

Austin Nguyen

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Education

Ph.D. in Computer Science Engineering

Aug 2022 - PRESENT

University of Michigan, Ann Arbor

Expected Graduation Date: April 2028

Advisor: Michael Wellman

BA in Computer Science, *High Distinction in General Scholarship*

Aug 2017 - May 2021

University of California, Berkeley

Thesis Title: Scalable, Decentralized Multi-Agent Reinforcement Learning Inspired by Stigmergy and Ant Colonies

Advisor: Ronald S. Fearing

Department GPA: 4.0

Overall GPA: 3.92

Research Interests

Innovating novel multi-agent reinforcement learning algorithms geared towards improving scalability, training stability and sample efficiency in variegated domains and applications, particularly those that have tangible societal impact.

Research Experience

Ph.D. Student Research

Aug 2022 - PRESENT

Strategic Reasoning Group under Michael Wellman, University of Michigan, Ann Arbor

- Developing Policy Space Response Oracles (PSRO) adaptation for cooperative games that require coordinated action between agents
- Engaging in in-depth literature review to narrow down thesis topic

Research Assistant

Oct 2019 - May 2021

Biomimetic Millisystems Lab under Ronald Fearing, University of California, Berkeley

- Completed honors thesis on decentralized multi-agent learning using ant-inspired pheromone coordination and hierarchical reinforcement learning for multi-agent path planning and environment modification
- Designed multi-agent reinforcement learning algorithm inspired by difference rewards to boost scalability of decentralized learning
- Used V-REP robot simulator with ROS interface in Linux (Ubuntu) environment

Research Assistant

Jan 2019 - Sep 2019

Swarm Labs under Kristofer Pister, University of California, Berkeley

- Used Bayesian Optimization to determine optimal quadcopter hovering parameters for proportional-integral-derivative (PID) controller
- Implemented ensemble neural networks with PyTorch and k-means clustering to train a model for quadcopter movement dynamics
- Designed general optimal PID parameter generator for any indefinitely hovering quadcopter with arbitrary dynamics and properties

Research Papers (Non peer-reviewed)

Nguyen, Austin A. (2021) "Scalable, Decentralized Multi-Agent Reinforcement Learning Inspired by Stigmergy and Ant Colonies."
<https://arxiv.org/abs/2105.03546>.

Nguyen, Austin A, Zhu, Jerry, & Zhu, Peter. (2020) "Combining Deep Bayesian Inverse Reinforcement Learning from Preferences (B-REX) with Bayesian Robust Optimization for Imitation Learning (BROIL)" for CS285 Deep Reinforcement Learning final research paper.

Relevant Coursework

Deep Reinforcement Learning - *Compsci 285 - Graduate Level*

Learned various deep reinforcement learning algorithms along with their mathematical motivations and derivations, making implementations

for MuJoCo tasks. Innovated final research project that created an end-to-end inverse reinforcement learning framework with risk tolerance.

Theoretical Statistics - Statistics 210A - Graduate Level

Studied material geared towards research careers in statistics and mathematical machine learning. Concepts included, but not limited to, resampling methods, hypothesis testing and statistical decision theory.

Introduction to Machine Learning - Compsci 189 - Upper Division

Introduced to the mathematical background of machine learning techniques. General topics included neural network variations, regression, clustering, and classification. Concepts included but not limited to kernel regression, support vector machines, random forests and PCA.

Teaching & Work Experience

Software Engineer

Aug 2021 - May 2022

AWS EC2 Nitro, Amazon Web Services

- Designing framework to autonomously maintain health of EC2 cloud computing fleet, used by all AWS customers and employees
- Collaborating and coordinating with team members in prioritizing and planning EC2 health maintenance campaigns to best serve AWS

Machine Learning Teaching Assistant

Aug 2020 - Dec 2020

CS189 Course Staff, University of California, Berkeley

- Led and facilitated course discussions for over 100 students by constructing mini-lectures and giving one-on-one guidance to students
- Lectured and organized test review sessions to provide course topic overviews, test preparation, and outlets to answer student questions

Software Engineer Intern

Jun 2020 - Aug 2020

AWS DynamoDB, Amazon Web Services

- Designed and implemented request router placement algorithm to maximize robustness across 50,000 cloud computing instances in AWS
- Helped construct request router ingestion automation framework still currently used by all of DynamoDB

Projects

Multi-Agent Pursuit and Evasion

Mar 2021 - May 2021

Final Project for Introduction to Robotics, University of California, Berkeley

- Designed a swarm intelligence-inspired algorithm to coordinate and commandeer multiple agents to pursue and capture one evader agent
- Designed techniques for pursuers to appropriately predict evader movement and devise coordinated strategies to trap the evader in real-time

Artificial Intelligence Writer

Mar 2019 - May 2021

Freelance Published Articles, Medium

- Published Medium articles across two publications (Towards Data Science, Towards AI) on AI foundations and novel RL algorithms
- Translated state-of-the-art research and mathematically inclined concepts into easily digestible articles for other data scientists and readers

Computer Vision Controlled Mouse

Dec 2019 - Jan 2020

Personal Project, University of California, Berkeley

- Used OpenCV, image processing techniques such as convex hulls extraction, and PyTorch to train a CNN for hand gesture recognition
- Implemented real-time hand gesture detection and tracking to control mouse cursor events using a designated webcam

AI Gym Reinforcement Learning Challenges

Jan 2019 - Aug 2019

Personal Project, University of California, Berkeley

- Implemented algorithms such as DQN, SARSA, and Q Actor-critic to solve classic reinforcement learning problems using PyTorch
- Self-taught and researched numerous reinforcement learning algorithms such as Soft Actor-Critic, TD3, PPO, and TRPO

Honors

National Science Foundation Graduation Research Fellowship

April 2022

High Distinction in General Scholarship

May 2021

Honors in Computer Science

May 2021

Upsilon Pi Epsilon

Dec 2019

Dean's List

May 2019, Dec 2020

Technical Skills

Programming languages: Python, Java, C, Lua, Ruby

Libraries and tools: OpenCV, ROS, CoppeliaSim, Gazebo, PyTorch

Others: Linux (Ubuntu), Windows OS, MAC OS