Justin Furlotte

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Education

MSc. Mathematics - *University of British Columbia* April 2022
Thesis: The Quantum Hall Effect; Bulk-Edge Correspondence in Interacting Lattice Systems.
Courses: Applied Machine Learning, Machine Learning, Advanced Machine Learning, Probability, Stochastic Processes.
Awards: NSERC Canada Graduate Scholarship - Master's (CGS-M), Faculty of Graduate Studies Award.

BSc. Mathematics & Physics - *University of New Brunswick* December 2019
Courses: Probability & Statistics, Numerical Methods, Computational Physics, Measure Theory.
Awards: NSERC Experience Award, Arthur & Sandra Irving Primrose Scholarship, others.

Work Experience

R&D Scientist - *C-Therm Technologies* 2017-2021

- Designed and implemented machine learning/regression algorithms in Python to extract thermal material properties from experimental curves.
- Created the "Flex TPS" regression algorithm, one of their core products which retails for $9,100.
- Performed computational physics research on cutting-edge technologies. Resulted in a publication.

Head Teaching Assistant - *UBC Mathematics Department* 2020-present

- Leader of all TAs for UBC's Differential Calculus course. High reviews from student evaluation surveys for ability to explain complex mathematical concepts in simple language.
- Previously a Graduate TA for an Applied Linear Algebra course.

Projects

- **Geophysical Inversion with Deep Neural Networks**: Variational autoencoder in PyTorch, combined with UBC geophysics lab's inversion software, to model subsurface density.
- **Outlier Detection in NHL:** Ensemble ML model to detect outlier goal scoring seasons of NHL players (cross-validation MAE: 1.6 goals). Significant preprocessing of data from moneypuck.com.
- **Vector-Quantized Naive Bayes:** Full from-scratch implementation in Julia.
- **Master's Thesis**: Quantum Hall effect; proving bulk-edge correspondence in interacting lattice systems. Uses mathematical tools such as functional analysis, spectral theory, and operator algebras.
- **Publication with C-Therm:** Temperature Fields Generated by a Circular Heat Source (CHS) in an Infinite Isotropic Medium: Treatment of Contact Resistances with Application to Thin Films, International Journal of Heat and Mass Transfer 137:677-689 (April 2019).
- **Others/Where to View:** Full project portfolio on personal website, https://justin-furlotte.github.io.

Skills

Programming Languages: Python, SQL, Julia, C#, Matlab
Libraries/Tools: PyTorch, Scikit-Learn, NumPy, SciPy, Pandas, Jupyter, Plotly, Dash, Git, LaTeX