Cameron Dufault

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Education

Master of Science, Computer Science   **September 2023 – Present**
University of Toronto
- Supervised by Dr. Alan Moses

Bachelor of Engineering, Software Engineering Co-op   **September 2017 – April 2023**
McMaster University
- Cumulative GPA of 3.78/4.0, GPA of 3.96/4.0 in 20 most recent courses taken

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Research Experience

University of Toronto, Alan Moses Lab

Research Student   **July 2023 – Present**
- Investigating methods of representation learning of biological data with deep learning
- Co-authored review paper on usage of large language models on genomic data

Lunenfeld-Tanenbaum Research Institute, Kieran Campbell Lab

Undergraduate Research Student   **May 2022 – June 2023**
- Built single-cell RNA sequencing data analysis pipeline and applied machine learning techniques for identifying gene expression patterns in tumour samples
- Investigated whether individual cells are stratified by cancer superclasses previously identified with bulk RNA seq analysis
- University of Toronto SUDS Research Program Scholar, supervised by Dr. Kieran Campbell and Dr. Rod Bremner

McMaster University, Nathan Magarvey Lab

Research Assistant, Part-Time   **September 2021 – January 2022**
- Developed C# application for automatic control of lab equipment through real-time analysis of mass-spectrometry data

Undergraduate Bioinformatics Research Assistant   **May 2020 – April 2021**
- Developed tool using Transformer-based natural language processing models to predict enzyme function from amino acid sequences
- Lead project to build de novo DNA sequence assembly tool combining existing bioinformatics methods with information extracted from transformer models trained on DNA sequences
- Performed deep learning tasks such as pre-training, fine-tuning, and dimensionality reduction

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Teaching Experience

CSC 301: Introduction to Software Engineering

Teaching Assistant   **September 2023 – Present**
- Supervising, mentoring, and grading four groups of 5-7 students working on a software engineering project with an industry partner

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Industry Experience

Borealis AI

Machine Learning Software Engineer Co-op   **January 2022 – April 2022**
- Worked with ML researchers and engineers on pricing financial products with deep learning
- Added features to pipeline for training and serving deep learning models
- Built automatic model documentation tool and wrote report on neural network optimization techniques

RBC

Data Scientist Co-op **May 2021 – August 2021**

- Member of AIOps group, working to develop ML models and tools for monitoring technical infrastructure
- Added features to, debugged, and deployed ML-oriented Python-based applications on Unix VM's
- Performed data processing and dataset creation using Python and Pandas

Enedym Inc. **May 2019 – August 2019**

Software Developer Co-op Student

- Developed, tested, and optimized application for the development of electric motors, primarily using MATLAB
- Tested and applied many optimization algorithms to determine optimal method of calculating motor parameters
- Achieved 95% total improvement in application runtime

Volunteer

McMaster Artificial Intelligence Society

Director of Projects **May 2021 – April 2022**

- Oversaw and advised all technical projects undertaken by the society's projects team of ~20 students
- Met with McMaster faculty to discuss their research and find opportunities for collaboration with the society
- Under my leadership the projects team finished multiple projects helping advance McMaster faculty research and teams presented their work at our end-of-year Project's Expo, judged by AI industry experts

Project Leader **May 2020 – April 2021**

- Lead team of students to build Python-based application using deep learning to detect and characterize tumours in 3-D brain MRI imagery
- Reviewed academic literature on computer vision, neuroradiology, and current MRI segmentation methods
- Collaborated with McMaster Radiology faculty to analyze and process real-world patient data

Publications

Micaela E. Consens, **Cameron Dufault**, Michael Wainberg, Duncan Forster, Mehran Karimzadeh, Hani Goodarzi, Fabian J. Theis, Alan Moses, and Bo Wang. *To Transformers and Beyond: Large Language Models for the Genome.* 2023. arXiv:2311.07621

Selected Projects

Radiology-and-AI

- Used computer vision/deep learning to segment and characterize brain tumours in 3-D neuroimaging data
- Research project in collaboration with McMaster neuroradiology researcher

SafetyVision

- Application for automatic detection of safety hazards in industrial environments using computer vision and Raspberry Pi monitoring devices
- Software Engineering Capstone project where I served as project leader

Honours/Awards

Summer Undergraduate Data Science Scholar ($7200 value) **2022**

- Awarded by University of Toronto Data Sciences Institute to fund data science research opportunities for undergraduate students

McMaster Dean's Honour List **2018, 2020, 2023**

- Awarded for having GPA above 9.5 in previous academic year

McMaster Presidents Award Entrance Scholarship ($2500 value) **2017**

- Awarded for having entering average of 95% or above