

SUMEET BATRA

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EDUCATION

University of Southern California

4th year Computer Science PhD student, USC Robotic Embedded Systems Lab (RESL), GPA 4.0

Advisor: Gaurav Sukhatme

Research Interests: Reinforcement Learning, Generative Models, Quality Diversity and open-ended learning

Relevant Coursework: Advanced Analysis of Algorithms, Deep Learning, Machine Learning, Advanced Robotics

University of Colorado Boulder

Bachelor of Science (summa cum laude), Computer Science (Minor: Applied Math) 4.0/4.0

TECHNICAL SKILLS

- Python (advanced), PyTorch (advanced), C++ (proficient), ROS (proficient), Robotics (advanced), OpenCV (past experience)
- Deep Learning, Deep Reinforcement Learning, Optimization, Quality Diversity
- Applied AI research internship experience working in large teams and on large codebases

PUBLICATIONS

- **Sumeet Batra**, Bryon Tjanaka, Matthew C. Fontaine, Aleksei Petrenko, Stefanos Nikolaidis, Gaurav Sukhatme. "Proximal Policy Gradient Arborescence for Quality Diversity Reinforcement Learning" – *ICLR 2024 Spotlight paper*
- Shashank Hegde*, **Sumeet Batra***, KR Zentner, Gaurav Sukhatme "Generating Behaviorally Diverse Policies with Latent Diffusion Models" – *in Neurips 2023*
- Zhehui Huang, **Sumeet Batra**, Tao Chen, Rahul Krupani, Tushar Kumar, Artem Molchanov, Aleksei Petrenko, James Preiss, Zhaojing Yang, Gaurav Sukhatme. "QuadSwarm: A Modular Multi-Quadrotor Simulator for Deep Reinforcement Learning with Direct Thrust Control" – *ICRA 2023 Workshop paper*
- **Sumeet Batra***, Zhehui Huang*, Aleksei Petrenko, Tushar Kumar, Artem Molchanov, Gaurav Sukhatme. "Decentralized Control of Quadrotor Swarms with End-to-end Deep Reinforcement Learning" – *In CoRL 2021*
- Gautam Salhotra, Shashank Hegde, **Sumeet Batra**, Peter Englert, Gaurav S. Sukhatme. "Guided Learning of Robust Hurdling Policies with Curricular Trajectory Optimization"
- **Sumeet Batra**, John Klingner, and Nikolaus Correll. "Augmented Reality for Human-Swarm Interaction in a Swarm-Robotic Chemistry Simulation." *In DARS-SWARM 2021*

RESEARCH EXPERIENCE

Research Intern at NVIDIA: Quality Diversity and Generative Models for Diverse Scenario Generation May'23 – September'23

I conducted research on using diffusion generative models and quality diversity algorithms to generate a diverse range of realistic and challenging autonomous driving scenarios. I trained diffusion models to generate multi-agent trajectories conditioned on real traffic maps and data, with behavioral diversity over agent accelerations and # of lane changes.

Research Intern at NVIDIA: High Throughput Simulation for RL and Neural Traffic Modeling May 2022 – August 2022

I successfully completed two projects over the course of my internship:

- Implemented a high-throughput vectorized simulator enabling large-scale experience collection for Reinforcement Learning algorithms
- Integrated NVIDIA's entire control and planning pipeline into DriveSim, a highly realistic simulator for autonomous vehicle development. This enables the team to use their pipeline as a Neural Traffic Model in a realistic simulator, enabling further testing, validation, and refinement of their algorithms.

Research Intern at NIST: Generative Adversarial Networks (GANs) June 2019 – May 2020

- Designed a flexible framework using PyTorch to automate large scale factor-screening experiments of different GAN architectures, and developed quantitative evaluation metrics to be used in these experiments

- Implemented many modern GAN architectures, including DCGAN, PACGAN, LSGAN, etc., as well as training optimization techniques such as Spectral Normalization, Minibatch Discrimination, Feature Matching, etc. on several datasets like MNIST, CIFAR, etc. as well as a custom dataset from the signal processing group at NIST
- Worked towards designing factor-screening experiments, as well as creating a new GAN architecture to replicate 4G LTE signals.

Undergraduate Research Assistant – CAIRO AI and Robotics Lab

January 2019 – May 2019

- Worked under Prof. Bradley Hayes and other graduate students on various machine learning for Human Robot Interaction (HRI) projects.
- Used PoseCNN, a 6-DOF joint object pose estimator and classifier, to enable a Baxter robot to assign scores to different workspaces based on their 'cleanliness'. Cleanliness was determined using the classification of the object (trash, water bottle, etc.), as well as the object's 3D pose and orientation relative to other objects in the workspace.

ACHIEVEMENTS

- DoD SMART Scholarship Awardee 2020
- USC PhD Fellowship Awardee
- Graduated summa cum laude from the University of Colorado Boulder
- Undergraduate Research Opportunities Program Awardee – 2016
- Undergraduate Research Opportunities Program Awardee – 2018
- Accepted into the highly selective Discover Learning Apprenticeship (DLA) 1-year research program at CU Boulder
- Nominated for best research presentation and attended the 2017 research symposium through DLA
- Engineering Merit Scholarship 2017