Winnie Xu

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Research Experience

Google Research, **Brain** — Mountain View, CA, USA
Research Scientist Intern with Scientist Igor Mordatch — 2021-10 – ongoing
Develop prescriptive sequential learning frameworks to enable creative robotic decision making in real and simulation.
Topics: sequential decision making, language representation, reinforcement learning, robotics

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, diffusion processes, latent variable models

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

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, coreset 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 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** — 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 courses: Natural Language Processing (CSC401), Probabilistic Reasoning and Uncertainty (CSC412), Deep Learning (CSC413), Stochastic Processes (STA447)
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

[2] †Sören Mindermann*, Muhammed Razzak*, **Winnie Xu***, 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.

[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.

Under Review

[3] Soon Hoe Kim, N. Benjamin Erichson, Francisco Utrera, **Winnie Xu**, and Michael Mahoney, "Noisy feature mixup," Under Review at ICLR, 2022.

[2] Michael Poli*, **Winnie Xu***, Chenlin Meng, and Stefano Ermon, "The self-similarity prior: Fractal patch representations for generative models," In Preparation, 2022.

[1] Yang Song*, **Winnie Xu***, and Stefano Ermon, "Noise invariant score-based generative models through learnable SDEs," In Preparation, 2022.

*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 symposium.

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

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** Oxford, United Kingdom
Workshop leader and content creator 2021

Computer Science Mentorship Program, **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