Jack Lu

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Education

New York University *Sep 2023 - Present*
Ph.D. in Computer Science
Advised by: Mengye Ren
Research focus: Abstract Reasoning, Few-Shot Learning, Adaptive Foundation Models, Generative Modeling

University of Waterloo *Sep 2018 – May 2023*
B.Math. in Computer Science
B.Math. in Statistics
B.Math. in Combinatorics & Optimization Overall Cumulative GPA 4.0

Experience

Ph.D. Student and Research Assistant *Sep 2023 - Present*
Supervised by Prof. Mengye Ren

- Developed a diffusion model-based method for few-shot learning of abstract concepts and for reducing data replication; accepted at **ECCV 2024**
- Enhanced LLMs' few-shot reasoning ability using novel neural program synthesis methods for the ARC-AGI challenge; **preparing a submission to COLM 2025**
- Researching test-time training and RLHF methods for personalized diffusion models
- Researching hierarchical representations in diffusion models

Research Intern | Waabi *Toronto, Canada | Sep 2022 – present*
Supervised by Prof. Raquel Urtasun

- Conducted research on diffusion models and graph neural networks
- Developed deep generative models for realistic and controllable traffic scenes; accepted at **ICRA 2024**

Research Intern | NVIDIA *Toronto, Canada | Sep 2021 – Mar 2022*
Supervised by Prof. Sanja Fidler

- Conducted research to improve autonomous vehicle perception models with synthetic data training, domain adaptation, and domain randomization methods
- Applied domain-adversarial training techniques and asset randomization methods to train large-scale computer vision networks, significantly improved 3D object detection metrics
- Engineered a comprehensive synthetic data evaluation pipeline with distribution matching metrics

Deep Learning Engineer | NVIDIA *Toronto, Canada | May 2021 – Aug 2021*

- Reduced the failure rate of NVIDIA autonomous vehicle path detection model by 21% using synthetic adversarial samples
- Accelerated collision detection in NVIDIA DriveSim by ~7 times with a quadtree-based search algorithm
- Engineered randomization features in NVIDIA's synthetic data generator (e.g., lighting, object placement) and scaled data generation to over 2M frames for training autonomous vehicle perception models

Deep Learning Engineer | DarwinAI *Waterloo, Canada | Sep 2020 – Dec 2020*
Supervised by Prof. Alexander Wong

- Conducted research on computer vision models for CT scan analysis
- Developed a pulmonary fibrosis progression prediction network for clients in the pharmaceutical industry, accepted at **Frontiers in Artificial Intelligence, 2021**

Cognitive Software Developer | IBM *Ottawa, Canada | Jan 2020 – Apr 2020*

- Developed and deployed a tabular data column clustering algorithm with word embeddings and ontology trees; co-authored a patent on the novel approach
- Significantly improved IBM Cognos Analytics chatbot's NER model accuracy with BERT model backbone

Full Stack Developer | Deep Trekker *Kitchener, Canada | May 2019 – Aug 2019*

- Engineered a location tracking application with OpenStreetMap API that enables remote robot tracking
- Refactored robot controller UI/UX with custom QML templates, reducing the codebase by over 50%

Publications

Jack Lu, Ryan Teehan, Mengye Ren. *ProCreate, Don't Reproduce! Propulsive Energy Diffusion for Creative Generation*. In *European Conference on Computer Vision (ECCV)*, 2024

Jack Lu*, Kelvin Wong*, Chris Zhang, Simon Suo, Raquel Urtasun. *SceneControl: Diffusion for Controllable Traffic Scene Generation*. In *International Conference on Robotics and Automation (ICRA)*, 2024

Alexander Wong, **Jack Lu**, Adam Dorfman, Paul McInnis, Mahmoud Famouri, Daniel Manary, James Ren Hou Lee, Michael Lynch. *Fibrosis-Net: A Tailored Deep Convolutional Neural Network Design for Prediction of Pulmonary Fibrosis Progression from Chest CT Images.* In *Frontiers in Artificial Intelligence*, 2021

Awards

Winston and Diana Cherry Scholarship - $2,250	*2023*
Engineering Faculty/Staff Upper Year Scholarship - $500	*2021*
President's Research Award - $1,500	*2020*
University of Waterloo President's Scholarship of Distinction – $5,000	*2019*
Term Dean's Honours List/Term Distinction (all undergraduate terms)	*2018*

Skills

Languages: Python, C++, C, Scala, JavaScript, Java, R, SQL, HTML, CSS
Libraries/Frameworks: PyTorch, Tensorflow, Keras, Scikit-learn, Pandas
Others: Docker, Slurm, Spark, Hadoop, Bazel, Linux