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- RESEARCH INTERESTS EDUCATION
- Linear Algebra, Geometry of Polynomials, and Applications in Algorithm Design
- Stanford University, 2008 - 2013
Ph.D. in Management Science and Engineering
Concentration Area: Information Science and Technology
Thesis Title: New Rounding Techniques for the Design and Analysis of Approximation Algorithms
- Sharif University of Technology, Tehran, Iran. 2004 - 2008
B.Sc. in Computer Engineering
- APPOINTMENTS
- ◇ Associate Professor in Paul Allen School of CSE at University of Washington, 2020-present.
 - ◇ Assistant Professor in Paul Allen School of CSE at University of Washington, 2015-2020.
 - ◇ Postdoctoral Miller fellow at University of California Berkeley, 2013-2014.
- HONORS AND AWARDS
- ◇ Best Paper Award, STOC 2021, STOC 2019, FOCS 2011, SODA 2010
 - ◇ Sloan Fellowship, 2019
 - ◇ ONR Young Investigator Award, 2017
 - ◇ 10 Scientists to Watch, ScienceNews, 2016
 - ◇ NSF Career Award, 2016
 - ◇ ACM Doctoral Dissertation Award (honorable mention), 2014
 - ◇ Miller Postdoctoral Fellowship, 2013-2014
 - ◇ Stanford Graduate Fellowship, 2010-2013
 - ◇ Gold Medal in International Olympiad in Informatics (IOI) 2004
 - ◇ Silver Medal in Central European Olympiad in Informatics (CEOI) 2003
- JOURNAL PUBLICATIONS
- ◇ Spectral Independence in High-Dimensional Expanders and Applications to the Hardcore Model, with N. Anari, K. Liu, invited to Siam Journal of Computing 2021, FOCS 2020.
 - ◇ A Generalization of Permanent Inequalities and Applications in Counting and Optimization, with N. Anari, Advances in Mathematics 2021, STOC 2017.
 - ◇ Log-Concave Polynomials I: Entropy and a Deterministic Approximation Algorithm for Counting Bases of Matroids, with N. Anari, C. Vinzant, Duke Math Journal 2021, FOCS 2018.
 - ◇ Thickness and Information in Dynamic Matching Markets, with M. Akbarpour, S. Li, Journal of Political Economy, 2020, EC 2014.
 - ◇ Sharp Bounds on Random Walk Eigenvalues via Spectral Embedding, with R. Lyons, IMRN (International Mathematics Research Notices) 2017.
 - ◇ An $O(\log n / \log \log n)$ -Approximation Algorithm for the Asymmetric Traveling Salesman Problem, with A. Asadpour, M. Goemans, A. Madry, A. Saberi, OR 2016.
 - ◇ Almost Optimal Local Graph Clustering using Evolving Sets, with R. Andersen, Y. Peres, L. Trevisan, JACM 2015, FOCS 2012.
 - ◇ A New Regularity Lemma and Faster Approximation Algorithms for Low Threshold-Rank Graphs, with L. Trevisan, Invited to Theory of Computing 2015, Approx 2013.
 - ◇ Multi-way Spectral Partitioning and Higher-Order Cheeger Inequalities, with J. R. Lee, L. Trevisan, JACM 2014, STOC 2012.

- ◇ Online Stochastic Matching: Online Actions Based on Offline Statistics, with V. Manshadi, A. Saberi, *Mathematics of Operations Research*, 2013, SODA 2011.
 - ◇ On Variants of the Matroid Secretary Problem, with J. Vondrak, *Algorithmica* 2013.
- CONFERENCE PUBLICATIONS
- ◇ A (Slightly) Improved Approximation Algorithm for Metric TSP, with A. Karlin, N. Klein, STOC 2021, best paper award.
 - ◇ Log-Concave Polynomials IV: Approximate Exchange, Tight Mixing Times, and Near-Optimal Sampling of Forests, with N. Anari, K. Liu, C. Vinzant, T. Vuong, STOC 2021.
 - ◇ An Improved Approximation Algorithm for TSP in the Half Integral Case, with A. Karlin, N. Klein, STOC 2020.
 - ◇ Log-Concave Polynomials II: High-Dimensional Walks and an FPRAS for Counting Bases of a Matroid, with N. Anari, K. Liu, C. Vinzant, STOC 2019, best paper award.
 - ◇ Composable Core-sets for Determinant Maximization Problems via Spectral Spanners, with P. Indyk, S. Mahabadi, and A. Rezaei, SODA 2020.
 - ◇ A Polynomial Time MCMC Method for Sampling from Continuous DPPs, with A. Rezaei, ICML 2019.
 - ◇ Composable Core-sets for Determinant Maximization: A Simple Near-Optimal Algorithm, with P. Indyk, S. Mahabadi, A. Rezaei, ICML 2019.
 - ◇ Time-Space Tradeoffs for Learning from Small Test Spaces: Learning Low Degree Polynomial Functions, with P. Beame, X. Yang, COLT 2018.
 - ◇ Graph Clustering using Effective Resistance, with V. Levi Alev, N. Anari, and L. C. Lau, ITCS 2018.
 - ◇ A Simply Exponential Upper Bound on the Maximum Number of Stable Matchings, with A. Karlin, R. Weber, STOC 2018.
 - ◇ Nash Social Welfare for Indivisible Items under Separable, Piecewise-Linear Concave Utilities, with N. Anari, T. Mai, V. Vazirani, SODA 2018.
 - ◇ Approximating the Largest Root and Applications to Interlacing Families, with N. Anari, A. Saberi, N. Srivastava, SODA 2018.
 - ◇ Simply Exponential Approximation of the Permanent of Positive Semidefinite Matrices, with N. Anari, L. Gurvits, A. Saberi, FOCS 2017.
 - ◇ Nash Social Welfare, Matrix Permanent, and Stable Polynomials, with N. Anari, A. Saberi, M. Singh, ITCS 2017, *invited*.
 - ◇ Approximation Algorithms for Finding Maximum Induced Expanders, with A. Rezaei, SODA 2017.
 - ◇ Monte Carlo Markov Chains for sampling Strongly Rayleigh distributions and Determinantal Point Processes, with A. Rezaei, COLT 2016.
 - ◇ The Kadison-Singer Problem for Strongly Rayleigh Measures and Applications to Asymmetric TSP, with N. Anari, FOCS 2015.
 - ◇ Effective-Resistance-Reducing Flows, Spectrally Thin Trees, and Asymmetric TSP, with N. Anari, FOCS 2015.
 - ◇ Partitioning into Expanders, with L. Trevisan, in SODA 2014.
 - ◇ Improved Cheeger's Inequality: Analysis of Spectral Partitioning Algorithms through Higher Order Spectral Gap, with T. C. Kwok, L. C. Lau, Y. T. Lee, L. Trevisan, in STOC 2013.
 - ◇ A Rounding by Sampling Approach to the Minimum Size k -Arc Connected Subgraph Problem, with B. Laekhanukit, M. Singh, ICALP 2012.
 - ◇ Simultaneous approximations for adversarial and stochastic online budgeted allocation, with V. Mirrokni, M. Zadimoghaddam, in SODA 2012.
 - ◇ The Asymmetric Traveling Salesman Problem on Graphs with Bounded Genus, with A. Saberi, SODA 2011.
 - ◇ Submodular Maximization by Simulated Annealing, with J. Vondrak, SODA 2011.
 - ◇ Minimizing Movement, with E. Demaine, M. Hajiaghayi, H. Mahini, M. Zadimoghaddam, in SODA 2007.

- WORKING MANUSCRIPTS
- ◇ Counting and Sampling Perfect Matchings in Regular Expanding Non-Bipartite Graphs, with F. Ebrahimi-nejad, A. Nagda, 2021.
 - ◇ An Improved Approximation Algorithm for the Minimum k-Edge Connected Multi-Subgraph Problem, with A. Karlin, N. Klein, X. Zhang, 2021.
 - ◇ Log-Concave Polynomials III: Mason’s ultra-log-concavity conjecture for independent sets of matroids, with N. Anari, K. Liu, C. Vinzant, 2018.
- MEDIA COVERAGE
- ◇ BREAKTHROUGH in algorithms: Improved algorithm for Metric TSP!!!!!!! by Mohammad Hajiaghayi.
 - ◇ Computer Scientists Find New Shortcuts for Infamous Traveling Salesman Problem by Erica Klarreich.
 - ◇ ‘Outsiders’ Crack a 50-Year-Old Math Problem by Erica Klarreich.
 - ◇ Whats happening in mathematical sciences volume 10, Dana Mackenzie.
 - ◇ Shayan Oveis Gharan finds the shortest route to success by Emily Conover.
 - ◇ Nima Anari, Kuikui Liu, Shayan Oveis Gharan, and Cynthia Vinzant Solved the Mihail-Vazirani Conjecture for Matroids! by Gil Kalaki
 - ◇ A Vast and Tiny Breakthrough by Kenneth Regan.
 - ◇ Computer Scientists Break Traveling Salesperson Record by Erica Klarreich.
- INVITED LECTURES
- ◇ Hausdorff Colloquium, University of Bonn, 2021
 - ◇ Prague Summer School on Discrete Mathematics, 2020
 - ◇ Highlights of Algorithms, Copenhagen, 2019
 - ◇ BIRS Workshop on Geometry of Real Polynomials, Convexity and Optimization, 2019
 - ◇ BIRS workshop on TSP, Banff, 2018
 - ◇ BIRS workshop on Analytic Techniques in Theoretical Computer Science, Oaxaca, 2018
 - ◇ Introduction to Partition Functions Workshop, Bernoulli Center, EPFL 2018
 - ◇ Workshop on Expected Characteristic Polynomial Techniques and Applications in Quantitative Linear Algebra program in UCLA, 2018
 - ◇ BIRS workshop on Approximation Algorithms and Hardness of Approximation, Banff, 2017
 - ◇ Simons Symposium on New Directions in Approximation Algorithms, Krün, 2017
 - ◇ Simons Institute workshop on Structure vs. Randomness, 2017
 - ◇ BIRS workshop on Algebraic and Spectral Graph Theory, Banff, 2016
 - ◇ Highlights of Algorithms, Paris, 2016
 - ◇ Spectrum of Random Graphs, Centre International de Recontres Mathématiques, 2016
 - ◇ Relaxation Workshop, Hausdorff Research Institute for Mathematics, 2015 (declined because of paternity leave)
 - ◇ Simons Collaboration on Algorithms & Geometry Annual Meeting, 2015
 - ◇ Workshop on Stochastic Processes, Learning, and Optimization, UW-MSR Summer Institute, 2015
 - ◇ Approximation and Online Algorithms Cluster, ISMP 2015
 - ◇ MSRI workshop on Kadison-Singer, Interlacing Polynomials, and Beyond, Berkeley, 2015
 - ◇ Institute for Advanced Studies seminar series, 2015,
 - ◇ Workshop on “Advances in Market Design”, Paris School of Economics 2014
 - ◇ BIRS workshop on Approximation Algorithms and the Hardness of Approximation, Banff, 2014
 - ◇ Combinatorics of Hyperbolic and Real Stable Polynomials minisymposium, SIAM Discrete Mathematics Conference, Minneapolis, 2014
 - ◇ Talking Across Fields, Institut de Mathématiques de Toulouse, 2014
 - ◇ FOCS Workshop on Zeros of Polynomials and their Applications to Theory, 2013
 - ◇ Simons New Directions in Approximation Algorithms Workshop, 2013

- WORKSHOP ORGANIZER
- ◇ A semester on Geometry of Polynomials at Simons Institute in Winter/Spring of 2019 with Nikhil Srivastava.
 - ◇ A workshop on Beyond Randomized Rounding and the Probabilistic Method as part of the semester long program on Geometry of Polynomials, at Simons Institute, Winter 2019, with Nikhil Srivastava.
 - ◇ A session on Geometry of Polynomials and Applications in Approximate Counting in ISMP 2018, Bordeaux.
 - ◇ A session on Approximating Traveling Salesman Problem using Algebraic Techniques in FOCS 2016, with Amin Saberi.
- SERVICE
- ◇ PC Member: SODA 2015, APPROX 2016, ESA 2017, ITCS 2018, FOCS 2019, SODA 2021
 - ◇ NSF review panel, 2016, 2020
 - ◇ Organizing UW theory seminar, 2014-present
- GRADUATE STUDENTS (ALUMNI)
- ◇ Nima Anari (student at UC Berkeley, that I mentored) now at Assistant Professor at Stanford University,
 - ◇ Alireza Rezaei, now at The Voleon Group
 - ◇ Mert Salgam (co-advised with Paul Beame), now at Google,
 - ◇ Robert Weber (co-advised with Anna Karlin), now Assistance Teaching Professor at University of Washington.
- CURRENT STUDENTS
- ◇ Dorna Abdolazimi
 - ◇ Farzam Ebrahimnejad (co-advised by James Lee)
 - ◇ Nathan Klein (co-advised with Anna Karlin)
 - ◇ Kuikui Liu
 - ◇ Xinzhi Zhang (co-advised with A. Karlin)