

AKHIL JALAN

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RESEARCH INTERESTS

Spectral & Algebraic Graph Theory, Optimization, Algorithmic Fairness

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

Nov 2018 - May 2019

Advisor: Professor Nikhil Srivastava

Berkeley, CA

- Presented four equivalent characterizations of the sandpile group of a graph, from combinatorics, spectral graph theory, algebraic graph theory, and algorithms
- Proved lower bounds for the number of trivial invariant factors for the sandpile groups of the hypercube graph, grid graph, and products of graphs
- Proved existence of bipartite expander graphs using the probabilistic method
- Numerically found that the largest invariant factor of the sandpile groups for two expander graph families (MGG and chordal cycle) grow exponentially as a function of vertices

Equity in the Facility Location Problem

Jan 2018 - Aug 2019

Advisors: Professors Gireeja Ranade & Swati Gupta

Berkeley, CA

- Found approximately optimal solutions for a family of 18 objective functions, in a case study of emergency room facilities
- Isolated “bad metrics” for equity measurement which disproportionately impacted the quality of approximately optimal solutions
- Found increase in user travel distance and nearby hospital burden in case study of local Alta Bates hospital closure

Machine Learning in Wireless Communication

Jan 2018 - Oct 2018

Advisor: Professor Anant Sahai

Berkeley, CA

- Implemented feedforward neural networks to test simple quantization strategy in the Witsenhausen counterexample in decentralized control
- Simulated radio demodulation with recurrent & feedforward neural networks, in low signal-to-noise ratio (SNR) settings

PUBLICATIONS

- **(Under Review) Equity Across Demographic Groups for the Facility Location Problem**

Swati Gupta, **Akhil Jalan**, Gireeja Ranade, Helen Yang, Simon Zhuang

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

- **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.

WORK EXPERIENCE

WeWork

Aug 2019 - Present

Engineer, Research & Applied Sciences Team

Palo Alto, CA

- Retrained location scoring ensemble model for office units, using an ensemble model of gradient boosted decision trees

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
- Implemented low-dimensional word embeddings (word2vec, GloVe) in Spark for feature design in subject line analysis
- Finalized “nickname impostor” feature in email risk model

SERVICE

Math Peer Advisor, UC Berkeley

August 2018 - May 2019

- Prepared free workshop on professional development for first and second-year math majors
- Offered 60 hours of free tutoring and course advice to STEM undergraduates
- Designed informational pamphlets for prospective students in collaboration with department administrator and fellow peer advisors