

Aman Bhullar

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EDUCATION

PhD, Applied Statistics <i>University of Guelph</i>	2020 – present <i>Guelph, ON</i>
<ul style="list-style-type: none">• Thesis: <i>Identification of Climate-driven Land Use Change for Agriculture Frontiers in Canada</i>• Advisors: Dr. A. Ali, Dr. K. Nadeem• Expected Completion Date: April 2024	
MSc, Applied Statistics <i>University of Guelph</i>	2018 – 2020 <i>Guelph, ON</i>
<ul style="list-style-type: none">• Thesis: <i>Interpreting Capsule Networks for Classification by Routing Path Visualization</i>• Advisors: Dr. A. Ali	
BSc, Physics Co-op (Minor in Math) <i>McMaster University</i>	2013 – 2018 <i>Hamilton, ON</i>

AWARDS

Graduate Tuition Scholarship, University of Guelph	2020
Ontario Graduate Scholarship, University of Guelph	2022
Ontario Graduate Scholarship, University of Guelph	2023

WORK EXPERIENCE

Teaching Assistant <i>University of Guelph</i>	Sept 2018 – Present <i>Guelph, ON</i>
<ul style="list-style-type: none">• Instructed labs, held office hours, and graded material for first and second year mathematics and statistics courses.• Taught concepts of statistics to students on a drop-in basis in Math and Stat Learning Centre.	
Founder <i>Silai</i>	May 2023 – Present <i>Hamilton, ON</i>
<ul style="list-style-type: none">• An AI-powered solution for custom fitted Punjabi women's dresses, allowing shops to become fully-remote and allowing customers to purchase custom-fitted clothing remotely.• One of 10 startups accepted into the McMaster Startup Survivor program for the year 2023.	
Research Assistant <i>McMaster University</i>	July 2020 – Aug 2020 <i>Hamilton, ON</i>
<ul style="list-style-type: none">• Developed and installed Python package for detecting the rare remnants of supernovae in astronomical images.• Analysed 13,000 telescope images using package and discovered new image of supernova remnant.	
Research Assistant <i>University of Guelph</i>	May 2020 – Aug 2020 <i>Guelph, ON</i>
<ul style="list-style-type: none">• Modelled the interactions between plant and pollinator species within a given ecosystem.• Evaluated performance of different optimization methods for statistical algorithm in R.	
Computer Scientist <i>Canadian Nuclear Laboratories</i>	May 2018 – Aug 2018 <i>Chalk River, ON</i>
<ul style="list-style-type: none">• Worked on Canada's Cosmic Ray Inspection and Passive Tomography detector (CRIPT). CRIPT utilizes muon tomography to detect nuclear material in closed containers.• Initiated and implemented density based clustering algorithm in Python to remove noise from CRIPT data, and improved detection accuracy by 40%.• Deduced features that could distinguish regular cargo from cargo containing nuclear material.	
Undergraduate Research Student <i>McMaster University</i>	Sept 2017 – Dec 2017 <i>Hamilton, ON</i>
<ul style="list-style-type: none">• Implemented SVM ensemble classification in Python to classify periodic variable stars.• Identified new set of classification features that improved classification from 49% to 90%.	
Undergraduate Research Student <i>McMaster University</i>	Jan 2016 – Aug 2016 <i>Hamilton, ON</i>
<ul style="list-style-type: none">• Mathematically manipulated and modelled data using Python code and statistical methods.• Performed tests on lab equipment to trace and solve mechanical problems.	

TEACHING EXPERIENCE

Instructor

Sept 2023 - Dec 2023

University of Guelph

Guelph, ON

- Instructed DATA*6200, a graduate data science course.
- It covers both pre and post modelling procedures for medical, geospatial, and image related data.

Lecturer

June 2023

University of Guelph

Guelph, ON

- Taught cloud-computing section for graduate data science course over 3 weeks (DATA*6600).
- Introduced data science related AWS services such as SageMaker and S3.

Lecturer

Nov 2021 and Nov 2022

University of Guelph

Guelph, ON

- Taught spatio-temporal section for graduate data science course over 1 week (DATA*6200).
- Introduced spatial and spatio-temporal modelling with the Google Earth Engine framework in Python.

PUBLICATIONS

- **Bhullar, A.**, Nadeem, K., Ali, R. A. (2023). *Simultaneous Multi-Crop Land Suitability Prediction from Remote Sensing Data using Semi-Supervised Learning*. Scientific Reports, 13. <https://doi.org/10.1038/s41598-023-33840-6>.
- **Bhullar, A.**, Ali, R. A., and Welch, D. (2022). *Interpreting Capsule Networks for Image Classification by Routing Path Visualization*. Submitted to Elsevier Artificial Intelligence.
- **Bhullar, A.**, Ali, R. A., and Welch, D. (2021). *A Package for the Automated Classification of Images Containing Supernova Light Echoes*. Astronomy and Astrophysics, 655, A82. <https://doi.org/10.1051/0004-6361/202039755>.
- Rand, E. T., Kamaev, O., Valente, A., **Bhullar, A.** (2020). *Nonparametric Dense-Object Detection Algorithm for Applications of Cosmic-Ray Muon Tomography*. Physical Review Applied, 14(6), 064032. <https://journals.aps.org/prapplied/abstract/10.1103/PhysRevApplied.14.064032>.
- Atchison, J., **Bhullar, A.**, Norman, B., Venus, D. (2019). *Finite-size Kosterlitz-Thouless transition in 2DXY Fe/W (001) ultrathin films*. Physical Review B, 99(12), 125425. <https://arxiv.org/abs/1811.09238v2>.

POSTER PRESENTATIONS AND TALKS

- Bhullar, A. (2020). *Classification of Astronomical Images using Capsule Networks*. Students in Graduate Mathematics and Statistics Presentation Series. University of Guelph.
- Bhullar, A. (2019). *Interpreting Capsule Networks for Image Classification by Routing Path Visualization*. Machine Learning Research Group Talk Series. University of Guelph.
- Bhullar, A. (2018). *Advancing Muon Tomography Detection Parameter for Nuclear Safety and Safeguards*. Undergraduate Co-op Presentations. Canadian Nuclear Laboratories.
- Bhullar, A. (2016). *Kosterlitz-Thouless Transition in 2D Fe/W(100) Films*. Undergraduate Thesis Poster. McMaster University.

PATENTS

- U.S. Patent 63/039,540: Muon Tomography Method and Apparatus, filed June 16, 2020.

COMPUTATIONAL AND TECHNICAL SKILLS

- Python, R, Tensorflow, L^AT_EX
- Google Cloud Platform, AWS, SHARCNET, Google Earth Engine, QGIS

PROJECTS AND VOLUNTEER EXPERIENCE

Breast Cancer Image Classification | Course Project: STAT 6821 2018

- Implemented transfer learning on the Inception-v3 neural network to classify histopathological images of breast tissue as benign or malignant. Achieved 90% accuracy.

McMaster Physics Help Initiative Volunteer | *McMaster University* 2014 – 2015

- Six to ten students were helped weekly in a drop-in basis for physics related academic help.

EXTRACURRICULAR ACTIVITIES

- Member of Students in Graduate Mathematics and Statistics (SIGMAS) at University of Guelph.
- University of Guelph varsity ultimate frisbee, intramural soccer, jiu jitsu.