Rad Niazadeh

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Research Interests

Algorithmic mechanism design; Revenue management; Machine learning; Optimization.

Academic Appointments

2017–present **Motwani Postdoctoral Fellow in Computer Science**, *Stanford University*.
Supervisors: Prof. Tim Roughgarden, Prof. Amin Saberi, and Prof. Moses Charikar.

Fall 2017 **Long-term Visiting Scientist**, *Simons Institute for the Theory of Computing*.

Education

2012–2017 **Ph.D. in Computer Science**, *Cornell University*.
Thesis: "Algorithms vs. Mechanisms: Mechanism Design for Complex Environments", GPA: 4/4.
Advisor: Prof. Robert Kleinberg, Committee: Prof. Jon Kleinberg and Prof. Emin Gün Sirer.
Minor: Applied Mathematics, Advisor: Prof. Jon Kleinberg.

2008–2010 **M.Sc. in Electrical Engineering**, *Sharif University of Technology*, Tehran, Iran.
Thesis: "Noisy Compressed Sensing and Sparse Channel Estimation", GPA: 19.37/20.
Advisors: Prof. Massoud Babaie-Zadeh and Prof. Ebadollah S. Mahmoodian.

2004–2008 **B.Sc. in Electrical Engineering**, *Sharif University of Technology*, Tehran, Iran.
GPA: 18.61/20.

Selected Awards and Honors

2018 The INFORMS Revenue Management and Pricing (RM&P) Section Dissertation Award, *Honorable Mention* (Runner Up).

2017 Stanford Theoretical Computer Science Motwani Fellowship.

2016 Google PhD Fellowship (in Market Algorithms).

2012 Cornell Irwin Jacobs Fellowship.

2010 Ranked $1/130$ in EE M.Sc. Class of 2010, Sharif University of Technology.

2008 Sharif Exceptional Talent Award (and M.Sc. Admission without Exam).

2008 Ranked $3/150$ in EE B.Sc. Class of 2008, Sharif University of Technology.

Publications (alphabetical author ordering)

[C]=*Conference*, [J]=*Journal*, [S]=*Survey/Magazine*, [T]=*Thesis*, [JS]= *Journal Submission*, [P]=*Preprint*.

[2017+]

[J4] *Multi-scale Online Learning and its Applications to Online Auctions*, with Sébastien Bubeck, Nikhil Devanur and Zhiyi Huang, accepted in the Journal of Machine Learning Research (**JMLR**).

[C17] *Hierarchical Clustering for Euclidean Data*, with Vaggos Chatziafratis, Moses Charikar and Grigory Yaroslavtsev, to appear in Proc. 22nd International Conference on Artificial Intelligence and Statistics (**AISTATS** 2019).

[C16] *Hierarchical Clustering better than Average-Linkage*, with Vaggos Chatziafratis and Moses Charikar, to appear in Proc. ACM-SIAM Symposium on Discrete Algorithms (**SODA** 2019).

[C15] *Prophet Inequalities vs. Approximating Optimum Online*, with Ali Shameli and Amin Saberi, to to appear in Proc. 14th Conference on Web and Internet Economics (**WINE** 2018)

[C14] *Optimal Algorithms for Continuous Non-monotone Submodular and DR-Submodular Maximization*, with Tim Roughgarden and Joshua Wang, in Proc. 32nd Annual Conference on Neural Information Processing Systems (**NeurIPS** 2018). [*selected as top 30 papers for full oral presentation at NIPS, out of ≈1,200 accepted papers, ≈4,900 submitted papers*]

[J3] *Optimal Auctions vs. Anonymous Pricing*, with Saeed Alaei, Jason Hartline, Yang Yuan, and Emmanouil Pountourakis, forthcoming in Games and Economic Behavior (**GEB**), 2018. [invited to the GEB special issue for best algorithmic game theory papers from STOC/FOCS/SODA 2014-15]

[C13] *Hierarchical Clustering with Structural Constraints*, with Vaggos Chatziafratis and Moses Charikar, in Proc. 35th International Conference on Machine Learning (**ICML** 2018).

[C12] *Fast Core Pricing for Rich Advertising Auctions*, with Jason Hartline, Mohammad Reza Khani, Nicole Immorlica, and Brendan Lucier, in Proc. 19th ACM conference on Economics and Computation (**EC** 2018).

[C11] *Bernoulli Factories and Black-Box Reductions in Mechanism Design*, with Shaddin Dughmi, Jason Hartline and Robert Kleinberg, in Proc. 49th ACM Symposium on Theory of Computing (**STOC** 2017).

[S2] *Bayesian Black-Box Reductions in Mechanism Design*, with Shaddin Dughmi, Jason Hartline and Robert Kleinberg, in **ACM SIGecom Exchanges** letters, Vol. 16.1.

[S1] *Algorithms Versus Mechanisms: How to Cope with Strategic Input?*, in **XRDS: Crossroads**, The ACM Magazine for Students, Vol. 24 Issue 1, Fall 2017.

[C10] *Online Auctions and Multi-scale Learning*, with Sébastien Bubeck, Nikhil Devanur and Zhiyi Huang, in Proc. 18th ACM conference on Economics and Computation (**EC** 2017).

[C9] *Truth and Regret in Online Scheduling*, with Nikhil Devanur, Shuchi Chawla, and Janardhan Kulkarni, in Proc. 18th ACM conference on Economics and Computation (**EC** 2017).

[C8] *GSP - The Cinderella of Mechanism Design*, with Chris Wilkens and Ruggiero Cavallo, in Proc. 26th International World Wide Web Conference (**WWW** 2017).

[Before 2017]

[C7] *Competitive Equilibria for Non-quasilinear Bidders in Combinatorial Auctions*, with Chris Wilkens, in Proc. 12th Conference on Web and Internet Economics (**WINE** 2016).

[C6] *Optimal Auctions vs. Anonymous Pricing*, with Saeed Alaei, Jason Hartline, Yang Yuan, and Emmanouil Pountourakis, conference version in Proc. 56th Annual IEEE Symposium on Foundations of Computer Science (**FOCS** 2015), also presented at 5th World Congress of the Game Theory Society (**GAMES** 2016).

[C5] *Secretary Problems with Non-Uniform Arrival Order*, with Thomas Kesselheim and Robert Kleinberg, in Proc. 47th ACM Symposium on Theory of Computing (**STOC** 2015), also presented at 1st Highlights of Algorithms (**HALG** 2016).

[C4] *Simple and Near-Optimal Mechanisms For Market Intermediation*, with Yang Yuan and Robert Kleinberg, in Proc. 10th Conference on Web and Internet Economics (**WINE** 2014).

[J2] *On the Achievability of Cramer-Rao Bound in Noisy Compressed Sensing*, with Massoud Babaie-Zadeh and Christian Jutten, **IEEE Transactions on Signal Processing**, Volume 60, Issue 1.

[J1] *ISI sparse channel estimation based on SL0 and its application in ML sequence-by-sequence equalization*, with Massoud Babaie-Zadeh, Sina Hamidi Ghalehjegh and Christian Jutten, Elsevier Journal of **Signal Processing**, Volume 92, Issue 8.

[C3] *An Alternating Minimization Algorithm for Sparse Channel Estimation*, with Massoud Babaie-Zadeh and Christian Jutten, in Proc. of 9th International Conference on Latent Variable Analysis and Signal Separation (**LVA-ICA** 2010).

[C2] *Adaptive and Non-Adaptive ISI Sparse Channel Estimation Based on SL0 and Its Application in ML Sequence-by-Sequence Equalization*, with Masoud Babaie-Zadeh, Sina Hamidi Ghalehjegh and Christian Jutten, in Proc. of 9th International Conference on Latent Variable Analysis and Signal Separation (**LVA-ICA** 2010).

[C1] *Implementation and Optimization of Wavelet Modulation in Additive Gaussian Channels*, with Sahar Nassirpour and Mohammad B. Shamsollahi, in Proc. 11th International Conference on Advanced Communication Technology (**ICACT** 2009).

[Journal Submissions (under-review)]

[JS3] *Fast Core Pricing for Rich Advertising Auctions*, with Jason Hartline, Mohammad Reza Khani, Nicole Immorlica, and Brendan Lucier, revise & resubmit from Operations Research (**OR**).

[JS2] *Optimal Algorithms for Continuous Non-monotone Submodular and DR-Submodular Maximization*, with Tim Roughgarden and Joshua Wang, under-review in the Journal of Machine Learning Research (**JMLR**).

[JS1] *Bernoulli Factories and Black-Box Reductions in Mechanism Design*, with Shaddin Dughmi, Jason Hartline and Robert Kleinberg, under-review in the Journal of the ACM (**JACM**).

[Theses]

[T2] *Algorithms vs. Mechanisms: Mechanism Design for Complex Environments*, **Ph.D. Thesis** (under Prof. Robert Kleinberg), Cornell University, Summer 2017.

[T1] *Noisy Compressed Sensing and Sparse Channel Estimation*, **M.Sc. Thesis** (under Prof. Masoud Babaie-Zadeh), Sharif University of Technology, Summer 2010.

[Preprints]

[P6] *Nearly Optimal Pricing Algorithms for Production Constrained and Laminar Bayesian Selection*, with Nima Anari, Amin Saberi and Ali Shameli, arXiv preprint:1807.05477.

[P5] *Prophet vs. Mortal: Ride-sharing Matching with Stochastic Riders*, with Amin Saberi

[P4] *Persuasion and Incentives Through the Lens of Duality*, with Shaddin Dughmi, Alexander Psomas, and Matt Weinberg.

[P3] *Mechanism Design for Value Maximizers*, with Chris Wilkens, Ruggiero Cavallo, and Samuel Taggart, arXiv preprint:1607.04362

[P2] *Combinatorial Bernoulli Factories*, with Shaddin Dughmi and Robert Kleinberg.

[P1] *A Unified Approach to Online Allocation Algorithms via Randomized Dual Fitting*, with Robert Kleinberg, arXiv preprint:1308.5444 (course material for CS 6820 at Cornell).

Research Employments and Experiences

[Research Internships]

Summer 2016 **Research Intern**, *Microsoft Research – Redmond (theory group)*, Mentor: Nikhil Devanur.
Research on learning theory and auctions: Online sample complexity of auctions and learning, Online learning and scheduling of jobs in the cloud.

Summer 2015 **Research Intern**, *Microsoft Research – New England*, Mentors: Nicole Immorlica and Brendan Lucier.
Research on algorithmic mechanism design and online algorithms: Algorithmic aspects of core-selecting package auctions, Online matching in general graphs.

Fall 2015 **Research Intern**, *Yahoo! Research – Sunnyvale*, Mentor: Christopher A. Wilkens.
Research on auction theory and mechanism design: Diversification in sponsored search auctions, Characterization of Walrasian equilibrium and incentive compatible auctions in multi-item markets with non-quasilinear utilities.

[Research Visits and Appointments]

2017–present **Postdoctoral Fellow in Computer Science**, *Stanford University*.
Research broadly on algorithms, game theory and machine learning, with applications in operations research and market design.

Fall 2017 **Long-term Visiting Scientist**, *Simons Institute for the Theory of Computing*.
Part of the program "Bridging Continuous and Discrete Optimization"; Research broadly on algorithms, game theory and machine learning, with a focus on submodular optimization and online learning.

Summer 2017 **Visiting Scientist**, *Princeton University*, Hosted by Prof. Matt Weinberg.
Research on algorithmic mechanism design: Duality framework in mechanism design, Bayesian persuasion and duality, Matroid prophet inequalities with one sample.

Spring 2016 **Student Researcher**, *Northwestern University*, Hosted by Prof. Jason Hartline.
Research on mechanism design: Applications of Bernoulli factory and its combinatorial generalizations for Bayesian incentive compatible black-box reductions in mechanisms design.

Fall 2015 **Student Researcher**, *Georgia Tech*, Hosted by Prof. Vijay Vazirani.
Research on online algorithms: secretary algorithms for picking the median element.

2014–2015 **Student Researcher**, *Microsoft Research – New England*, Hosted by Prof. Robert Kleinberg.
Research on online algorithms and mechanism design: Secretary problems and optimal stopping theory with limited randomness.

2012–2017 **Ph.D. Student in CS**, *Cornell University*, Advised by Prof. Robert Kleinberg.
Research on algorithmic game theory, machine learning and mechanism design: Bayesian Blackbox reductions, Revenue approximation of anonymous posted pricing in single item auctions for non-identical bidders, Approximate fee-setting affine mechanisms for market intermediation, Envy-free benchmark for non-ordinal environments, Unified randomized dual-fitting analysis for online allocation problems and online matching, etc.

Selected Talks

[Invited Talks]

Nov 2018 *Optimal Algorithms for Continuous Non-monotone Submodular Maximization*, EECS Department at **Massachusetts Institute of Technology (MIT)** , ML seminar.

Nov 2018 *Optimal Algorithms for Continuous Non-monotone Submodular Maximization*, ISyE Department at **Georgia Institute of Technology (Georgia Tech)**, DOS seminar.

Nov 2018 *Optimal Algorithms for Continuous Non-monotone Submodular Maximization*, Department of Computer Science at **University of Southern California (USC)**, CS theory seminar.

Nov 2018 *Optimal Algorithms for Continuous Non-monotone Submodular Maximization*, EECS Department at **Northwestern University** , 2018 Junior Theorists Workshop.

Oct 2018 *Optimal Algorithms for Continuous Non-monotone Submodular Maximization*, Department of Computer Science at **Yale University**, YINS seminar.

Oct 2018 *Multi-scale Online Learning and Applications to Online Auctions*, **INFORMS**, Phoenix, AZ.

Oct 2018 *Fast Core Pricing for Rich Advertising Auctions*, **INFORMS** (Auction Cluster), Phoenix, AZ.

Jan 2018 *Online Auctions and Multi-scale Learning*, the Third **TOCA-SV** meeting (joint between Stanford, Google Research, Facebook, IBM and Berkeley).

Oct 2017 *Blackbox Reductions in Bayesian Mechanism Design and Combinatorial Bernoulli Factories*, CSE 50th Anniversary at **University at Buffalo (SUNY)**.

Sept 2017 *Blackbox Reductions in Bayesian Mechanism Design and Combinatorial Bernoulli Factories*, Department of Computer Science at **Stanford University**, Theory Seminar.

July 2017 *Bernoulli Factories and Blackbox Reduction in Mechanism Design*, **Google Research (NYC)**.

Feb 2017 *Bernoulli Factories and Mechanism Design*, Department of Computer Science at **Cornell University**, Theory Seminar.

March 2017 *Algorithms vs. Mechanisms : Mechanism Design For Complex Environments*, Computer Science and Engineering at **University at Buffalo (SUNY)**, CS Colloquium.

July 2016 *Secretary Problems with Non-Uniform Arrival Order*, Department of Computer Science at **University of Washington**, Theory Seminar.

June 2016 *Robustness and Approximation Theory in Online Algorithm Design*, **INFORMS International** 2016, Big-Island, HI.

May 2016 *Bernoulli Factories and Mechanism Design*, **Microsoft Research (Redmond)**.

Jan 2016 *Optimal Auctions vs. Anonymous Pricing* , **NYCE** 2016: New York CS and Economics Day.

Nov 2016 *Secretary Problems with Non-Uniform Arrival Order*, **Google Research (Mountain View)**.

[Miscellaneous]

Oct 2018 *Optimal Algorithms for Continuous Non-monotone Submodular and DR-Submodular Maximization*, **INFORMS**, Phoenix, Arizona.

Oct 2017 *Online Auctions and Multi-scale Learning*, **INFORMS**, Houston, TX.

Oct 2017 *Truth and Regret in Online Scheduling*, **INFORMS**, Houston, Texas.

Oct 2017 *Bernoulli Factories and Blackbox Reductions in Mechanism Design*, **INFORMS** Annual Meeting, Houston, Texas.

June 2017 *Mechanism Design For Complex Environments: Online Auctions and Learning*, Department of Computer Science at Cornell University, Ph.D. Defense Talk.

Aug 2016 *Online Leaning in Auctions*, **Microsoft Research (Redmond)**, Internship Talk.

May 2015 *Posted Pricing vs Optimal Auction in Single Item Environment*, **Microsoft Research (New England)**, Internship Talk.

Selected Mentoring and Teaching Experiences

[Graduate Mentees]

2017-present *Vaggos Chatziafratis*, Ph.D. student in Computer Science at Stanford University, Advised by Prof. Tim Roughgarden and Pof. Moses Charikar.

2017-present *Ali Shameli*, Ph.D. student in Management Science and Engineering at Stanford University, Advised by Prof. Amin Saberi.

2017-2018 *Joshua R. Wang*, Ph.D. in Computer Science at Stanford University, Advised by Prof. Tim Roughgarden, Now at Google Research (Mountain View).

[Teaching Positions]

Spring 2018 **Mini-course Instructor**, *Department of Computer Science, Stanford University*, Special Topics in Sampling and Counting, joint with Nima Anari.

Spring 2017 **Teaching Assistant**, *Department of Computer Science, Cornell University*, Graduate Networks (CS 6850), by Prof. Jon Kleinberg.

Spring 2014 **Teaching Assistant**, *Department of Computer Science, Cornell University*, Graduate Algorithmic Game Theory (CS 6840), by Prof. Eva Tardos.

Fall 2012 **Teaching Assistant**, *CS Department, Cornell University*, Undergraduate Networks (CS 2085), by Prof. Jon Kleinberg and Prof. Eva Tardos.

2007–2011 **Course Instructor and lab Supervisor**, *Electrical Engineering Department, Sharif University of Technology, Tehran, Iran*.

Industrial Experiences

2010–2011 **R&D Project Member**, *Parto Tamaas Novin (Parman) Corporation*, Tehran, Iran.

Professional Services

[Program Committee]

2019 *European Symposium on Algorithms (ESA).*

2018 *ACM Conference on Economics and Computation (EC).*

[Reviewer]

2012-present *CS Conferences:* EC, FOCS, STOC, SODA, WINE, and WWW.

2012-present *OR Journals:* Operations Research (OR), Management Science (MS), and Mathematics of Operations Research (Math of OR).

2012-present *Econ and CS Journals:* Transactions on Economics and Computation (TEAC), SIAM Journal on Computing (SICOMP) and Games and Economics Behavior (GEB).

Professional Memberships

2012-present Association for Computing Machinery (ACM), *Member*.

2012-present Institute for Operations Research and the Management Sciences (INFORMS), *Member*.