

AKHIL JALAN

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RESEARCH INTERESTS

Theoretical Computer Science: Graph Theory, Optimization, Algorithmic Fairness, Machine Learning

EDUCATION

University of California, Berkeley

B.A. Applied Mathematics, Highest Honors

August 2015 - May 2019

GPA: 3.95/4.00

RESEARCH EXPERIENCE

The Structure of the Sandpile Group (Bachelor's Thesis) ¹

Advisor: Professor Nikhil Srivastava

Nov 2018 - May 2019

Berkeley, CA

- Proved lower bounds for the number of trivial invariant factors of sandpile groups, for the hypercube, torus, & integer lattice graphs
- Found “almost cyclic” structure of sandpile groups for expander graphs through computer experiments in Mathematica and Python
- Proved existence of bipartite expander graphs using the probabilistic method
- Proved four unique definitions of sandpile group are isomorphic, from combinatorics, spectral graph theory, algebraic graph theory, and algorithms respectively

Equity in the Facility Location Problem

Advisors: Professors Gireeja Ranade & Swati Gupta

Jan 2018 - Aug 2019

Berkeley, CA

- Wrote codebase and drafted case study section for paper on approximately optimal solutions to multi-objective facility location problem
- Found explicit approximately optimal hospital placement for 18 distinct objective functions, with multiplicative factor of 2.3
- Identified “bad metrics” for equity measurement which disproportionately impact approximation quality

Machine Learning in Wireless Communication

Advisor: Professor Anant Sahai

Jan 2018 - Oct 2018

Berkeley, CA

- Implemented split-input representation for neural networks to learn a quantization strategy for decentralized control, as part of Allerton paper
- Trained feedforward and recurrent neural nets to learn radio demodulation mapping for 4 unique demodulation schemes

PUBLICATIONS/PREPRINTS

- **Some New Numeric Results Concerning the Witsenhausen Counterexample**

Vignesh Subramanian, Laura Brink, Nikunj Jain, Kailas Vodrahalli, **Akhil Jalan**, Nikhil Shinde, Anant Sahai. 2018 56th Annual Allerton Conference on Communication, Control, and Computing (Allerton). IEEE, 2018.

¹Available at https://akhiljalan.github.io/files/akhil_thesis_sandpile_group.pdf

- **(Preprint) Equity Across Demographic Groups for the Facility Location Problem**
Swati Gupta, Akhil Jalan, Gireeja Ranade, Helen Yang, Simon Zhuang. 2019.

WORK EXPERIENCE

WeWork

Aug 2019 - Present

Engineer, Research & Applied Sciences Team

Palo Alto, CA

- Trained and deployed location scoring ensemble model for office units, using an ensemble model of gradient boosted decision trees in Python and R
- Built customer-to-building sales tool for similarity-based recommendations, using Google Maps Geocoding and Distance Matrix APIs

Agari

Jun 2018 - Aug 2018

Intern, Data Science Team

Foster City, CA

- Designed and trained new component of email risk model via rule-based subject line analysis
- Trained custom word-embedding from company email corpus in Spark, to outperform off-the-shelf word embeddings (word2vec, GloVe) for feature design
- Finalized “nickname impostor” feature in email risk model to detect employee impersonation

SERVICE

Math Peer Advisor, UC Berkeley

August 2018 - May 2019

- Prepared and hosted career development workshop for first/second year math majors and transfer students, in collaboration with Berkeley Women in Mathematics
- Offered 60+ hours of free tutoring and course advice to STEM undergraduates
- Individual mentor to math & computer science students through BUMP (Berkeley Undergrad Math-mentoring Program)
- Designed informational pamphlets for prospective students in collaboration with department administrator and fellow peer advisors