

RESEARCH EXPERIENCE

Google Research, Brain

Mountain View, CA, USA

Research Scientist Intern with Scientist Igor Mordatch

2021-10 – ongoing

(1) Improve Decision Transformer models to extrapolate in creative and general ways in embodied game play and protein prediction problems. (2) Enable 3D neural implicit scene representations with diffusion models.

Topics: sequence modeling, Transformers, language representation, reinforcement learning, biology

Stanford University, Stanford AI Research

Menlo Park, CA, USA

Visiting Research Scholar with Prof. Stefano Ermon

2021-06 – ongoing

(Fall 2021) Develop self-referential operators for fractal data encoding, efficient compression, and creative generation. (Summer 2021) Derive noise-invariant score-based generative models with improved likelihood and sample quality.

Topics: score-based generative models, diffusion processes, latent variable models

Vector Institute & University of Toronto

Toronto, ON, Canada

Undergraduate Researcher with Prof. David Duvenaud

2020-01 – 2021-09

Derive variance-reducing gradient estimator and improve Neural ODE robustness through Bayesian inference w/ SDEs.

Topics: stochastic differential equations, Bayesian neural networks, variational inference

Oxford University, OATML

Oxford, United Kingdom

Research Intern with Prof. Yarin Gal

2021-01 – 2021-08

Develop data efficient algorithms that leverage information theoretic proxy selection and uncertainty-aware heuristics.

Topics: Bayesian active learning, model disagreement, curriculum learning, coresets selection

FOR.ai, Machine Learning

Toronto, ON, Canada

Open Collaboration Research Lead

2019-07 – ongoing

Explore sparse and low-rank parameterizations that effectively train heavily parameterized neural language models.

Topics: progressive growth neural networks, low-rank factors, efficient network architectures

Princess Margaret Cancer Research, Computational Biology

Toronto, ON, Canada

Research Intern with Prof. Michael Hoffman

2018-05 – 2018-09

Develop annotation pipelines and unsupervised learning techniques to predict 20+ cancer-linked epigenetic factors.

Topics: next-generation sequencing (ChIP-seq, exo, RNA-seq), genome annotations

INDUSTRY EXPERIENCE

Cohere, Natural Language Modeling

Toronto, ON, Canada

Machine Learning Researcher with Nick Frosst and Aidan Gomez

2021-01 – 2021-06

Apply deep learning algorithms to improve training cost and personalization of billion parameter language models.

Topics: GPT models, attention, distillation, distributed cloud training, TPUs

Nvidia, Simulations & Robotics

Toronto, ON, Canada

Deep Learning Research Intern with Gavriel State and Prof. Animesh Garg

2020-08 – 2020-12

Build performant GPU-accelerated environments towards time / resource efficient reinforcement learning for robotics.

Topics: Omniverse, IsaacGym, robotics simulation

Google, Tensorflow

Mountain View, CA, USA

Research Engineering Intern

2020-05 – 2020-08

Actualize state of the art pre-/post-hoc pruning methods for easy experimentation and efficient hardware computation.

Topics: lottery tickets, dynamic sparsity, Tensorflow Model Optimization Toolkit (contributor)

Google, Cloud

Waterloo, ON, Canada

Software Engineering Intern

2019-05 – 2019-08

Integrate remote build execution pipelines on Google Cloud Registry for Docker and Bazel clients worldwide.

Topics: remote build, cloud infrastructure tooling, rules-docker (contributor)

EDUCATION

University of Toronto 2017 – 2020, 2021 – 2022
Honours Bachelors of Science in *Computer Science, Statistics, Mathematics* Deans List Scholar
Graduate coursework: Natural Language Processing (CSC401), Probabilistic Reasoning and Uncertainty (CSC412), Deep Learning (CSC413), Stochastic Processes (STA447), Computer Vision (CSC420)
Natural/Social Sciences (2017-2019): Evolutionary/Molecular Genetics (BIO120/130), Physical/Organic Chemistry (CHM135/135), Calculus (MAT135/136/235), Political Sciences (MUN101), Global Affairs (MUN102)
Teaching Assistant: Fall 2020 CSC258 (Intro. to Computer Systems)

PUBLICATIONS

PEER-REVIEWED

- [3] Soon Hoe Kim, N. Benjamin Erichson, Francisco Utrera, **Winnie Xu**, and Michael Mahoney, “Noisy feature mixup,” International Conference on Learning Representations, 2022.
- [2] **Winnie Xu**, Ricky T.Q. Chen, Xuechen Li, and David Duvenaud, “Infinitely deep bayesian neural networks with stochastic differential equations,” International Conference on Artificial Intelligence and Statistics, 2022.
- [1] **Winnie Xu***, Sören Mindermann*, Muhammed Razzak*, Andreas Kirsch, Mrinank Sharma, Aidan N. Gomez, Sebastian Farquhar, Jan Brauner, and Yarin Gal, “Prioritized training on points that are learnable, worth learning, and not yet learned,” *Workshop in Subset Selection in ML*, ICML, 2021.

UNDER REVIEW

- [2] Yang Song, **Winnie Xu**, and Stefano Ermon, “Noise invariant score-based generative models through learnable SDEs,” In Preparation, 2022.
- [1] **Winnie Xu***, Michael Poli*, Chenlin Meng, and Stefano Ermon, “Self-similarity priors: Neural collages as differentiable fractal representations,” In Submission to ICML, 2022.

*equal contribution, †author ordering by seniority

AWARDS

Finalist Award , Computing Research Association (CRA) Awarded to undergraduates nominated by their home institutions for significant research contributions.	2021
Deep Tech Fellowship , On Deck Awarded to fund the participation in the On Deck Deep Tech fellowship program.	2021
Undergraduate Student Research Award , NSERC [<i>declined</i>] Awarded to fund a summer research internship in Canada. Declined due to dual employment in industry.	2020
Trinity College Scholarship , University of Toronto Awarded on the basis of academic standing.	2019
Dean’s List Scholar , University of Toronto Awarded on the basis of grade point average (cGPA).	2018, 2019, 2021
Computer Science Research Studentship , University of Toronto Awarded to fund a summer research internship in Computer Science at the University of Toronto.	2018

HONORS

1st Place , Hack the North Awarded to top project of the year at Canada’s largest Major League sponsored hackathon.	2019
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1st Place , Google x BCG Hack the Globe Competition Awarded to top project of the year based on social impact and technological delivery.	2019
Axelrad Award , Princess Margaret Cancer Research Awarded to top cancer research project in Computer Science at annual poster symposium.	2018
Top 15% Distinction , Waterloo National Mathematics Contest Awarded for performance in the Cayley, Fermat, and Euclid contests.	2015, 2016, 2017
1st Place , Sanofi Biogenius Canada Awarded for best research project to qualify for the National Biogenius Challenge.	2017
Top 20 in Fair , Canada-Wide Science Fair Awarded for one of 20 best projects in the Senior category out of 500.	2017

INVITED TALKS, PRESENTATIONS, AND PANELS

TALKS

- [1] *Infinitely deep bayesian neural networks*, NeurIPS European Bayesian Deep Learning Meetup, Virtual, 2020.

PANELS

- [1] *AI student researcher panel*, AI Squared Forum, Toronto, Canada, 2019.

PROFESSIONAL ACTIVITIES

CONFERENCE PAPER REVIEWING

- International Conference on Learning Representations (ICLR) 2021

JOURNAL REVIEWING

- Journal of Machine Learning Research (JMLR) 2022

COMMUNITY SERVICE AND LEADERSHIP

Girls Who ML, Oxford University Workshop leader and content creator	Oxford, United Kingdom 2021
Computer Science Mentorship Program, University of Toronto Mentor to underclassmen	Toronto, ON, Canada 2019 – present
Computer Science Orientation Week, University of Toronto Group Leader	Toronto, ON, Canada 2019
Machine Intelligence Student Team (MIST), University of Toronto Vice President of Academics	Toronto, ON, Canada 2019 – 2020

TECHNICAL SKILLS

Languages: Python, C/C++ , Java, Golang, Bash

Libraries and Tools: JAX, PyTorch, TensorFlow, GCP, TPU, Slurm, Docker, Matplotlib, Git, Unix, L^AT_EX