AKHIL JALAN

Email: akhiljalan@berkeley.edu — **Website**: akhiljalan.github.io

RESEARCH INTERESTS

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

EDUCATION

University of California, Berkeley Aug 2015 - May 2019
B.A. Applied Mathematics, Highest Honors *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*

- 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 Jan 2018 - Aug 2019
Advisors: Professors Gireeja Ranade & Swati Gupta *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 Jan 2018 - Oct 2018
Advisor: Professor Anant Sahai *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.

[1] Available 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

PROGRAMMING LANGUAGES

Experienced: Python, R
Proficient: Java, Julia, MATLAB, Javascript

SERVICE

Math Peer Advisor Aug 2018 - May 2019
UC Berkeley *Berkeley, CA*

· 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