

# DANIEL RALSTON

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## EDUCATION

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**University of California Santa Barbara**  
PhD Mathematics

Goleta, CA  
2021 - Present

**Bowdoin College**  
BA *Magna Cum Laude*  
Mathematics (major), English (minor), *GPA: 3.92*

Brunswick, ME  
2017 - 2021

## CODING EXPERIENCE

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### Diffusion Mapping Project

Summer 2022

UCSB, advised by Professor Paul Atzberger

- Experimented with new variations of diffusion mapping algorithm (a manifold dimension reduction algorithm) by incorporating  $k$ -NN algorithm and different metric assumptions of underlying dataset
- Currently investigating convergence of Laplacian-Beltrami Operator (the function that provides mathematical rigor to the algorithm) under different norms

### Stochastic Neighborhood Embedding Project

Fall 2020, Summer 2022

- Wrote basic stochastic neighborhood embedding algorithm from ground up, the underlying process behind the  $t$ -SNE and UMAP dimension reduction methods
- Prepared detailed report comparing the  $t$ -SNE and UMAP algorithms based off of original the papers, specifically explaining their similarities which are presented from different mathematical perspectives

### Machine Learning on MRI Data

Summer 2020

Harvey Mudd College, advised by Professor Weiqing Gu

- Introduction to machine learning and data science best practices working with convolutional neural network architectures on volumetric MRI brain scan data

## MATHEMATICS EXPERIENCE

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### PhD Progress

- Passed qualifying exams in topology and analysis (real and complex) at the PhD level
- Teaching Assistant experience in differential equations, as well as differential and integral calculus (all course evaluations available on request)
- Graduate coursework in analysis (measure theory with applications in probability/stochastics), topology, and algebra

### Toroidal Circle Packing

Summer 2019

National Science Foundation, advised by Professor William Dickinson

- Identified optimal packings of two circles with radius ratio  $\sqrt{2} - 1$  on flat torus (further details available on dralston78.github.io/projects/)

## TECHNICAL STRENGTHS

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Scripting Languages: Python (Libraries: Numpy, Scipy, Pandas, Matplotlib)  
Database Management: SQL (SQLite)  
Modeling and Analysis: Mathematica, MATLAB