Zachary I. Schutzman

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Last updated: December 30, 2020

INTERESTS Algorithmic game theory and economics, fairness in algorithm design, differential privacy and its applications, computational social science, theoretical machine learning, mathematics of redistricting

EDUCATION

University of Pennsylvania Philadelphia, PA 2016-2021 (expected)
Ph.D., Computer and Information Science
Thesis: *Algorithmic Processes and Social Values*
Advisor: Aaron Roth
Affiliations: Warren Center for Data & Network Science, Penn Research in Machine Learning, CS Theory Research Group

Colby College Waterville, ME 2012-2016
B.A., *cum laude*, Economics (Honors) and Mathematics
Thesis: *Computational Simulation and Analysis of Landscape Conservation Auctions*
Advisors: Timothy Hubbard and Sahan Dissanayake
Phi Beta Kappa, William D. Adams Presidential Scholar, Distinction in Economics
Minor: Computer Science

RESEARCH Authors are listed alphabetically by surname

Geometry of Graph Partitions via Optimal Transport
In *SIAM Journal on Scientific Computing*, Vol. 42 Issue 5. Oct. 2020
with Tara Abrishami, Nestor Guillen, Parker Rule, Justin Solomon, Thomas Weighill, and Si Wu

Algorithms and Learning for Fair Portfolio Design
Manuscript: `https://arxiv.org/abs/2006.07281`
with Emily Diana, Travis Dick, Hadi Elzayn, Michael Kearns, Aaron Roth, Saeed Sharifi-Malvajerdi, and Juba Ziani

The Gerrymandering Jumble: Map Projections Permute Districts' Compactness Scores
In *Cartography and Geographic Information Science*, Vol. 3 Issue 46. May 2020
with Assaf Bar-Natan and Lorenzo Najt

Trade-Offs in Fair Redistricting
In *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society* (AIES), 2020
accepted with an oral presentation

Total Variation Isoperimetric Profiles
In *SIAM Journal on Applied Algebra and Geometry*, Vol. 3 Issue 4. Nov. 2020
with Daryl DeFord, Hugo Lavenant, and Justin Solomon

Equilibrium Characterization for Data Acquisition Games
In *Proceedings of the 28th International Joint Conferences on Artificial Intelligence* (IJCAI), 2019
with Jinshuo Dong, Hadi Elzayn, Shahin Jabbari, and Michael Kearns

The Price of Privacy in the Keynesian Beauty Contest
In *Proceedings of the ACM Conference on Economics and Computation* (EC), 2019
with Hadi Elzayn

Fair Algorithms for Learning in Allocation Problems
In *Proceedings of the ACM Conference on Fairness, Accountability, and Transparency* (FAT*), 2019
with Hadi Elzayn, Shahin Jabbari, Michael Kearns, Christopher Jung, Seth Neel, and Aaron Roth

Strategic Classification from Revealed Preferences
In *Proceedings of the ACM Conference on Economics and Computation* (EC), 2018
with Jinshuo Dong, Aaron Roth, Bo Waggoner, and Zhiwei Steven Wu
appeared at the Workshop on Learning in the Presence of Strategic Behavior (NeurIPS 2017) as a long oral presentation

OTHER PROJECTS

askmath.org
A blog-like question-and-answer platform for users to ask and mathematical professionals to answer questions about learning and applying the mathematical sciences.
Available at: `https://askmath.org`

Diffix Bug Bounty Program Winner
Executed three linear programming reconstruction attack on a supposedly privacy-preserving data analysis product, with Travis Dick and Matthew Joseph.
Coauthored a pair of blog posts on `differentialprivacy.org` with Aloni Cohen, Sasho Nikolov, and Jon Ullman
Available at `https://differentialprivacy.org/reconstruction-theory/`, `https://differentialprivacy.org/diffix-attack/`

GerryChain, Contributor
An open-source Python Markov Chain Monte Carlo sampler to generate ensembles of redistricting plans.
Available at `https//github.com/mggg/GerryChain`

District-Shortening Flow
An introduction to 'multiscale compactness' using curve-shortening flow.
Available at `https://mggg.org/distflow`

Redistricting Gridlandia
An gentle interactive introduction to the mathematics of redistricting.
Appeared in *Geometry v. Gerrymandering*, Moon Duchin *Scientific American*, Nov. 2018
Available at `https://mggg.org/metagraph`

ASSISTANT-SHIPS

Graduate Research Fellow Voting Rights Data Institute, MIT/Tufts Summer 2018
Worked on problems at the interface of mathematics, computing, and statistics with redistricting and voting rights with expert practitioners, faculty, and students from a range of disciplines.
Hosts: Moon Duchin (Tufts Mathematics) & Justin Solomon (MIT CSAIL)

TEACHING & MENTORSHIP

Voting Rights Data Institute Faculty, MIT/Tufts — Summer 2019
Co-led independent research groups of undergraduate and graduate students from various disciplinary backgrounds on topics at the intersection of mathematics, computing, and voting rights. Organized and co-taught a series of hands-on workshops introducing students to topics and techniques in optimization.

Independent Study
Michael Ramdatt, *Quadratic Voting Analysis* (with Bo Waggoner) — Spring 2018

Teaching Assistantships

Algorithmic Game Theory (NETS 412), UPenn	Spring 2018
Networked Life (NETS 112), UPenn	Fall 2017
Game Theory (EC 379), Colby College	Spring 2016
Data Structures and Algorithms (CS 231), Colby College	Fall 2015
Computational Thinking (CS 151/152), Colby College	2014-2015

TALKS

Algorithms for Applied Large-Scale Differential Privacy — October 2020
Written Preliminary Exam Presentation

Algorithms, Fairness, and Redistricting — April 2020
Penn CIS Student Colloquium

Trade-Offs in Fair Redistricting — February 2020
AIES

Equilibrium Characterization for Data Acquisition Games — August 2019
IJCAI

Introduction to the Metagraph of Districting Plans — June 2019
Voting Rights Data Institute

Graphs, Geometry, and Gerrymanders — February 2019
University of Toronto Dept. of Mathematics *Diet Graduate Seminar*

Shape Analysis for Redistricting — February 2019
University of Toronto Dept. of Mathematics *Hyperbolic Lunch Seminar*

Computational Simulation and Analysis for Landscape Auctions May 2016
Honors Thesis Defense, Colby College Department of Economics

SERVICE

Conference Reviewing
NeurIPS Workshop on Machine Learning for Economic Policy 2020 (PC), AAAI 2020 (PC), ICML 2019, EC 2018

Department
Dean's Doctoral Advisory Board, Summer 2020 COVID-19 Communications Committee, Student representative on CIS doctoral requirements committee

TECHNICAL SKILLS

Python, C++, Julia,
MATLAB, QGIS, Isadora,