Hoda Heidari

CONTACT INFORMATION

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RESEARCH INTERESTS

- Societal Aspects of AI (Fairness and Explainability)
- Data-driven Decision Making and Machine Learning
- Algorithmic Economics and Mechanism Design

CURRENT POSITION

Post-doctoral fellow, **ETH Zürich**, Switzerland — Aug 2017–present

- *Supervisor:* Professor Andreas Krause
- *Affiliation:* Learning and Adaptive Systems Group at the Machine Learning Institute

EDUCATION

University of Pennsylvania, Philadelphia, PA — 2017

Ph.D. in Computer and Information Science

- *Thesis*: "Essays in Algorithmic Market Design under Social Constraints"
- *Advisors*: Prof. Michael Kearns and Prof. Ali Jadbabaie
- *Committee*: Rakesh Vohra, Aaron Roth, Shivani Agrawal, Vahab S. Mirrokni
- *Coursework*: Microeconomics I (Decision Theory and General Equilibrium Theory), Microeconomics II (Game Theory and Mechanism Design), Market Design, Discrete Convexity & Submodularity, Convex Optimization, Computational Learning Theory

Wharton School of Business, Philadelphia, PA — 2017

M.Sc. in Statistics

- *Thesis:* "What Can Machine Learning Teach Econometrics?"
- *Supervisor*: Prof. Dylan Small
- *Coursework*: Applied Econometrics I, Mathematical Statistics, Probability, Stochastic Processes, Statistical Learning Theory, Data Analysis, Statistical Computing

Sharif University of Technology, Tehran, Iran — 2011

B.Sc. in Computer Engineering

- *Thesis:* "Toward Optimal Vaccination Strategies for Probabilistic Models" Joint work with Z. Abbassi, supervised by Prof. Mohammad Ghodsi.
- *Coursework*: Linear Algebra, Algorithmic Game Theory (graduate course)

WORK EXPERIENCE

Summer intern, **Google Research**, New York — 2015

- *Collaborators:* Hossein Azari, Mohammad Mahdian, Umar Syed, Sergei Vassilvitskii
- *Project:* Collaborated with the ad exchange team to improve pricing and callouts. Worked with large-scale data manipulation tools (Sawzall, Dremel, MapReduce) at Google.

Summer Intern, **Microsoft Research**, New York — 2014

- *Collaborators:* Sebastien Lahaie, David Pennock, Jenn Wortman Vaughan
- *Project:* Designed an algorithmic mechanism to execute limit orders fairly in continuous prediction markets.

PUBLICATIONS

[1] *Algorithmic Notions vs. Human Perceptions of Fairness: A Descriptive Approach to Selecting a Suitable Fairness Metric*. Megha Srivastava, Hoda Heidari, and Andreas Krause. **ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)**, 2019.

[2] *On the Long-term Impact of Algorithmic Decision Policies: Effort Unfairness and Feature Segregation through Social Learning*. Hoda Heidari, Vedant Nanda, and Krishna P. Gummadi. **The International Conference on Machine Learning (ICML)**, 2019.

[3] *On the Impact of Choice Architectures on Inequality in Online Donation Platforms*. Abhijnan Chakraborty, Nuno Mota, Asia J. Biega, Krishna P. Gummadi and Hoda Heidari. **The Web Conference (WWW)**, 2019

[4] *A Moral Framework for Understanding of Fair ML through Economic Models of Equality of Opportunity*. Hoda Heidari, Michele Loi, Krishna Gummadi, and Andreas Krause. **ACM conference on Fairness, Accountability, and Transparency (FAT*)**, 2019.

[5] *Fairness Behind a Veil of Ignorance: A Welfare Analysis for Automated Decision Making*. Hoda Heidari, Claudio Ferrari, Krishna P. Gummadi, and Andreas Krause. **Neural and Information Processing Systems (NIPS)**, 2018.
Featured in "5 Great Human-Centered AI Papers from 2018", Medium

[6] *A Unified Approach to Quantifying Algorithmic Unfairness: Measuring Individual and Group Unfairness via Inequality Indices.* Till Speicher, Hoda Heidari, Nina Grgic-Hlaca, Krishna P. Gummadi, Adish Singla, Adrian Weller, Muhammad Bilal Zafar. **ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD)**, 2018.

[7] *Preventing Disparate Treatment in Sequential Decision Making.* Hoda Heidari and Andreas Krause. **The International Joint Conference on Artificial Intelligence (IJCAI)**, 2018.

[8] *Fairness in Criminal Justice Risk Assessments: The State of the Art.* Richard Berk, Hoda Heidari, Shahin Jabbari, Michael Kearns, and Aaron Roth. **Sociological Methods and Research**, 2018.

[9] *Pricing a Low-regret Seller*. Hoda Heidari, Mohammad Mahdian, Umar Syed, Sergei Vassilvistskii, and Sadra Yazdanbod. **The International Conference on Machine Learning (ICML)**, 2016.

[10] *Tight Policy Regret Bounds for Improving and Decaying Bandits*. Hoda Heidari, Michael Kearns and Aaron Roth. **The International Joint Conference on Artificial Intelligence (IJCAI)**, 2016.

[11] *Integrating Market Makers, Limit Orders, and Continuous Trade in Prediction Markets*. Hoda Heidari, Sebastien Lahaie, David Pennock, and Jenn Wortman Vaughan. **The Economics and Computation Conference (EC)**, 2015.
*Full version was invited for publication, and appeared in the ACM **Transactions on Economics and Computation (TEAC)**.*

[12] *Learning from Contagion (Without Timestamps)*. Kareem Amin, Hoda Heidari, and Michael Kearns. **The International Conference on Machine Learning (ICML)**, 2014.

[13] *New Models for Competitive Contagion*. With Moez Draief and Michael Kearns. **The AAAI Conference on Artificial Intelligence (AAAI)**, 2014.

[14] *Competitive Contagion in Networks*. Sanjeev Goyal, Hoda Heidari, and Michael Kearns. **Games and Economic Behavior Journal (GEB)**, 2014.

[15] *Depth-Workload Tradeoffs for Workforce Organization*. Hoda Heidari and Michael Kearns. **The Conference on Human Computation & Crowdsourcing (HCOMP)**, 2013.

HONORS

- *Silver Medal* in National Mathematical Olympiad, Iran 2006
- Awarded grant from the *National Foundation of Elites* for outstanding academic success, Iran 2007-2011
- *Honorary admission* to graduate studies in Computer Engineering at Sharif University of Technology 2010
- *Doctoral Fellowship*, University of Pennsylvania 2011-2017

TEACHING EXPERIENCE

Lecturer, ETH Zürich

- **Designed and taught a new course on *Fairness, Explainability, and Accountability for Machine Learning*** (listed as 263-5215-00L) Spring 2019

Teaching Assistant, ETH Zürich

- *Introduction to Machine Learning* Prof. A. Krause Spring 2018
- *Probabilistic Artificial Intelligence*. Prof. A. Krause Fall 2017

Teaching Assistant, University of Pennsylvania

- *Decision Models*. Prof. R. Vohra Fall 2014
- *Market and Social Systems on the Internet*. Prof. M. Kearns and A. Roth Spring 2013
- *Networked Life*. Prof. M. Kearns Fall 2012

Instructor, Sharif University of Technology Spring 2010
Prolog Programming Language, Part of the Artificial Intelligence course syllabus.

SERVICE

Organizer

- **Tutorial on *"Economic Theories of Distributive Justice for Fair ML"*** 2019
  Presented at the **30th Web Conference (WWW)**
- **Weekly reading group on the *"Societal Aspects of AI"***, ETHZ 2017, 2018
  Attended by students and researchers from a wide range of disciplines, including computer science, economics and law, mathematics, psychology, political philosophy, and bioethics.

Program Committee

- ACM Conference on Fairness, Accountability, and Transparency (ACM FAT*) 2019
- The AAAI Conference on Human Computation and Crowdsourcing (HCOMP) 2019
- The International Conference in Machine Learning (ICML) 2016—2019
- The Conference on Economics and Computation (EC) 2015, 2018
- The Conference on Artificial Intelligence (AAAI) 2018

Reviewer

- Journal of Machine Learning Research (JMLR)
- The Conference on Neural Information Processing Systems (NIPS) 2013, '14, '15, '17, 19'
- The Operations Research Journal (OR)
- Mathematics of Operations Research (MOR)
- The Network Science Journal
- Transactions on Economics and Computation (TEAC)
- Transactions on Signal Processing (TSP)
- Information Processing Letters (IPL)

External Reviewer

- Conference on Learning Theory (COLT)
- The Conference on Web and Internet Economics (WINE)
- The Symposium on Discrete Algorithms (SODA) (2013, 2017)
- The Symposium on Foundations of Computer Science (FOCS)
- The International Joint Conference on Artificial Intelligence (IJCAI)
- Conference on Decision and Control (CDC)

Misc.

- Speaker at the *Digital Life Workshop*, ETHZ — Aug 2018
  Organized by the *Chair of Bioethics*, Prof. E. Vayena
- Expert Feedback at *ETH Week: Manufacturing the Future*, ETHZ — Sep 2017

PRESENTATIONS & DISCUSSIONS

Invited discussant at the *Philosophical Questions about AI, Law, and Governance*. Workshop organized by the *Faculty of Law, UZH* (Prof. Christoph Graber), and *Berkman Klein Center of Internet and Society, Harvard University* 2018

Invited discussant at *the Governance of Decision-making Algorithms—How to Address Risks?* Expert Workshop organized by *Swiss Re* 2018

Invited discussant at *UZH Digital Forum: Can Algorithms be Fair?*
Organized by the *UZH Digital Society Initiative* and the *Swiss Alliance for Data-Intensive Services* 2018

What Can Fair ML Learn from Economic Theories of Distributive Justice?

- The AI frontiers series, *Microsoft Research*, Cambridge, UK — Jan 2019
- Invited speaker at the *Workshop on Ethical, Social and Governance Issues in AI*, co-located with NeurIPS — Dec 2018
- Speaker at the lunch series, invited by Prof. Elliott Ash
  Department of Humanities, Social and Political Sciences (GESS), ETHZ — Sep 2018

Fairness in Sequential Decision Making

- *Cambridge University* — Jan 2019
- Invited talk at the *Max Planck Institute for Software Systems (MPI-SWS)* — Nov 2018

A General Framework for Evaluating Callout Mechanisms in Repeated Auctions

- Invited talk at the *Institute für Automatik (IfA)*, ETHZ — 2018
- Contributed talk at *Women in Machine Learning (WiML) workshop*, NIPS — 2017