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Shengyi "Costa" Huang

Summary

- Third-year CS Ph.D. student specializing in Deep Reinforcement Learning (DRL) research.
- Proficient in Python, Numpy, Pytorch for building Machine Learning models.
- Authored a DRL library CleanRL with algorithms such as Deep-Q Networks and Proximal Policy Gradient. Received 340+ upvotes from Reddit and 274+ stars from Github.
- Streamline experiment version management that keeps tracks of 5,000+ experiments with logging of hyper-parameters and important metrics.

Education

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

- Advisor: Dr. Santiago Ontañón
- Research Area: Game Artificial Intelligence with Deep Reinforcement Learning

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

Experience

Ph.D. Student Researcher
GAIMS Lab, Drexel University, Philadelphia, PA **Sep 2018 – Present**

- Design a DRL library that displays complete hyper-parameters, training metrics, and exact commands to reproduce experiments in a dashboard (https://benchmark.cleanrl.dev).
- Develop new DRL algorithms and techniques for Real-time Strategy (RTS) games to improve sample-efficiency in large discrete action spaces.
- Create scalable DRL infrastructure based on AWS to launch thousands of jobs concurrently.

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

- Experimented with Dynamic Bayesian Network (DBN) to infer players' intentions in RTS games, which could significantly improve the agents' ability to counter opponents' strategy.
- Interfaced communication between Java and Python to incorporate more powerful data analysis library and machine learning tools.
- Practiced Agile Development by communicating our findings with the funding agency regularly.

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

- Tutored 30+ students with Python and Java lab assignments.
- Graded 200+ students' homework and provided detailed feedback.
- Provide useful resources and instructions for students' final projects.

Backend Developer
Carely, Inc., Greenville, SC **Jun 2018 – Sep 2018**

- Developed the API server using Go and MySQL that served 10,000+ users.
- Perfected the development environment by using Docker to enable cross-platforms reproducibility.
- Automated API test workflow by using OpenAPI (Swagger).

Software Developer
Furman University, Greenville, SC **Oct 2017 – Feb 2018**

- Developed an application for the commencement of 200+ graduating students.
- Collaborated with the university registrar and IT department for logistical setups.
- Utilized Go and Algolia to build real-time search of student's profiles.

Teaching Assistant

Furman University, Greenville, SC **Aug 2017 – Dec 2017**

- Tutored 30+ students on Web Programming topics: JavaScript, VueJs, Webpack, Vuetify, AWS, PHP, Go, MySQL, Docker, REST API, Python, and Laravel.
- Helped the professor with preparing lab materials with respect to the latest tools and projects.
- Collaborated with the professor to create the course website using the latest front-end tools.

Research Fellow

Furman University, Greenville, SC **Jun 2017 – Aug 2017**

- Authored a Python package, StreetTraffic, that collects more than 100 GBs of traffic flow data.
- Worked with Dr. Chirs Healy to conduct research on travel plan recommendations.
- Set up proper unit-tests and documentation by using Sphinx.

Projects

(Onging) CleanRL (benchmark.cleanrl.dev)

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

(Onging) Gym-MicroRTS (github.com/vwxyzjn/gym-microrts)

The OpenAI Gym wrapper of MicroRTS for DRL research

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

(Onging) Gym-PySC2 (sc2.cleanrl.dev)

The OpenAI Gym wrapper of DeepMind's PySC2 for DRL research

- Python OpenAI Gym Policy Gradient Real-time Strategy Games

(2018) Portwarden (github.com/vwxyzjn/portwarden)

Create Encrypted Backups of Your Bitwarden Vault with Attachments

- Go Docker Kubernetes AES Encryption

(2017) StreetTraffic (streettraffic.org)

Collects the traffic flow data of your favorite routes and cities

- Python JavaScript Policy Gradient Real-time Strategy Games

Skills

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

Publications

Huang, S., Ontañón, S., "Action Guidance: Getting the Best of Training Agents with Sparse Rewards and Shaped Rewards", *AIIDE 2020 Strategy Games Workshop, submitted to ICLR 2021*

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

Huang, S., Ontañón, S., "A Closer Look at Invalid Action Masking in Policy Gradient Algorithms", *preprint*

Huang, S., Ontañón, S., "Comparing Observation and Action Representations for Reinforcement Learning in μRTS", *AAIIDE 2019 Strategy Games Workshop*

Huang, S., Grethlein, D., "Generating Interpretable Class Model Visualizations for CNNs with Varying Dilation Factors", *preprint*

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