

Yu Cheng

Mathematics, Statistics, & Computer Science (MSCS)
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Research Interests: My research interests lie in the area of theoretical computer science, with a focus on machine learning, optimization, and game theory. My long-term goal is to address the challenges that arise in the interactions between machine learning systems and strategic agents.

Employment

Assistant Professor, Mathematics (MSCS), Univ. of Illinois at Chicago. 2019 - present
Assistant Professor (by courtesy), Computer Science, Univ. of Illinois at Chicago.
Postdoctoral Researcher, Computer Science, Duke University. 2017 - 2019

Education

Ph.D., Computer Science, University of Southern California. 2011 - 2017
Advisor: Shang-Hua Teng.
Thesis: Computational Aspects of Optimal Information Revelation.
B.S., Computer Science, Shanghai Jiao Tong University, China. 2007 - 2011

Honors and Awards

Best Paper Award, the 14th Conference on Web and Internet Economics (WINE). 2018
Finalist (5 finalists), Excellence in Graduate Research Award in Machine Learning, USC. 2017
ACM International Collegiate Programming Contest (ACM-ICPC)
14th Place, World Finals (120 teams selected from 2,322 universities). 2013
Champion, Southern California Regional (75 teams from 25 universities). 2011, 2012
Excellent Intern Award, Microsoft Research Asia. 2011
China National Scholarship (top 1%). 2010

Publications

Refereed Conference Proceedings

19. Yu Cheng, Ilias Diakonikolas, Rong Ge, Mahdi Soltanolkotabi. High-Dimensional Robust Mean Estimation via Gradient Descent. *In Proceedings of the 37th International Conference on Machine Learning (ICML 2020)*. To appear.
18. Hanrui Zhang, Yu Cheng, Vincent Conitzer. Distinguishing Distributions When Samples Are Strategically Transformed. *In Proceedings of the 16th Conference on Neural Information Processing Systems (NeurIPS 2019)*, pp. 3187–3195.
17. Yu Cheng, Zhihao Jiang, Kamesh Munagala, Kangning Wang. Group Fairness in Committee Selection. *In Proceedings of the 20th ACM Conference on Economics and Computation (EC 2019)*, pp. 263–279.

16. Yu Cheng, Ilias Diakonikolas, Rong Ge, David P. Woodruff. Faster Algorithms for High-Dimensional Robust Covariance Estimation. *In Proceedings of the 32nd Conference on Learning Theory (COLT 2019)*, pp. 727–757.
15. Hanrui Zhang, Yu Cheng, Vincent Conitzer. When Samples Are Strategically Selected. *In Proceedings of the 36th International Conference on Machine Learning (ICML 2019)*, pp. 7345–7353.
14. Hanrui Zhang, Yu Cheng, Vincent Conitzer. A Better Algorithm for Societal Tradeoffs. *In Proceedings of the 33rd AAAI Conference on Artificial Intelligence (AAAI 2019)*, pp. 2229–2236.
13. Yu Cheng, Ilias Diakonikolas, Rong Ge. High-Dimensional Robust Mean Estimation in Nearly-Linear Time. *In Proceedings of the 30th ACM-SIAM Symposium on Discrete Algorithms (SODA 2019)*, pp. 2755–2771.
12. Yu Cheng, Nick Gravin, Kamesh Munagala, Kangning Wang. A Simple Mechanism for a Budget-Constrained Buyer. *In Proceedings of the 14th Conference on Web and Internet Economics (WINE 2018)*, pp. 96–110. **(Best Paper Award)**
11. Yu Cheng, Ilias Diakonikolas, Daniel Kane, Alistair Stewart. Robust Learning of Fixed-Structure Bayesian Networks. *In Proceedings of the 15th Conference on Neural Information Processing Systems (NeurIPS 2018)*, pp. 10304–10316.
10. Yu Cheng, Rong Ge. Non-Convex Matrix Completion Against a Semi-Random Adversary. *In Proceedings of the 31st Conference on Learning Theory (COLT 2018)*, pp. 1362–1394.
9. Yu Cheng, Wade Hann-Caruthers, Omer Tamuz. A Deterministic Protocol for Sequential Asymptotic Learning. *In Proceedings of 2018 IEEE International Symposium on Information Theory (ISIT 2018)*, pp. 1735–1738.
8. Yu Cheng, Shaddin Dughmi, David Kempe. On the Distortion of Voting with Multiple Representative Candidates. *In Proceedings of the 32nd AAAI Conference on Artificial Intelligence (AAAI 2018)*, pp. 973–980.
7. Yu Cheng, Shaddin Dughmi, David Kempe. Of the People: Voting Is More Effective with Representative Candidates. *In Proceedings of the 18th ACM Conference on Economics and Computation (EC 2017)*, pp. 305–322.
6. Xi Chen, Yu Cheng, Bo Tang. Well-Supported versus Approximate Nash Equilibria: Query Complexity of Large Games. *In Proceedings of the 8th Innovations in Theoretical Computer Science Conference (ITCS 2017)*.
5. Yu Cheng, Ilias Diakonikolas, Alistair Stewart. Playing Anonymous Games using Simple Strategies. *In Proceedings of the 28th ACM-SIAM Symposium on Discrete Algorithms (SODA 2017)*, pp. 616–631.
4. Yu Cheng, Xi Chen, Bo Tang. On the Recursive Teaching Dimension of VC Classes. *In Proceedings of the 13th Conference on Neural Information Processing Systems (NIPS 2016)*, pp. 2164–2171.
3. Umang Bhaskar, Yu Cheng, Young Kun Ko, and Chaitanya Swamy. Hardness Results for Signaling in Bayesian Zero-Sum and Network Routing Games. *In Proceedings of the 17th ACM Conference on Economics and Computation (EC 2016)*, pp. 479–496.
2. Yu Cheng, Ho Yee Cheung, Shaddin Dughmi, Ehsan Emamjomeh-Zadeh, Li Han, and Shang-Hua Teng. Mixture Selection, Mechanism Design, and Signaling. *In Proceedings of the 56th Symposium on Foundations of Computer Science (FOCS 2015)*, pp. 1426–1445.
1. Dehua Cheng, Yu Cheng, Yan Liu, Richard Peng, and Shang-Hua Teng. Efficient Sampling for Gaussian Graphical Models via Spectral Sparsification. *In Proceedings of the 28th Conference on Learning Theory (COLT 2015)*, pp. 364–390.

Talks

- Faster Algorithms for High-Dimensional Robust Covariance Estimation**
International Conference on Machine Learning (ICML). July 2020
- On the Distortion of Voting with Multiple Representative Candidates.**
Workshop on the Distortion and Information-Efficiency Tradeoffs. July 2020
AAAI Conference on Artificial Intelligence (AAAI). Feb 2018
- Robustness and Strategic Concerns in Machine Learning.**
Tsinghua University (IIIS-Haihua Frontier Seminar). Dec 2019
Institute of Advanced Study (Seminar on Theoretical Machine Learning). Oct 2019
Google MTV. Aug 2019
Nanjing Theory Day. May 2019
Shanghai University of Finance and Economics. May 2019
University of Virginia. Mar 2019
Pennsylvania State University. Mar 2019
Washington University in St. Louis. Mar 2019
Google NYC. Mar 2019
University of Utah. Feb 2018
University of Illinois at Chicago. Feb 2018
Rensselaer Polytechnic Institute. Feb 2018
Shanghai Jiao Tong University. Jan 2019
- High-Dimensional Robust Mean Estimation in Nearly-Linear Time.**
Institute of Advanced Study (Mathematical Conversations). Dec 2019
Information Theory and Applications (ITA) Workshop. Feb 2019
ACM-SIAM Symposium on Discrete Algorithms (SODA). Jan 2019
Simons Institute (Robust Statistics Workshop, Lightning Talks). Oct 2018
Georgia Tech (ACO Student Seminar). Oct 2018
TTI Chicago (Robust Statistics Workshop). Aug 2018
- Non-Convex Matrix Completion Against a Semi-Random Adversary.**
Google NYC (Machine Learning Seminar). Aug 2018
Conference on Learning Theory (COLT). Jul 2018
Microsoft Research Redmond. Apr 2018
- Faster Algorithms for High-Dimensional Robust Covariance Estimation**
Conference on Learning Theory (COLT). Jun 2019
- Playing Anonymous Games using Simple Strategies.**
China Theory Week. Jul 2017
ACM-SIAM Symposium on Discrete Algorithms (SODA). Jan 2017
Southern California Theory Day. Nov 2016
- Of the People: Voting Is More Effective with Representative Candidates.**
ACM Conference on Economics and Computation (EC). Jun 2017
- Computational Aspects of Optimal Information Revelation.**
Google NYC (Algorithms Seminar). Apr 2017
Duke University (CS-ECON Seminar). Mar 2017

Caltech (Social and Information Sciences Seminar).	Mar 2017
Southern California Symposium on Network Economics and Game Theory (NEGT).	Nov 2016
ACM Conference on Economics and Computation (EC).	Jul 2016
Sparse Newton's Method.	
Duke University (Algorithms Seminar).	Mar 2017
Query Complexity of Large Games.	
Innovations in Theoretical Computer Science Conference (ITCS).	Jan 2017
Mixture Selection, Mechanism Design, and Signaling.	
Symposium on Foundations of Computer Science (FOCS).	Oct 2015

Teaching

University of Illinois at Chicago

Instructor, MCS 401: Computer Algorithms I (undergraduate level).	Fall 2020
Instructor, MCS 425: Codes and Cryptography (undergraduate level).	Fall 2020
Instructor, MCS 425: Codes and Cryptography (undergraduate level).	Spring 2020
Instructor, MCS 590: Spectral Graph Theory (graduate level).	Spring 2020

Duke University

Teaching Assistant, COMPSCI 590.2: Computational Microeconomics (graduate level).	Fall 2018
Guest lectures in COMPSCI 223 (Computational Microeconomics, undergraduate level), COMPSCI 330 (Design and Analysis of Algorithms, undergraduate level), COMPSCI 630 (Randomized Algorithms, graduate level).	

University of Southern California

Teaching Assistant, CSCI 671: Randomized Algorithms (graduate level).	Fall 2015
Teaching Assistant, CSCI 599: Convex and Combinatorial Optimization (graduate level).	Fall 2013
Teaching Assistant, CSCI 271: Discrete Methods in Computer Science (undergraduate level).	Fall 2012
Teaching Assistant, CSCI 271: Discrete Methods in Computer Science (undergraduate level).	Fall 2011
Student Coach for Competitive Programming.	2011 - 2014
(USC won the ACM-ICPC Southern California Regional four years in a row.)	

Shanghai Jiao Tong University

Student Coach for Competitive Programming.	2009 - 2011
(SJTU won the ACM-ICPC World Champion in 2010.)	

Professional Services

Conference Reviewing Activities

Conference on Learning Theory (COLT), Conference on Economics and Computation (EC), European Symposium on Algorithms (ESA), International Colloquium on Automata, Languages and Programming (ICALP), Innovations in Theoretical Computer Science (ITCS), Symposium on Algorithmic Game Theory (SAGT), Symposium on Discrete Algorithms (SODA), Symposium on Theory of Computing (STOC), Conference on Web and Internet Economics (WINE).

Journal Reviewing Activities

Artificial Intelligence (AIJ), Bernoulli Journal, IEEE Transactions on Information Theory, Information Sciences, Journal of Machine Learning Research (JMLR), Social Network Analysis and Mining (SNAM).

Institutional Services

University of Illinois at Chicago

Ph.D. Admission Committee. 2020

Duke University

Ph.D. Admission Committee. 2019

Organizer, Algorithms Seminar. 2017 - 2019

Co-Organizer, CS-ECON Seminar Series. 2017 - 2019

University of Southern California

Organizer, USC Theory Reading Group. 2014 - 2016

Organizer, USC Programming Contest. 2013 - 2015

Internships

Google (New York, NY). May 2013 - Aug 2013

Mentor: Konstantin Voevodski.

Projects: Local clustering algorithms (Geo team), parallel set cover algorithms (Research team).

Google (Mountain View, CA). May 2012 - Aug 2012

Mentor: Wen Xu.

Project: Load balancing algorithms for partially replicated services (Infrastructure team).

Microsoft Research Asia (Beijing, China). Jul 2010 - Feb 2011

Mentor: Chin-Yew Lin.

Project: Discovering deep web services via query templates (Web Search and Mining group).

APEX Data & Knowledge Management Lab (Shanghai, China). Sep 2009 - Jan 2010

Mentor: Yong Yu.

Project: 3D reconstruction from multiple images by space carving.