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. **Fox, C**; Schmidt, M. "Glocal Smoothness: Line Search can really help!". *NeurIPS OPT Workshop*, 2024 [Link]
2. **Fox, C***; Galli, L*; Schmidt, M; Rauhut, H. "Nonmonotone Line Searches Operate at the Edge of Stability". *NeurIPS OPT Workshop*, 2024 [Link]
3. 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]
4. **Fox, C**. "A Study of the Edge of Stability in Deep Learning". *Master's Thesis*, 2023 [Link]
5. 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]
6. **Fox, C**; Supervisors: Sun, Y; Friedlander, M. "Truncated Interior Point Method for LP-Boost". *Technical Report*, 2018 [Link]

*Equal Contribution

RESEARCH EXPERIENCE

Graduate Research Assistant

University of British Columbia - Computer Science *May 2022 - Present*

- Research has focused on optimization for machine learning, both for deep neural networks and convex optimization tasks
- Worked on two projects involving the use of line searches in optimization for machine learning, leading to the papers [1] and [2] above
- Explored transformer models and their use in next-token prediction language tasks, discussed in paper [3] above
- Wrote master's thesis on the Edge of Stability phenomenon in deep learning

NSERC Undergraduate Research Assistant
University of British Columbia - Statistics *May 2019 - Aug 2019*

- Conducted research in using convolutional neural networks to extract biologically significant base-pair sequences from genomic data, leading to the paper [5] above

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

- Conducted research into boosting algorithms, summarized in the technical report [6] above

Teaching Experience

Teaching Assistant
University of British Columbia - Graduate TA *2021 - present*
University of British Columbia - Undergraduate TA *2015 - 2019*

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

Work Experience

Software Developer
Synic Software *2020 - 2021*

Selected Skills

Programming Languages: Python, MATLAB, Java

Packages/Tools: PyTorch, NumPy, Matplotlib, Weights and Biases

Awards and Honours

Graduate Teaching Assistant Award
University of British Columbia *2024*

- Graduate teaching assistant award given by 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 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 research papers in machine learning and attended various talks

Convex Optimization Research Group

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