Mahsa Derakhshan

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Research Interests

- My primary research interest is in algorithmic mechanism design and algorithmic game theory. My works in this area fall into one of the two following categories.
  - Designing new models and algorithms for online platforms such as online advertising markets and online retail markets.
  - Developing algorithms and mechanisms for resource allocation problems in the presence of uncertainty and strategic behavior. Examples include the kidney exchange problem, Colonel Blotto, and spatio-temporal games.
- I am also interested in the design and analysis of big data algorithms, especially in distributed, dynamic and streaming settings.

Education

- **PhD in Computer Science** — Jan 2016 - present
  Computer Science Department, University of Maryland
  - *Advisor*: Prof. MohammadTaghi Hajiaghayi
- **M.S. in Computer Science** — Jan 2016 - Dec 2018
  Computer Science Department, University of Maryland
  - *Advisor*: Prof. MohammadTaghi Hajiaghayi
- **B.S. in Computer Software Engineering** — Sep 2011 - Feb 2016
  Computer Engineering Department, Sharif University of Technology
  - *Advisor*: Prof. Mohammad Ghodsi

Honors and Awards

- 2020 **Google PhD Fellowship** for Algorithms, Optimizations, and Markets. — 2020
- Selected to give a **Rising Stars** Talk at the TCS Women Spotlight workshop. — 2020
- **Ann G. Wylie Dissertation Fellowship.** — 2019
- Ranked 56th at the **ACM-ICPC Programming Contest World Finals 2017**. — 2017
  · Participants selected from more than 10000 teams worldwide.
- Awarded as **Outstanding Student** by the University president at Sharif University of Technology. — 2011
- Recipient of the grant for undergraduate studies from the Iranian National Elites Foundation, for **Outstanding Academic Success**. — 2011 - 2015

◇ **Gold Medal** in the 19$^{\text{th}}$ Iranian National Olympiad in Informatics.
· Young Scholars Club, Tehran, Iran. 2010

Visits and Internships

◇ Research internship at **Toyota Technological Institute at Chicago (TTIC)** Summer 2020
· Mentor: Avrim Blum

◇ Research internship at **Microsoft Research** Summer 2019
· Mentors: Alex Slivkins, David Pennock

◇ Research internship at **Microsoft Research** Spring 2019
· Mentors: Alex Slivkins, David Pennock

◇ Visiting Graduate Student at the **Simons Institute, UC Berkeley** Fall 2018
· Programs: Foundations of Data Science

◇ Research internship at **Google** Summer 2018
· Mentors: Negin Golrezaei, Renato Paes Lemme

◇ Visiting Graduate Student at the **Simons Institute, UC Berkeley** Spring 2018
· Programs: The Brain and Computation, Real-Time Decision Making

◇ Software engineering internship at **Google** Summer 2017

Journal Publications

◇ *LP-based Approximation for Personalized Reserve Prices*
M. Derakhshan, N. Golrezaei, R. Paes Leme
Management Science – Special Issue on Data-Driven Prescriptive Analytics, forthcoming.
Conference version in Proceedings of EC 2019.

◇ *Product Ranking on Online Platforms*
M. Derakhshan, N. Golrezaei, V. Manshadi, V. Mirrokni
Management Science, forthcoming.
Conference version in Proceedings of EC 2020.

◇ *Faster and Simpler Algorithm for Optimal Strategies of Blotto Game*
S. Behnezhad, S. Dehghani, M. Derakhshan, S. Seddighin, M. Hajiaghayi.
Minor revision at **Operations Research**.
Conference version in Proceedings of AAAI 2017.

Conference Publications

◇ *Beating Greedy For Approximating Reserve Prices in Multi-Unit VCG Auctions*
M. Derakhshan, D. Pennock, A. Slivkins
In Proceedings of the 32th Annual ACM-SIAM Symposium on Discrete Algorithms. **SODA 2021**
To appear

◇ *Stochastic Weighted Matching:* $(1-\epsilon)$*-Approximation*
S. Behnezhad, M. Derakhshan
In Proceedings of the 61th Annual IEEE Symposium on Foundations of Computer Science. **FOCS 2020**
To appear

◇ *Product Ranking on Online Platforms*
M. Derakhshan, N. Golrezaei, V. Manshadi, V. Mirrokni
In Proceedings of the 21th ACM Conference on Economics and Computation. **EC 2020**
Pages: 459–459

◇ *Stochastic Matching with Few Queries:* $(1-\epsilon)$*-Approximation*
S. Behnezhad, M. Derakhshan, M. Hajiaghayi
In Proceedings of the 52nd Annual ACM Symposium on Theory of Computing. **STOC 2020**
Pages: 1111–1124

◇ *Fully Dynamic Maximal Independent Set with Polylogarithmic Update Time*
S. Behnezhad, M. Derakhshan, M. Hajiaghayi, C. Stein, M. Sudan
In Proceedings of the 60th Annual IEEE Symposium on Foundations of Computer Science. **FOCS 2019**
Pages: 382–405

◇ *LP-based Approximation for Personalized Reserve Prices*
M. Derakhshan, N. Golrezaei, R. Paes Leme
In Proceedings of the 20th ACM Conference on Economics and Computation. **EC 2019**
Pages: 589–589

◇ *Optimal Strategies of Blotto Games: Beyond Convexity*
S. Behnezhad , A. Blum , M. Derakhshan, M. Hajiaghayi , C. Papadimitriou , S. Seddighin
In Proceedings of the 20th ACM Conference on Economics and Computation. **EC 2019**
Pages: 597–616

◇ *Streaming and Massively Parallel Algorithms for Edge Coloring*
S. Behnezhad, M. Derakhshan, M. Hajiaghayi, M. Knittel, H. Saleh
In Proceedings of the 27th Annual European Symposium on Algorithms. **ESA 2019**
Pages: 15:1–15:14 (Also appeared as a brief announcement at DISC 2019.)

◇ *Stochastic Matching on Uniformly Sparse Graphs*
S. Behnezhad, M. Derakhshan, A. Farhadi, M. Hajiaghayi, N. Reyhani
In Proceedings of the 12th International Symposium on Algorithmic Game Theory. **SAGT 2019**
Pages: 357–373

◇ *Massively Parallel Computation of Matching and MIS in Sparse Graphs*
S. Behnezhad S. Brandt, M. Derakhshan, M. Fischer, M. Hajiaghayi, R. Karp, J. Uitto
In Proceedings of the 38th ACM Symposium on Principles of Distributed Computing. **PODC 2019**
Pages: 481–490

◇ *Spatio-Temporal Security Games Beyond One Dimension*
S. Behnezhad, M. Derakhshan, M. Hajiaghayi, S. Seddighin

In Proceedings of the 19th ACM Conference on Economics and Computation. **EC 2018**
Pages: 697–714

◇ *Brief Announcement: MapReduce Algorithms on Massive Trees*
M.H. Bateni, S. Behnezhad, M. Derakhshan, M. Hajiaghayi, V. Mirrokni
In Proceedings of the 45th International Colloquium on Automata,
Languages, and Programming. Pages: 162:1–162:4 **ICALP 2018**

◇ *From Battlefields to Presidential Elections: Winning Strategies of Blotto and Auditing Games*
S. Behnezhad, A. Blum, M. Derakhshan, M. Hajiaghayi, M. Mahdian, C. Papadimitriou,
R. Rivest, S. Seddighin, P. Stark
In Proceedings of the 29th Annual ACM-SIAM Symposium on Discrete Algorithms. **SODA 2018**
Pages: 2291–2310

◇ *Affinity Clustering: Hierarchical Clustering at Scale*
M.H. Bateni, S. Behnezhad, M. Derakhshan, M. Hajiaghayi, R. Kiveris, S. Lattanzi, V. Mirrokni
In Proceedings of the 31th Annual Conference on Neural Information Processing Systems. **NIPS 2017**
Pages: 6864–6874

◇ *A Polynomial Time Algorithm For Spatio-Temporal Security Games*
S. Behnezhad, M. Derakhshan, M. Hajiaghayi, A. Slivkins
In Proceedings of the 18th ACM Conference on Economics and Computation. **EC 2017**
Pages: 697–714

◇ *Graph Matching in Massive Datasets*
S. Behnezhad, M. Derakhshan, H. Esfandiari, M. Hajiaghayi, E. Tan, H. Yammi
In Proceedings of the 29th ACM Symposium on Parallelism in Algorithms and Architectures. **SPAA 2017**
Pages: 133–136

◇ *Faster and Simpler Algorithm for Optimal Strategies of Blotto Game*
S. Behnezhad, S. Dehghani, M. Derakhshan, S. Seddighin, M. Hajiaghayi
In Proceedings of the 31st AAAI Conference on Artificial Intelligence. **AAAI 2017**
Pages: 369–375

Collaborators

◇ I have published papers with the following co-authors: Mohammad Hoseein Bateni (Google), Soheil Behnezhad (UMD), Avrim Blum (TTIC), Sebastian Brandt (ETH), Sina Dehghani (IPM), Hossein Esfandiari (Google), Alireza Farhadi (UMD), Manuela Fischer (ETH), Negin Golrezaei (MIT), MohammadTaghi Hajiaghayi (UMD), Richard Karp (Berkeley, **Turing Laureate**), Raimondas Kiveris (Google), Marina Knittel (UMD), Silvio Lattanzi (Google), Mohammad Mahdian (Google), Vahideh Manshadi (Yale), Vahab Mirrokni (Google), Renato Paes Leme (Google), Christos Papadimitriou (Columbia, **Knuth Prize winner**) David Pennock (Rutgers), Nima Reyhani (Airbnb), Ronald L. Rivest (MIT, **Turing Laureate**), Hamed Saleh (UMD), Saeed Seddighin (TTIC), Alex Slivkins (MSR), Philip B. Stark (Berkeley), Cliff Stein (Colombia), Madhu Sudan (Harvard), Elif Tan (Ankara), Jara Uitto (Aalto University), Hadi Yami (Microsoft).

Academic Services

- ◇ Reviewing Committee of ICML 2020.
- ◇ Reviewing Committee of NeurIPS 2019.
- ◇ Referee for the journal of Management Science.
- ◇ Referee for the following conferences: SODA, EC, WWW, ESA, SIGMETRICS, PODC, DISC, AAAI, IJCAI, TheWebConf, ICALP.
- ◇ Coach assistant, University of Maryland ACM-ICPC Programming Contest Team.
- ◇ Mentoring female students for Olympiad in Informatics, Farzanegan Amin High School, Iran.
- ◇ Mentoring female students for Olympiad in Informatics, Farzanegan Shahrekord High School, Iran.

Teaching Experience

- ◇ **Teaching Assistant**, University of Maryland
  - Introduction to Algorithms — Fall 2017
  - Data Structures — Spring 2017
  - Introduction to Algorithms — Spring 2016
- ◇ **Teaching Assistant**, Sharif University of Technology
  - Design of Algorithms — Fall 2013
  - Data Structures and Fundamentals of Algorithms — Fall 2013
  - Design of Algorithms — Spring 2014
  - Data Structures and Fundamentals of Algorithms — Fall 2014
  - Design of Algorithms — Fall 2014
  - Theory of Computation and Complexity — Spring 2014
  - Discrete Structures — Spring 2015
- ◇ **Teaching at High Schools**
  Preparing students for Olympiad in Informatics. Topics included Algorithms, Graph Theory, Problem Solving Strategies, and Programming.

Skills

- ◇ **Programming Languages:** C++, Java, Python, Matlab.
- ◇ **Data Analytics and Database Tools:** Spark, Google Flume, TensorFlow (TFX)
- ◇ **Web/DB Technologies:** HTML5, CSS3, Javascript, SQL