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.

Coursework: Machine Learning (Graduate-Level) · Advanced Algorithms & Data Structures · Advanced Differential Equations · Stochastic Processes · Molecular Biology

Teaching Assistant: STA414/2104 (Machine Learning) · Ran office hours and graded assignments

Experience

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

- Reducing the memory footprint of models for predicting splicing from genome sequence.

Machine Learning Researcher · Python · JAX · PyTorch · Bash · Git · LaTeX — 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 of tabular data.
- Implemented Taylor-mode automatic differentiation rules in JAX for regularizing higher derivatives of Neural Ordinary Differential Equations (Neural ODEs) to be easier to solve. Implemented and numerically tested ODE solvers of different orders in JAX. Ran experiments.

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 Lab — Jul 2016 — Aug 2016

- Led two team members in reducing noise in bluetooth beacon signal to improve localization and 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) since April 2020. Implemented Taylor-mode automatic differentiation rules and wrote numerical tests. Fixed bugs in numerical differential equation 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
1st Place, ECOO Central Ontario Programming Contest — 2017

Skills

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