Andrew Cheng

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Education

McGill University & Montreal Institute of Learning Algorithms (MILA)
Thesis-Based Master's in Mathematics and Statistics — September 2021 - May 2023

- **cGPA: 4.00/4.00** | **Coursework:** Advanced Probability 1 & 2, Random Matrix Theory, Convex Optimization, High-Dimensional Probability
- Graduate Excellence Scholarship plus stipend from MILA: $30,000
- FQRNT Scholarship: $17,500 and MITACS Scholarship: $21,000
- Research area lies in the intersection of machine learning, large-scale optimization, random matrix theory, and high dimensional probability
- **Talks:**
  1. Presented a proof of Polyak momentum using Chebyshev polynomials to the Montreal Optimization Seminar (2021)
  2. Presented our paper (see publication) at 2022 INFORMS Annual Meeting, NeurIPS 2022, and the Montreal Optimization Seminar
- **Publication:**
  1. Kiwon Lee, Andrew N. Cheng, et al. Trajectory of Mini-Batch Momentum: Batch Size Saturation and Convergence in High Dimensions. (2022) OpenReview (accepted, NeurIPS 2022).

McGill University
BSc. Joint Honours Statistics and Computer Science & Minor in Physics — September 2016 - May 2021

- **CS, Stats, & Physics GPA: 3.86** | **cGPA: 3.78** (First Class Honours)
- **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 master's and PhD-level courses)

Work Experience

Deep Learning Research Intern
Valence Discovery (Drug Discovery Startup) — May 2022 - Present

- 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 - Present

- 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 convergence.
- Worked on two computational statistics papers which will be submitted for publication (first author)

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 (honours mathematics thesis)

Research Intern
Quantum Machine Learning, McGill Department of Physics — May 2018 - December 2018

- Applied convolutional neural networks in **MATLAB** to solve quantum mechanical systems
- Showcased results at an international physics conference

Application Development
Wilson Orbit Imaging, Summer Intern — May 2017 - August 2017

- Developed the workflow for an application aimed to digitize medical prescriptions given by doctors
- Analyzed work dynamic between radiologists, patients, and receptionists at the clinic and streamlined the workflow of the app based on their needs

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

Extracurriculars

Co-Organizer
NeurIPS 2022 November 28-December 4

- Co-arranged the optimization and machine learning workshop at NeurIPS 2022

Co-Organizer
Random Matrix Theory, Machine Learning, and Optimization Graduate Seminar @ McGill University November 2022 - May 2023

- Arranged and scheduled graduate students to present their research and papers in the union of random matrix theory, machine learning, and optimization
- Held weekly; See website for more information

Vice-President of Finance
McGill Physics Undergraduate Council May 2018 - May 2019

- Elected into council
- Council's finances increased by 40% under my tenure
- Responsible for ensuring profit via social events and clothing sales

Piano Teacher
School of Music Montreal January 2017 - June 2018

- Volunteered to teach weekly piano lessons (both group and individual) for students at Verdun Elementary
- Helped prepare a concert in March where students performed their learned songs

Physics Class Representative
McGill Physics Undergraduate Council September 2017 - May 2018

- Elected into McGill's Physics undergraduate council as the representative of the undergraduate class
- Fostered a close-knit student community by coordinating events (e.g., social dances, game nights) and inviting guest researchers for talks