Yi Ao (Jack) Lu

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Education

New York University   *Sept 2023 - Present*
PhD Computer Science
Advised by: Mengye Ren
Research focus: deep generative models, few-shot learning, representation learning

University of Waterloo   *Sept 2018 - Present*
BMATH Computer Science, Honours, Co-op
BMATH Statistics, Honours, Co-op
BMATH Combinatorics & Optimization, Joint Honours, Co-op   Overall Cumulative GPA 95.62%

Research Experience

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

- Conducted research for traffic scene generation with set-generation models, deep generative models, and graph neural networks.
- Developed SceneControl: a novel diffusion model for realistic and controllable traffic scene generation

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

- Conducted research for improving AV perception models with synthetic data training, domain adaptation methods, and domain randomization techniques.
- Achieved significant mAP improvement on the nuScenes 3D object detection dataset through domain-adversarial training techniques and novel asset-randomization methods.
- Engineered a data evaluation pipeline with all major distribution matching metrics (e.g., IS, FID, KID).

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

- Developed Fibrosis-Net: a pulmonary fibrosis progression prediction network for clients in the pharmaceutical industry.
- Conducted investigation in distributed training performance of computer vision models with Slurm and Horovod. Significantly improved distributed training performances of various computer vision models.

Research Assistant | Vision and Image Processing Lab   *Waterloo, Canada | Sep 2019 – Dec 2019*
Supervised by Prof. David Clausi

- Developed object detection and classification models for hockey player identification and jersey number recognition from hockey game footage.

Industry Experience

Deep Learning Engineer | NVIDIA   *Remote | May 2021 – Aug 2021*

- Reduced the failure rate of NVIDIA autonomous vehicle's path detection model by 21% by training it against synthetic data with adversarial scenarios.
- Accelerated collision detection in NVIDIA DriveSim by ~7 times with a quadtree-based search algorithm.
- Engineered scene randomization interfaces in NVIDIA DriveSim with support for 5+ diversity features (e.g., lighting, object placement); scaled data generation to 2M+ frames for training AV perception DNNs.

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 application 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 allows remote tracking of robots.
- Refactored robot controller UI/UX with custom QML templates, reducing the codebase by over 30%.

Publications

Jack Lu*, Kelvin Wong*, Chris Zhang, Simon Suo, Raquel Urtasun. *SceneControl: Diffusion for Controllable Traffic Scene Generation*. In submission for *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 *Frontier in Artificial Intelligence*, 2021

Awards

Winston and Diana Cherry <u>Scholarship</u> - $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