

JONATHAN WILDER LAVINGTON

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EDUCATION

University of British Columbia, Vancouver

Fall 2018 - Present

PhD Student in Computer Science, Emphasis: Machine Learning and Artificial Intelligence, GPA: 4.0

University of Colorado Boulder, College of Engineering

Fall 2013 - Spring 2018

Masters Degree in Applied Mathematics, Emphasis: Mathematical Biology, GPA: 3.814

Bachelors Degree in Applied Mathematics, Emphasis: Computational Statistics, GPA: 3.251

TECHNICAL STRENGTHS

Programming Languages

C/C++, MATLAB, R/RShiny, Python, Hive/Oracle SQL

Software Packages

Tensorflow, PyTorch, Theano, Keras, Networkx, Pandas

Scikitlearn, Scipy, Numpy

Software & Tools

LaTeX, Tableau, Mathematica, ChemPlot, Db Visualizer, Alteryx, Knime

Database Systems

Hadoop, Oracle

Operating Systems

Linux, OSX, Windows

GitHub

<https://github.com/WilderLavington>

PROFESSIONAL EXPERIENCE

Data Science Intern (Summer)

May 2017 - August 2017

Seagate Technologies

Longmont, CO

- Produced GUI in R-shiny that creates statistical visualizations of driver data for engineering divisions.
- My program queried N-way join data from Hadoop clusters, pushed it to an Oracle server, then dynamically generated and pushed SQL queries built from user picks.
- Using the dynamically queried data, I generated interpretable statistical metrics and visualizations within the GUI for the user. (R, R-shiny, Apache Hive, Oracle SQL)

Data Science Intern (Spring)

February 2017 - May 2017

Seagate Technologies

Longmont, CO

- Performed a software evaluation report that reviewed current citizen data science platforms, as well as statistical visualization and GUI tool boxes. (Alteryx, KNIME, Tableau, R-shiny, SAS)

Marketing Analyst Intern

May 2016 - August 2016

Analytic Partners

Broomfield, CO

- My work consisted of data mining, data preparation, marketing model creation using time series analysis. Most of my work was done in R, VBA, Excel, SQL, and proprietary software.

TEACHING EXPERIENCE

Teaching Assistant

September 2017 - May 2018

Applied Mathematics Department

University of Colorado, Boulder

- In Fall 2017 I ran two recitation sections of pre-calculus, two one hour lectures once a week.
- In Spring 2018, I ran one calculus three recitation, which consisted of a single, one hour lecture once a week.
- For these courses I was responsible for the creation of quizzes and review sheets, as well as grading and proctoring.

Learning Assistant

September 2015 - May 2017

Applied Mathematics Department

University of Colorado, Boulder

- I worked as a learning assistant for courses including: Applied Probability (Fall 2015, Spring 2017), Scientific Computing in Matlab (Spring 2016), and Intermediate Numerical Analysis I (Fall 2016).

RESEARCH EXPERIENCE

Research Assistant

Professor Manuel Lladser's Research Group

February 2016 - Present

University of Colorado, Boulder

- My research focuses on using probabilistic modeling to describe the formation of R loops within CRISPR molecular binding systems. The majority of my project was programed within Matlab (for numerical simulation) and python (for data management). Using machine learning and Monte Carlo simulation in conjunction with intuitive physical models to create accurate predictions and interpretable heuristics for future experimentation within the field.

Lab Assistant

Professor Steven Mojzsis' Research Group

May 2014 - July 2015

University of Colorado, Boulder

- While at the Astrobiology Materials Lab, I was tasked with processing and analysis of zircon carrying mineral samples for use pre-archean geochemistry research. Tasks included, creation of thin sections for the use in mass spectrometry, heavy liquid separation, stone cutting, and image processing.

GRANTS

Expeditions in Training, Research, and Education for Mathematics and Statistics through Quantitative Explorations of Data (EXTREEMS)

Fall 2016 - Fall 2017

Undergraduate student grant

Awarded

- Created a probabilistic binding model for the CRISPR-Cas9 enzyme in bacterial genomes. The model leverages a discrete Markov Chain to probabilistically approximate the sequential nature of R loop formation within CRISPR.

Undergraduate Research Opportunities Program (UROP)

Fall 2015

Undergraduate student grant

Awarded

- Project focused on the investigation of the mass fractionation of sulfide isotopes in Pre-Archean zircons.

CONFERENCES

Society for Industrial and Applied Mathematics (SIAM)

March 2017, 2018

Undergraduate Student Conference

Denver, CO

- Presented results of a probabilistic model applied to prediction of CRISPR-dCas9 system. The model was applied to a yellow fluorescent protein (YFP) repression dataset provided by Katia Tarasava of Gill Lab at CU Boulder earlier that year.

PUBLICATIONS

A Zipper Model of R-loop Formation in CRISPR-dCas9 Systems

Fall 2017

J. Lavington, K. Tarasava, M. Lladser

To be submitted

- Investigation and modeling of targeting efficiency within CRISPR-dCas binding systems with respect to changes in the target RNA sequence composition via Markov chains.

RELEVANT COURSE WORK

Matrix Methods & Applications

Numerical Linear Algebra

Intermediate Numerical Analysis I, II

Complex Variables and Applications

Applied Probability

Calculus I, II, III

Markov Chains, Queues, and Monte-Carlo Simulations

Fourier Series and Boundary Value Problems

Applied Analysis I

Advanced Topics in Convex Optimization

Differential Equations with Linear Algebra

Data Structures

Scientific Computing in Matlab

General Physics I,II

Organic Chemistry I

Discrete Mathematics

Random Graphs

Introduction to Mathematical Statistics

Introduction to Artificial Intelligence
Computational Bayesian Statistics
Computer Systems
Machine Learning
Graduate Numerical Analysis I, II

Mathematical Modeling
Experimental Physics
Spatial Statistics
Network Analysis and Modeling

CLASS PROJECTS

Network Analysis and Modeling: · Leveraging Graph Diversity via the Joint Degree Distribution	Spring 2017
Machine Learning: · Optimizing Predator-Prey Behavior Through Q-Learning	Spring 2017
Advanced Topics in Convex Optimization: · A Review of the Adjoint State Method	Fall 2017
Spatial Statistics: · A Review of the Link between Gaussian Random Fields and Gauss-Markov Random Fields	Fall 2017
Complex Variables and Applications: · PDE Solutions in Polygons Using the Schwarz-Christoffel Transformation	Spring 2016
Numerical Linear Algebra: · Neural Networks Versus Principal Component Analysis in Facial Recognition	Spring 2016
Modeling in Applied Mathematics: · Financial Time Series Modeling	Fall 2016
Intermediate Numerical Analysis I: · Fluid Flow Over a Flat Plate: Kinematic Viscosity and Heat Diffusion · Modeling a Non-adiabatic Explosion	Summer 2015
Matrix Methods & Applications · Applications of Spectral Clustering in Image Segmentation	Fall 2014

VOLUNTEER WORK AND EXTRA-CURRICULAR ACTIVITIES

Volunteer Firefighter <i>Sunshine Canyon</i>	June 2013-September 2015 <i>Sunshine Fire Department</i>
· Member of the Sunshine Volunteer Fire Department. Worked as a volunteer first responder for roughly two years at a volunteer fire department within Boulder County. I currently have certificates in wilderness first aid, and wild-land behavior (S130/S190).	
College Radio Station <i>Radio 1190</i>	February 2013 - Present <i>University of Colorado, Boulder</i>
· Aside from acting as a director of the station in 2014, along with two other students within the Applied Mathematics Department, I started a talk radio show and podcast titled “Probably Novel” where we invite undergraduate researchers from CU to talk about their work. The goal of the show is not only to display the amazing undergraduate research being done at CU, but to make scientific topics digestible for a lay audience, and to inspire other undergraduates to become active researchers.	