Justin Furlotte

MSc Mathematics

I am a graduate student researching mathematical physics (in particular, the Quantum Hall Effect) as a member of the Institute of Applied Mathematics at the University of British Columbia. Other than physics, I also have a strong interest in applied mathematics, including scientific computing, mathematical modelling, and machine learning.

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EDUCATION

MSc - Mathematics
University of British Columbia

09/2020 - Present *GPA: 88%*

Awards

- NSERC Canada Graduate Scholarship - Master's (CGS-M).
- Faculty of Graduate Studies Award (x2).

B.Sc (Honours) - Mathematics-Physics
University of New Brunswick

09/2015 - 12/2019 *GPA: 4.0*

Awards

- NSERC Experience Award (2018).
- Dr. Ker-Ping Lee Memorial Scholarship (2019).
- The Arthur and Sandra Irving Primrose Scholarship (2015-2019).
- Older awards available upon request.

RECENT WORK EXPERIENCE

R&D Scientist
C-Therm Technologies

06/2017 - 08/2020 *Fredericton, NB, Canada*

Achievements/Tasks

- 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 C-Therm's core products which retails for $9,100.
- Performed computational physics research on cutting-edge technologies, resulting in a publication.

Head Teaching Assistant
University of British Columbia

09/2020 - 04/2022

MATH 110 (Introduction to Differential Calculus); MATH 307 (Applied Linear Algebra)

Achievements/Tasks

- Leader of all TAs for UBC’s Differential Calculus course.
- Created weekly teaching plans, problem sets, and solutions for graduate TAs.
- High reviews from student evaluation surveys for ability to explain complex mathematical concepts in simple language.

SKILLS

Machine Learning | Python | PyTorch | Scikit-Learn | Pandas | Jupyter | Julia | MATLAB | SQL | LaTeX

PROJECTS & PUBLICATIONS

Geophysical Inversion with Deep Neural Networks
- Variational autoencoder in PyTorch, combined with UBC geophysics lab’s inversion software, to model subsurface density.

Variational Autoencoder Lecture
- Sample lecture & assignment created for UBC’s CPSC 540 (Advanced Machine Learning) course.

Ensemble ML xG Model
- Created an expected goals model to detect outlier goal scoring seasons of NHL players.
- Significant preprocessing of data from moneypuck.com.
- Created Plotly/Dash dashboard app, deployed with Heroku.

Master's Thesis - The Quantum Hall Effect
- Proving bulk-edge correspondence in interacting lattice systems.
- Uses mathematical tools such as functional analysis, spectral theory, and operator algebras.

Vector-Quantized Naïve Bayes
- Full from-scratch implementation in Julia.
- Modification of ordinary naïve Bayes which adds a latent variable using unsupervised classification.

Publication with C-Therm Technologies
- M. Emanuel, M. Bhouri, J. Furlotte, D. Groulx, J. Maassen: 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).

Other Projects & Where to View
- These projects and more can be browsed in greater detail on my personal website, https://justin-furlotte.github.io.