Curtis Fox

CONTACT INFORMATION

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EDUCATION

University of British Columbia
Doctor of Philosophy (PhD) in Computer Science *2023 - Present*
- Research Area: Machine Learning
- Supervisor: Mark Schmidt

Master of Science (MSc) in Computer Science *2021 - 2023*
- Research Area: Machine Learning
- Supervisor: Mark Schmidt
- Thesis: A Study of the Edge of Stability in Deep Learning

Bachelor of Science (BSc) *2014 - 2019*
- Major: Combined Honours in Computer Science and Statistics

PAPERS

1. Madden, L; **Fox, C**; Thrampoulidis, C. "Upper and lower memory capacity bounds of transformers for next-token prediction". *arXiv preprint arXiv:2405.13718*, 2024 [Link]
2. **Fox, C**. "A Study of the Edge of Stability in Deep Learning". *Master's Thesis*, 2023 [Link]
3. Maslova, A; Ramirez, R; Ma, K; Schmutz, H; Wang, C; **Fox, C**; Ng, B; Benoist, C; Mostafavi, S; The Immunological Genome Project. "Deep Learning of Immune Cell Differentiation". *Proceedings of the National Academy of Sciences of the United States of America*, 2020 [Link]
4. **Fox, C**; Supervisors: Sun, Y; Friedlander, M. "Truncated Interior Point Method for LP-Boost". *Technical Report*, 2018 [Link]

RESEARCH EXPERIENCE

Graduate Reseach Assistant
University of British Columbia - Computer Science *May 2022 - Present*
- Research has focused on optimization for machine learning, for both non-convex settings such as deep learning and convex optimization tasks
- Explored transformer models and their use in next-token prediction language tasks, and wrote code for experiments showing how many parameters are required for simplified transformer model to memorize text data
- Wrote master's thesis on the edge of stability (EOS) phenomenon, which involved a comprehensive literature review and writing code using PyTorch to show how the EOS impacts each layer of a neural network during training
- See papers [1] and [2] above for some of the work completed

NSERC Undergraduate Research Assistant
University of British Columbia - Statistics *May 2019 - Aug 2019*
- Conducted research in using convolutional neural network to extract biologically significant base-pair sequences (called motifs) from genomic data

- This project lead to paper [3] above

NSERC Undergraduate Research Assistant
University of British Columbia - Computer Science *May 2018 - Aug 2018*

- Conducted research in Machine Learning boosting algorithms, involving implementing the LP boost algorithm and comparing different regularization techniques, using real datasets from the UCI Machine Learning repository
- This project lead to the report [4] above

Teaching Experience

Teaching Assistant

University of British Columbia - Graduate TA	*Sep 2023 - Dec 2023*
	Sep 2022 - Apr 2023
	Sep 2021 - Apr 2022
University of British Columbia - Undergraduate TA	*Sep 2018 - Apr 2019*
	Sep 2015 - Aug 2017

I have worked as a TA for the following courses:

1. CPSC 110 - Computation, Programs, and Programming
2. CPSC 213 - Introduction to Computer Systems
3. CPSC 221 - Basic Algorithms and Data Structures
4. CPSC 302 - Numerical Computation for Algebraic Problems
5. CPSC 340 - Machine Learning and Data Mining
6. CPSC 406 - Computational Optimization
7. CPSC 421 - Introduction to Theory of Computing
8. STAT 200 - Elementary Statistics for Applications
9. STAT 302 - Introduction to Probability

Other Work Experience

Software Developer
Synic Software *2020 - 2021*

Awards and Honours

Graduate Teaching Assistant Award
University of British Columbia *2024*

- Graduate teaching assistant award given by the UBC Computer Science department

NSERC Undergraduate Student Research Award ($4500)
University of British Columbia *2019*

- Government research funding for undergraduate research position

NSERC Undergraduate Student Research Award ($4500)
University of British Columbia *2018*

- Government research funding for undergraduate research position

Trek Excellence ($1500)
University of British Columbia *2015*

- Awarded for being ranked in the top 5% of the undergraduate year, faculty, and school

Activities

UBC Computer Science Graduate and Recruiting Admissions Committee

- Reviewed graduate school applications for the Computer Science Department

Machine Learning Research Group

- UBC research group led by Dr. Mark Schmidt
- Presented various research papers in machine learning as well as attended various talks

Convex Optimization Research Group

- UBC research group led by Dr. Michael Friedlander
- Attended meetings with faculty and graduate students which involved discussion and presentations of computational optimization problems

Google Code Jam

- Participated in the Google Code Jam competition which involved implementing algorithmic problems