Winnie Xu

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Research Experience

Stanford University, **Stanford AI Research** — Menlo Park, CA, USA
Visiting Research Scholar with Prof. Stefano Ermon — 2021-06 – ongoing
Derive noise-invariant, general SDEs that improve likelihood and sample quality of score-based generative models.
Topics: score-based generative models, SDEs, EBMs, diffusion probabilistic models, latent variable models

Oxford University, **OATML** — Oxford, United Kingdom
Research Intern with Prof. Yarin Gal — 2021-01 – ongoing
Develop data efficient algorithms that leverage information theoretic proxy selection and uncertainty-aware heuristics.
Topics: Bayesian active learning, model disagreement, curriculum learning, coreset selection

Vector Institute & **University of Toronto** — Toronto, ON, Canada
Undergraduate Researcher with Prof. David Duvenaud — 2020-01 – ongoing
Derive variance-reducing gradient estimator and improve Neural ODE robustness through Bayesian inference w/ SDEs.
Topics: stochastic differential equations, Bayesian neural networks, variational inference

FOR.ai, **Machine Learning** — Toronto, ON, Canada
Open Collaboration Research Lead — 2019-07 – Present
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), hidden Markov models

Industry Experience

Cohere, **Research Team** — Toronto, ON, Canada
Machine Learning Researcher with Nick Frost 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 Team** — Toronto, ON, Canada
Deep Learning Research Intern with Gavriel State and Animesh Garg — 2020-08 – 2020-12
Build performant GPU-accelerated environments towards time / resource efficient reinforcement learning for robotics.
Topics: Omniverse, IsaacGym, robotics, reinforcement learning

Google Brain — 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)

Publications

[2] †Sören Mindermann*, Muhammed Razzak*, **Winnie Xu***, Andreas Kirsch, Mrinank Sharma, Adrien Morisot, 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.

[1] **Winnie Xu**, Ricky T.Q. Chen, Xuechen Li, and David Duvenaud, "Infinitely deep bayesian neural networks with stochastic differential equations," *Workshop in Bayesian Deep Learning,* NeurIPS 2020.

*equal contribution, †author ordering by seniority

Awards

Deep Tech Fellowship, On Deck 2021
Awarded to fund the participation in the On Deck Deep Tech fellowship program.

Undergraduate Student Research Award, NSERC [*declined*] 2020
Awarded to fund a summer research internship in Canada. Declined due to dual employment in industry.

Trinity College Scholarship, University of Toronto 2019
Awarded on the basis of academic standing.

Dean's List Scholar, University of Toronto 2018, 2019, 2021
Awarded on the basis of grade point average (cGPA).

Computer Science Research Studentship, University of Toronto 2018
Awarded to fund a summer research internship in Computer Science at the University of Toronto.

Honors

1st Place, Google x BCG Hack the Globe Competition 2019
Awarded to top project of the year based on social impact and technological delivery.

Axelrad Award, Princess Margaret Cancer Research 2018
Awarded to top cancer research project in Computer Science at annual poster session.

Top 15% Distinction, Waterloo National Mathematics Contest 2015, 2016, 2017
Awarded for performance in the Cayley, Fermat, and Euclid contests.

1st Place, Sanofi Biogenius Canada 2017
Awarded for best research project to qualify for the National Biogenius Challenge.

Top 20 in Canada-Wide Science Fair, Science Fairs Canada 2017
Awarded for one of 20 best projects in the Senior category out of 500.

Education

University of Toronto, Honours Bachelor of Science Toronto, ON, Canada
Computer Science, Statistics, Mathematics 2017 – 2020, 2021 – 2022
Coursework (graduate-level): Natural Language Processing (CSC401), Deep Learning (CSC413), Probabilistic Reasoning and Uncertainty (CSC412), Stochastic Processes (STA447)
Teaching Assistant: Fall 2020 CSC258 (Intro. to Computer Systems)

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) 2022

Community Service and Leadership

Girls Who ML, **Oxford University** Oxford, United Kingdom
Workshop leader and content creator 2021

Computer Science Mentorship, **University of Toronto** Toronto, ON, Canada
Mentor to underclassmen 2019 – present

Computer Science Orientation Week, **University of Toronto** Toronto, ON, Canada
Group Leader 2019

Machine Intelligence Student Team (MIST), **University of Toronto** Toronto, ON, Canada
Vice President of Academics 2019 – 2020

Technical Skills

Languages: Python, C/C++ , Java, Golang, Bash
Libraries and Tools: JAX, PyTorch, TensorFlow, GCP, TPU, Slurm, Docker, Matplotlib, Git, Unix, LaTeX