# Eli Quist

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Research-focused applied mathematician passionate about utilizing topological descriptors to improve ML pipelines for eccentric data.

## Education

**Montana State University**                                                                          *Bozeman, MT*

M.S. IN COMPUTER SCIENCE                                                                          *January 2023 - May 2025*

- GPA: 4.00
- Concurrent B.S./M.S. studies through 4+1 Accelerated M.S. Program

**Montana State University, MSU Honors College**                                     *Bozeman, MT*

B.S. IN APPLIED MATHEMATICS (MINORS: COMPUTER SCIENCE, DATA SCIENCE)          *August 2020 - May 2024*

- GPA: 3.99
- Presidential Scholar
- Honors Program - Academic Achievement

## Experience

**MSU Computational Topology and Geometry Research Group**                      *Bozeman, MT*

RESEARCH ASSISTANT                                                                       *October 2020 - PRESENT*

- Extending techniques in computational topology and geometry to machine learning applications
- Advancing skills in collaboration, technical communication, and cognitive agility by working on interdisciplinary teams to develop computational solutions to complex problems
- Building an understanding of innovative data solutions and structures, and developing analytical creativity to understand eccentric data
- Performing computational research and testing on the Tempest High Performance Computing Research Cluster

**Brightvine**                                                                                           *Bozeman, MT*

SOFTWARE ENGINEERING INTERN                                                             *November 2021 - PRESENT*

- Building software products from the ground up, frontend to backend, in a fast-paced, startup environment
- Designing and writing AI driven web applications in Go, Javascript, and Python that operate on centralized and distributed data stores
- Building expertise in cloud machine learning and artificial intelligence products on the Google Cloud Platform (GCP)
- Leading the development of an AI driven ETL pattern for PDF parsing, from research and proof of concept to production environments
- Exploring lifestyles in collaborative problem solving & teamwork, clean architecture, "you are your own devops," and agile development

## Selected Projects

**Intrinsic Validation of Manifold Learning Techniques**

MSU COMPUTATIONAL TOPOLOGY AND GEOMETRY RESEARCH GROUP                     *Submitted 2023, Under Review*

- Utilizing theoretical geometric and topological properties of manifolds to enhance applied techniques in manifold learning
- Developing novel techniques for validation of manifold learning algorithms in an unsupervised settings

**The Weighted Euler Characteristic Transform for Image Shape Classification**

MSU COMPUTATIONAL TOPOLOGY AND GEOMETRY RESEARCH GROUP                     *Submitted 2023, Under Review*

- Exploring theoretical properties of the Weighted Euler Characteristic Transform (WECT)
- Designing and running experiments that demonstrate the abilities of the WECT as a tool in image classification and recognition pipelines

**Attractors of Multivalued Boolean Networks from Expanded Graph Translations**

UNDER DIRECTION OF PROF. TOMAS GEDEON                                                     *Present*

- Exploring the relationships between boolean networks and their graphical representations to better understand the structural properties of biological systems

**Catching Polygons**

MSU COMPUTATIONAL TOPOLOGY AND GEOMETRY RESEARCH GROUP                     *September 2021*

- Combining geometric insight with tools from non-linear convex optimization to solve a classical arrangement problem in computational geometry
- 2021 *Fall Workshop on Computational Geometry*

# Coursework

| | |
|---|---|
| **Graduate** | Mathematics of Machine Learning, Mathematical Optimization, Computational Topology, Computational Geometry, Real Analysis, Linear Algebra |
| **Undergraduate** | Machine Learning, Data Structures and Algorithms, Statistics, Database Systems, Numerical Linear Algebra, Numerical Analysis, Techniques in Applied Mathematics, Mathematical Biology, Software Engineering, Software in Mathematics |
| **Seminar** | Analytical Techniques of Big Data, Data Science for National Security, Ethical Issues in Computer Science, Honors Seminars in Knowledge, Imagination, and Music |

# Skills

| | |
|---|---|
| **Computer** | Advanced level: Python and PyTorch, R, MATLAB, Go, Docker, Kubernetes, Google Cloud Platform. Other: C++, Linux Systems, SQL, graph databases, Javascript, Java |
| **Productivity** | git/GitHub, Jira, Microsoft Office, LaTex |
| **Personal** | Problem solving, cognitive agility, ambition & motivation, team work |

# Volunteer, Service & Outreach

### Co-Director and Tutor

MSU AMERICAN INDIAN AND ALASKA NATIVE STUDENT SUCCESS CENTER                    *August 2021 - Present*

- Volunteer tutor for the American Indian Council (AIC) at Montana State University
- Focusing on growth and impact of the tutoring program on the AIC community
- Completing organizational and administrative tasks for the program

### Student Advisory Council Member

MSU HONORS COLLEGE                    *August 2021 - Present*

- Working with faculty and administration to bring student voice to administrative decisions of the Honors College
- Building relationships with prospective students while serving as a student ambassador

### Moral Courage Ambassador Trainee

MONTANA STATE UNIVERSITY                    *October 2023*

- Selected to take Irshad Manji's course *Diversity Without Division: Introducing the Moral Courage Method of Communicating*, in pursuit of becoming a trained Moral Courage Ambassador

# Awards and Honors

### ACADEMICS

- MSU Alumni Foundation Founder's Day Award for Student Excellence, *December 2023*
- MSU Dept. Mathematical Sciences Outstanding Scholar Award, *April 2023*
- William J. Swartz Mathematical Sciences Award, *May 2022*
- MSU Nominee, Computing Research Association Outstanding Undergraduate Award, *October 2021*
- Pi Mu Epsilon Inductee, *May 2021*
- John L. Magaret Mathematical Sciences Scholarship, *May 2021*
- MSU Department of Mathematical Sciences Outstanding Scholar Award, *April 2021*
- MSU Presidential Scholar, *August 2020*

### OTHER

- Presidential Volunteer Service Award, *October 2018*
- Minetonka Scholar Athlete of the Year, *May 2020*
- Yale Book Award, *October 2019*