

JACOB KELLY

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EDUCATION

University of Toronto Toronto, ON
Computer Science, Math, Stats · *cGPA: 3.93/4 Course Average: 90%* Sep 2017 — Jun 2022
Recipient of more than \$11,000 in scholarships and grant funds.
Graduate Courses: Machine Learning I & II · Deep Learning · ML for Health · Stochastic Processes
Undergrad Courses: Advanced Algorithms & Data Structures · Advanced Differential Equations
C & Systems Programming · Enriched Calculus I & II · Intro. Molecular Biology
Teaching Assistant: STA414/2104 (Grad. Machine Learning II) · Office hours and assignment grading

EXPERIENCE

Machine Learning Research Intern · Python · TensorFlow · pandas · Bash · Git Toronto, ON
Deep Genomics Sep 2020 — Apr 2021

- Developed framework for compressing deep convolutional splicing models with neural distillation. Resulting models matched performance across tasks and metrics while 3.7x smaller and 3.3x faster.
- Integrated knockdown and peak data with deep learning model for automated oligonucleotide design using a new biological mechanism. Developed statistical benchmarks of performance and significance.

Machine Learning Researcher · Python · JAX · PyTorch · Bash · Git · SLURM Toronto, ON
Vector Institute for AI · Supervisor: David Duvenaud Sep 2019 — Aug 2020

- Analyzed bias of estimator for scalable entropy-regularized training of Energy-Based Models (EBMs). Cleaned data and tuned EBM performance on semi-supervised classification for 3 tabular datasets.
- Derived and implemented numerically-stable Taylor-mode automatic differentiation rules in JAX. Implemented and numerically tested 12 ODE solvers of various orders. Aggregated results for sweeps of >100 jobs on SLURM cluster measuring regularization effect on Neural ODE models across tasks.

Computational Biology Researcher · R · MATLAB · Bash · Git Toronto, ON
Princess Margaret Cancer Research · Supervisor: Benjamin Haibe-Kains Apr 2019 — Sep 2019

- Developed R package for benchmarking machine learning methods for inferring sample-specific gene regulatory networks from single-cell RNA sequencing (scRNA-Seq) data.

Computer Vision Software Developer · SPEL+ (internal C++ wrapper) · SVN Markham, ON
Epson Research and Development Lab May 2018 — Aug 2018

- Optimized motored stage movements and performed image capture and evaluation asynchronously, supporting researchers by improving speed of data collection by 58%.

Android Developer · Java · Android SDK · Estimote API · Git Toronto, ON
Cossette Health Jul 2016 — Aug 2016

- Led two team members in reducing noise in bluetooth beacon signal to improve localization and developing pathfinding algorithms for indoor navigation system for The Hospital for Sick Children.

PUBLICATIONS

1. W. Grathwohl*, **J. Kelly***, M. Hashemi, M. Norouzi, K. Swersky, D. Duvenaud,
“No MCMC for me: Amortized sampling for fast and stable training of energy-based models”.
International Conference on Learning Representations (ICLR) 2021
2. **J. Kelly***, J. Bettencourt*, M. J. Johnson, D. Duvenaud,
“Learning Differential Equations that are Easy to Solve”.
Neural Information Processing Systems (NeurIPS) 2020

PROJECTS

JAX (Open-source contributor) · Python · Git github.com/google/jax

- Top 10% of contributors (25 commits, ~ 1000 lines of code). Derived and implemented numerically stable Taylor-mode automatic differentiation rules. Wrote numerical tests and fixes for ODE solvers.

AWARDS

Undergraduate Student Research Award, NSERC Canada	2020
Dorothy Helen McRobb Scholarship	2019
David L. Squires Foundation Scholarship	2019
Margaret Ronald & Thomas Paxton Taylor Scholarship in Mathematics	2019
Distinction (Top 15%), Euclid National Mathematics Contest, Univ. of Waterloo	2017
Top 10, ECOO Central Ontario Programming Contest	2017

SKILLS

Languages: Python · Bash · Git · \LaTeX · C/C++ · R · Java
Frameworks: PyTorch · JAX · TensorFlow · Keras · NumPy · pandas · scikit-learn