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Christopher Donnay

cdonnay.github.io

Experience

Data and Democracy Lab, Cornell University — Remote

Lab Manager — January 2025 - Present

- Lead a team of 6 contributors to "VoteKit", the Lab's Python package for modeling and analyzing elections, plan for the stable continuation of the package, and implement speed improvements and organizational refactorings.
- Manage the development and successful public release of Districtr 2.0, a browser-based geospatial application for drawing legislative districts, with a remote team of 5 full-stack developers. Coordinate communication between the development team and the Lab PI. Continue to facilitate the addition of new features and improve user experience.
- Design, write, and execute training experiences for collaborators and partner organizations, including a 3-day workshop in modeling alternative systems of elections, a 6-session program in statistical inference of polarized voting run by the Southern Poverty Law Center, and Python tutorials of the Lab's software.
- Organize and schedule Lab events, including a weekly Zoom seminar with 20+ academics, a 3-day in-person workshop with a budget of $40k that required coordinating travel, lodging, and catering for professors and non-profit staff, and tri-yearly in-person visits for full-time lab staff members that requires coordinating travel and lodging.
- Prepare and oversee the Lab's 2 million dollar budget, grant proposals, and funding relationships.
- Present research to community groups, partner organizations, and academics.

Research Scientist — January 2024 - January 2025

- Developed and maintained the codebase, as well as produced documentation, for "VoteKit". Was the top contributor on GitHub with over 450 commits.
- Conducted computational research on the Voting Rights Act, polarized voting, election modeling, and historical elections using a high-performance cluster. Results were used to inform the efforts of political advocacy groups in 3 states and were incorporated into a research paper.
- Communicated and presented modeling results to community groups, academics, non-profits, and technical stakeholders.

STEM Teacher — Bryn Mawr, PA

The Shipley School, Penn GSE Teaching Fellow — June 2018 - June 2020

- Created a novel, year-long curriculum and accompanying materials for an introduction to Python course.
- Taught computer science courses in Python and Processing, as well as geometry.
- Conducted inquiry-based research to inform teaching practice and pedagogy for my Master's degree.

Education

Department of Mathematics, The Ohio State University — Columbus, OH

Doctor of Philosophy in Mathematics — December 2024

- **Advisor**: Matthew Kahle
- **Co-advisor**: Moon Duchin
- **Research**: Mathematics of Democracy
- **Data Science Certificate**: Erdős Institute

Department of Mathematics, The Ohio State University — Columbus, OH

Master of Science in Mathematics — May 2024

University of Pennsylvania Graduate School of Education — Philadelphia, PA

Master of Science in Education — May 2020

Pomona College — Claremont, CA

Bachelor of Arts, Mathematics, Cum Laude — May 2018

Courses Taught

- **Math 1125; Mathematics for Elementary Teachers I**: The Ohio State University, Fall 2022.
- **Math 1075; Precollege Algebra**: The Ohio State University, Fall 2021.
- **Introduction to Animation in Processing**: The Shipley School, 2019-2020.
- **Geometry**: The Shipley School, 2018-2020.
- **Introduction to Computer Science in Python**: The Shipley School, 2018-2020.

Presentations

- **Portland, OR 2024 City Council Election Analysis**: North Star Civic Foundation, July 2025.
- **Portland, OR 2024 City Council Election Analysis**: Oregon Donor Alliance, April 2025.
- **Portland, OR 2024 City Council Election Analysis**: Lift Every Voice Portland convening, More Equitable Democracy, April 2025.
- **Portland, OR 2024 City Council Election Analysis**: Ranked-choice Voting Research and Communications Squad, March 2025.
- **Asymptotics of Redistricting the $n \times n$ grid**: MGGG seminar, October 2024.
- **Asymptotics of Redistricting the $n \times n$ grid**: Combinatorics seminar, The Ohio State University, October 2024.
- **3:1 Nesting Rules in Redistricting**: Computational redistricting, SIAM Annual Meeting, July 2024.
- **Asymptotics of Redistricting the $n \times n$ grid**: Redistricting Seminar, SLMath, December 2023.
- **Understanding Nesting Rules in Redistricting**: Graduate Student Topology and Geometry Seminar, The Ohio State University, February 2023.
- **High-Throughput Screening of Nanoporous Materials with Topological Data Analysis**: Graduate Student Topology and Geometry Seminar, The Ohio State University, April 2022.

Publications

- **"Asymptotics of Redistricting the $n \times n$ grid"**: with M. Kahle, to appear in *The American Mathematical Monthly,* November 2025.
- **"VoteKit: A Python package for computational social choice research"**: with M. Duchin, J. Gibson, Z. Glaser, A. Hong, M. Mukundan, and J. Wang, *Journal of Open Source Software*, May 2025.
- **"3:1 Nesting Rules in Redistricting"**: in revisions with *Statistics and Public Policy.*
- **"Proportionality for Ranked Voting, in Theory and Practice"**: with G. Benadè, M. Duchin, and T. Weighill, preprint.
- **"p-adic Quotient Sets II: Quadratic Forms"**: with S. Garcia and J. Rouse, *Journal of Number Theory*, August 2019.

Fellowships

- **Dissertation Fellowship**: The Ohio State University, Fall 2024.
- **Algorithms, Fairness, and Equity**: Program member, SLMath, Fall 2023.
- **Rhodus Graduate Fellowship**: Department of Mathematics, The Ohio State University, Fall 2023.
- **Data Science for Democracy**: SNF Agora Institute, Johns Hopkins University, June 2022.
- **Tibor Radó Research Semester**: The Ohio State University, Spring 2022.
- **Distinguished University Fellowship**: The Ohio State University, 2020-2021.

Awards

- **Distinguished First-Year Graduate TA**: Department of Mathematics, The Ohio State University, April 2022.
- **1st Place Data Science Bootcamp**: Erdős Institute, The Ohio State University, December 2020.
- **Bruce Jay Levy Prize in Mathematics**: Mathematics Department, Pomona College, 2017.

Workshops

- **Voting Methods Modeling Workshop**: Organizer, Data and Democracy Lab, Cornell University, June 2025.
- **Randomness in Topology and its Applications**: Attendee, IMSI, University of Chicago, March 2023.

Service

- **President**: Math Graduate Student Association, The Ohio State University, October 2022-December 2024.
- **Member**: Committee for Graduate Student Mental Health, Department of Mathematics, The Ohio State University, February 2023-December 2024.
- **Panelist**: STEM Graduate Student Panel for Humanitarian Engineering Scholars, The Ohio State University, February 2023.
- **Panelist**: Association for Women in Mathematics Graduate School Panel, The Ohio State University, November 2021.
- **Panelist**: Graduate School Panel, Pomona College, September 2020.

Skills and Background

- **Python**: Jupyter, (Geo)Pandas, Poetry, NetworkX, NumPy, scikit-learn, UV.
- **GitHub**
- **Mathematics**: Markov Chain Monte Carlo methods, graphs and networks, topological data analysis, asymptotic analysis, discrete geometry, combinatorics, computational social choice, voting methods.
- **Open source project management**
- **High-performance clusters**: SLURM
- **Other software**: QGIS, Mathematica, LaTeX.
- **Selected courses**: Computational Statistics, Fundamentals of Computer Science, Operations Research.