# Curtis Fox

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CONTACT
INFORMATION

Email: curtfox@student.ubc.ca
Phone: 604-786-3354
Google Scholar: [Link]
Website: [Link]

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 various model architecture choices influence the EOS

- 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

<table>
<tr><td>TEACHING<br>EXPERIENCE</td><td>**Teaching Assistant**<br>University of British Columbia - Graduate TA</td><td>*Sep 2024 - present*<br>*Sep 2023 - Dec 2023*<br>*Sep 2022 - Apr 2023*<br>*Sep 2021 - Apr 2022*</td></tr>
<tr><td></td><td>University of British Columbia - Undergraduate TA</td><td>*Sep 2018 - Apr 2019*<br>*Sep 2015 - Aug 2017*</td></tr>
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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 **Software Developer**
EXPERIENCE Synic Software                                                     *2020 - 2021*

SKILLS **Programming Languages**
- Python
- MATLAB
- Java

**Packages/Tools**
- PyTorch
- NumPy
- Matplotlib
- Weights and Biases

**Operating Systems**
- Windows
- Linux

**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

**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