helps researchers to develop, test, and manage AI-based robots.
- Analyzed and benchmarked the performance of state-of-the-art deep RL frameworks such as Stable-baselines 3, rl_games, RLLib, and CleanRL, creating solid baselines for the research team.
- Implemented a more efficient multi-GPU training paradigm for rl_games that increased up to 20% more system throughput for training agents.
- Prototyped and delivered the integration between CleanRL and Isaac Gym, significantly lowering the barrier of entry to customize Isaac Gym for research.

Deep Learning Growth Engineer Intern
Weights and Biases, Palo Alto, CA **Jun 2021 – Sep 2021**

- Researched 37 implementation details of Proximal Policy Optimization. Published at ICLR 2022.
- Contributed the W&B visualization integration to popular RL projects, such as the MineRL competition (16k views) and Stable-baselines 3 library (used by 400+ packages).
- Created multiple ML educational content, including a blog post on AWS SageMaker and a webinar on experiment tracking and analysis workflow (200 + views on YouTube).

Machine Learning Engineer Intern
Curai Health, Palo Alto, CA **Apr 2021 – Jun 2021**

- Analyzed 4 years of experiment management needs in an AI-first healthcare startup.
- Implemented an experiment management pipeline that was adopted by the team's workflow, which covered dataset versioning, experiment orchestration, tracking, analysis, and tuning.
- Led the design of a prototype project to generate medical conversation by leveraging DialoGPT. Published at ML4H 2021.

Graduate Research Assistant
Drexel University, Philadelphia, PA **Sep 2019 – Jun 2020**

Graduate Teaching Assistant
Drexel University, Philadelphia, PA **Sep 2018 – Jun 2019**

Projects

CleanRL (github.com/vwxyzjn/cleanrl, 1.2k stars on GitHub)

High-quality single file implementation of Deep Reinforcement Learning algorithms with research-friendly features

- Python PyTorch OpenAI Gym Tensorboard Docker AWS Weights and Biases Deep Q-learning Policy Gradient Visualization

Gym-MicroRTS (github.com/vwxyzjn/gym-microrts, 100 stars on GitHub)

The OpenAI Gym wrapper of MicroRTS for deep RL research

- Python OpenAI Gym Policy Gradient Real-time Strategy Games Docker AWS Learning through Self-play CI/CD Numpy

Portwarden (github.com/vwxyzjn/portwarden, 372 stars on GitHub)

Create Encrypted Backups of Your Bitwarden Vault with Attachments

- Go Docker Kubernetes AES Encryption

Publications

Weng, J., Lin, M., **Huang, S.**, Liu, B., Makoviichuk, D., Makoviychuk, V., Liu, Z., Song, Y., Luo, T., Jiang, Y. and Xu, Z., 2022. EnvPool: A Highly Parallel Reinforcement Learning Environment Execution Engine, NeurIPS 2022.

Huang, S., Kanervisto, A., Raffin, A., Wang, W., Ontan'on, S., & Dossa, R.F. A2C is a special case of PPO. *preprint, 2022*

Huang, S., Dossa, R., Raffin, A., Kanervisto, A., Wang, W. The 37 Implementation Details of Proximal Policy Optimization. *ICLR Blog Post Track, 2022*

Huang, S., Dossa, R., Ye, C., Braga, J., CleanRL: High-quality Single-file Implementations of Deep Reinforcement Learning Algorithms, *Journal of Machine Learning Research, 2022*

Huang, S., Ontañón, S., "A Closer Look at Invalid Action Masking in Policy Gradient Algorithms", *FLAIRS-35, 2022*

Compton, R., Valmianski, I., Deng, L., **Huang, C.**, Katariya, N., Amatriain, X., Kannan, A. MEDCOD: A Medically-Accurate, Emotive, Diverse, and Controllable Dialog System. *Machine Learning for Health, 2021.*

Dossa, R., **Huang, S.**, Ontañón, S., Matsubara, T., "An Empirical Investigation of Early Stopping Optimizations in Proximal Policy Optimization", *IEEE Access, 2021*

Huang, S., Ontañón, S., Bamford, C., Grela, L., "Gym-μRTS: Toward Affordable Full Game Real-time Strategy Games Research with Deep Reinforcement Learning", *IEEE Conference on Games 2021*

Bamford, C., **Huang, S.**, Lucas, S., "Griddly: A platform for AI research in games.", *AAAI 2021 Reinforcement Learning in Games Workshop*

Huang, S., Ontañón, S., "Action Guidance: Getting the Best of Training Agents with Sparse Rewards and Shaped Rewards", *AIIDE 2020 Strategy Games Workshop*

Huang, S., Healy, C., "StreetTraffic: a Library for Traffic Flow Data Collection and Analysis", poster presentation in *ACMSE 2018 Conference*

Skills

Python, Pytorch, Tensorflow, Numpy, Git, Linux, Statistics, Go, Docker, JavaScript, SQL.

Relevant courses

Artificial Intelligence, Machine Learning, Computer Vision, Computer Graphics, Algorithmic Game Theory, Software Design, Statistics, Probability, Linear Algebra, Real Analysis, Abstract Algebra, Fundamentals of Databases, Developing User Interfaces