Andrew Cheng

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Education

Harvard University   **Supervised by Melanie Weber**
PhD Computer Science (Optimization & Machine Learning)   Expected 2027
- NSERC CGS-D PhD Fellowship: $120k

McGill University & MILA   **Supervised by Courtney and Elliot Paquette**
Thesis-Based Master's in Mathematics (Optimization & Machine Learning)   June 2023
- **cGPA: 4.00/4.00 | Coursework:** Advanced Probability 1 & 2, Random Matrix Theory, Convex Optimization, High-Dimensional Probability
- Graduate Excellence Scholarship (MILA): $30,000 | FQRNT Scholarship: $17,500 | MITACS Scholarship: $30,000

McGill University
BSc. Joint Honours Statistics and Computer Science & Minor in Physics   June 2021
- **cGPA: 3.80 | Major GPA: 3.90**
- **Master's coursework:** Time Series Analysis; Sampling Theory; Matrix Computations; Honours Linear Regression; Generalized Linear Models; Applied Machine Learning
- **PhD-level coursework:** Mathematical Techniques in Machine Learning; Computation Intensive Statistics; Probabilistic Analysis of Algorithms (achieved highest grade in all 9 graduate courses during undergrad)

Publications & Preprints

1. Kiwon Lee, **Andrew N. Cheng**, Paquette[2]. Trajectory of Mini-Batch Momentum: Batch Size Saturation and Convergence in High Dimensions. (2022) arXiv: https://arxiv.org/abs/2206.01029 (accepted, NeurIPS 2022).

2. **Andrew N. Cheng**, Kiwon Lee, Courtney Paquette. *Exact Dynamics of First Order Stochastic Algorithms in High-Dimensions* (2024) (accepted to NeurIPS 2024 MLOPT workshop and to be submitted to SIAM Review).

3. **Andrew N. Cheng***, Vaibhav Dixit*, Melanie Weber. *Disciplined Geodesically Convex Programming* (2024) (submitted to JMLR).

4. **Andrew N. Cheng**, Melanie Weber. *Structured Optimization on the PSD Riemannian Manifold* (2024) (accepted to NeurIPS 2024 MLOPT workshop and submitted to 60th Allerton Communication, Control and Computing and and Mathematical Programming)

Talks

1. Presented the link between stochastic optimization of quadratic functions and polynomials to the Montreal Optimization Seminar (2021)

2. Presented at 2022 INFORMS Annual Meeting, NeurIPS 2022, and the Montreal Optimization Seminar

Work Experience

Deep Learning Research Intern
Valence Labs (Start-Up Acquired in June 2023)   May 2022 - July 2022 & July 2023 - September 2023
- Designed unsupervised learning methods inspired by the notion of disentanglement to navigate the molecular space to generate novel molecular compounds
- Applied transformers and variational autoencoders in PyTorch to molecular (NLP) data sets

Research Intern
Computational Statistics, McGill Department of Computer Science   May 2020 - September 2021
- Created an **R** package to predict the risk of recurring heart attacks and post-kidney transplant failures (recurrent survival analysis)
- Implemented SVRG, SAGA and k-SVRG into BigSurvSGD's framework (Tarkhan et al. 2020), effectively reducing variance and improving empirical convergence behaviour.

Research Intern
Deep Learning Survival Analysis Methods, McGill Department of Mathematics   June 2019 - December 2019
- Generated synthetic data-sets in **Python** to test the robustness of the *DeepHit Algorithm (Lee et al. 2018)* which is based in a **Tensorflow** environment

Additional Awards and Scholarships

Quebec Merit Scholarship for Computer Science
Government of Quebec: $1,000   June 2021

Kaplan Family Summer Undergraduate Research Award
McGill Department of Mathematics and Statistics: $7,500   May 2020
- Based on academic and research merit to conduct research in machine learning

Languages and Programming Languages

- English; Cantonese
- Python; PyTorch; R