Sewoong Oh

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EDUCATION

Stanford University, Stanford, CA, USA — Sep 07 – Jan 11
Ph.D. in Electrical Engineering
Advisor: Andrea Montanari
Dissertation: "Matrix Completion: Fundamental Limits and Efficient Algorithms"

Stanford University, Stanford, CA, USA — Sep 05 – Jun 07
Master of Science in Electrical Engineering

Seoul National University, Seoul, Korea — Mar 1998 – Mar 02
Bachelor of Science in Electrical Engineering

APPOINTMENTS

Assistant Professor – University of Illinois at Urbana-Champaign July 12 – present
Department of Industrial and Enterprise Systems Engineering

Massachusetts Institute of Technology, Cambridge, MA, USA — Jan 11 – July 12
Postdoctoral Researcher at Laboratory for Information and Decision Systems (LIDS)
Mentor: Devavrat Shah

AWARDS

- ACM SIGMETRICS Rising Star Award, 2017
- GOOGLE Faculty Research Award, 2016
- NSF CAREER Award, 2016
- ACM SIGMETRICS best paper award, 2015
- Kenneth C. Sevcik Outstanding Student Paper Award, ACM SIGMETRICS, 2010
- Samsung Fellowship, 2005–2010

REPRESENTATIVE ACTIVITIES

- ACM SIGMETRICS conference – General co-chair: 2017 (UIUC, Illinois), Registration Chair, Program Committee Member, Session Chair: 2014 (Austin, TX), Technical Program Committee member 2014, 2015, 2016
- Neural Information Processing Systems Conference (NIPS) – Reviewer 2013, 2016, 2017
- Referee for Proceedings of the National Academy of Sciences (PNAS), Journal of Machine Learning Research (JMLR), IEEE Transactions on Information Theory, Annals of Statistics, IEEE Transactions on Networking, IEEE Transactions on Signal Processing, IEEE Transactions on Knowledge and Data Engineering, Constructive Approximation, Stochastic Systems

TEACHING

Fall 2014, 2015, Spring 2017: Instructor for the undergraduate course IE310/311, "Operations Research"
Spring 2013, 2014: Instructor for the graduate course IE512, "Network Analysis of Systems"
Fall 2012, Spring 2015, Fall 2016: Instructor for the graduate course IE598SO, "Inference on Graphical Models"
Spring 2016: Instructor for the graduate course IE598AI, "Statistical Learning"

Journal Publications

1. J. Ok, S. Oh, J. Shin, and Y. Yi, "Optimality of Belief Propagation for Crowdsourced Classification", under review
2. A. Khetan and S. Oh, "Achieving budget-optimality with adaptive schemes in crowdsourcing", under review
3. W. Gao, S. Oh, and P Viswanath, "Demystifying Fixed k-Nearest Neighbor Information Estimators", under review
4. W. Gao, S. Oh, and P Viswanath, "Breaking the Bandwidth Barrier: Geometrical Adaptive Entropy Estimation", under review
5. W. Gao, S. Kannan, S. Oh, and P. Viswanath, "Conditional Dependence via Shannon Capacity: Axioms, Estimators and Applications", under review
6. A. Khetan, and S. Oh, "Computational and Statistical Tradeoffs in Learning to Rank", under review
7. A. Khetan, and S. Oh, "Data-driven Rank Breaking for Efficient Rank Aggregation", *Journal of Machine Learning Research*, Vol.17, no.193, pp.1-54, October 2016
8. G. Fanti, P. Kairouz, S. Oh, K. Ramchandran, and P. Viswanath, "Hiding the Rumor Source", *IEEE Transactions on Information Theory*, 2017
9. S. Krishnasamy, R. Sen, S. Oh, and S. Shakkottai, "Detecting Sponsored Recommendations", *ACM Transactions on Modeling and Performance Evaluation of Computing Systems*, 2016
10. G. Fanti, P. Kairouz, S. Oh, K. Ramchandran, and P. Viswanath, "Metadata-conscious Anonymous Messaging", *IEEE Transactions on Signal and Information Processing over Networks*, 2016
11. P. Kairouz, S. Oh, and P. Viswanath, "The Composition Theorem for Differential Privacy", *IEEE Transaction on Information Theory*, 2017
12. P. Kairouz, S. Oh, and P. Viswanath, "Extremal Mechanisms for Local Differential Privacy", *Journal of Machine Learning Research (JMLR)*, Vol. 17, pp.1-51, April 2016.
13. S. Negahban, S. Oh, and D. Shah, "RankCentrality: Ranking from Pair-wise Comparisons," *Operations Research*, Vol.65, no.1, pp.266-287, October 2016
14. Q. Geng, P. Kairouz, S. Oh, and P. Viswanath, "The Staircase Mechanisms in Differential Privacy", *Selected Topics in Signal Processing*, April 2015
15. D. R. Karger, S. Oh, D. Shah, "Budget-optimal task allocation for reliable crowdsourcing systems," *Operations Research*, Vol 62 Issue 1, pp.1-24, January 2014.
16. A. Karbasi, S. Oh, "Robust localization from incomplete local information," *IEEE Trans. on Networking*, Vol 21 pp.1131-1144, August 2013.
17. R. Parhizkar, A. Karbasi, S. Oh, M. Vetterli, "Calibration using matrix completion with application to ultrasound tomography," *IEEE Trans. on Signal Processing*, Vol 61, pp.4923-4933, Oct 2013.
18. A. Marcus, D. Karger, S. Madden, R. Miller, S. Oh, "Counting with the crowd", *Journal Proceedings of the VLDB Endowment*, Volume 6, Issue 2, Pages 109-120, December 2012
19. R. H. Keshavan, A. Montanari, S. Oh, "Matrix completion from noisy entries," *Journal of Machine Learning Research*, Vol 11 pp.2057-2078, July 2010.
20. R. H. Keshavan, A. Montanari, S. Oh, "Matrix completion from a few entries," *IEEE Trans. on Information Theory*, Vol 56 no.6 pp.2980-98, June 2010.

Conference Publications

1. J. Ok, Y. Jang, S. Oh, J. Shin, and Y. Yi, "Efficient Learning for Crowdsourced Regression", under review
2. W. Gao, S. Kannan, S. Oh, and P. Viswanath, "Estimating Mutual Information for Discrete-Continuous Mixtures", *Neural Information Processing Systems (NIPS)*, Long Beach, CA, 2017, **Spotlight presentation**, (Acceptance rate: 678/3240=20.9%, Spotlight acceptance rate: 152/3240=4.7%)
3. W. Gao, S. Kannan, H. Kim, S. Oh, and P. Viswanath, , "Discovering Potential Influence via Information Bottleneck", *Neural Information Processing Systems (NIPS)*, Long Beach, CA, 2017, (Acceptance rate: 678/3240=20.9%)
4. M. Jang, S. Kim, C. Suh, and S. Oh, "Top-K Ranking from Pairwise Comparisons: When Spectral Ranking is Optimal", *Neural Information Processing Systems (NIPS)*, Long Beach, CA, 2017, (Acceptance rate: 678/3240=20.9%)
5. A. Khetan, S. Oh, "Matrix Norm Estimation from a Few Entries", *Neural Information Processing Systems (NIPS)*, Long Beach, CA, 2017, **Spotlight presentation**, (Acceptance rate: 678/3240=20.9%, Spotlight acceptance rate: 152/3240=4.7%)
6. W. Gao, S. Oh, and P Viswanath, "Density Functional Estimators with k-Nearest Neighbor Bandwidths", ISIT, 2017
7. W. Gao, S. Oh, and P. Viswanath, "Demystifying Fixed k-Nearest Neighbor Information Estimators", ISIT, 2017
8. W. Gao, S. Oh, and P. Viswanath, "Breaking the Bandwidth Barrier: Geometrical Adaptive Entropy Estimation", *Neural Information Processing Systems (NIPS)*, Barcelona, Spain, 2016 (Acceptance rate: 568/2500=22.7%)
9. A. Khetan and S. Oh, "Computational and Statistical Tradeoffs in Learning to Rank", *Neural Information Processing Systems (NIPS)*, Barcelona, Spain, 2016 (Acceptance rate: 568/2500=22.7%)
10. A. Khetan and S. Oh, "Achieving budget-optimality with adaptive schemes in crowdsourcing", *Neural Information Processing Systems (NIPS)*, Barcelona, Spain, 2016 (Acceptance rate: 568/2500=22.7%)
11. W. Gao, S. Kannan, S. Oh, P. Viswanath, "Conditional Dependence via Shannon Capacity: Axioms, Estimators and Applications", *International Conference on Machine Learning (ICML)*, New York, 2016, (Acceptance rate: 322/1327=24.3%)
12. A. Khetan, S. Oh, "Data-driven Rank Breaking for Efficient Rank Aggregation", *International Conference on Machine Learning (ICML)*, New York, 2016, (Acceptance rate: 322/1327=24.3%)
13. J. Ok, S. Oh, J. Shin, Y. Yi, "Optimality of Belief Propagation for Crowdsourced Classification", *International Conference on Machine Learning (ICML)*, New York, 2016, (Acceptance rate: 322/1327=24.3%)
14. G. Fanti, P. Kairouz, S. Oh, K. Ramchandran and P. Viswanath, "Metadata-conscious Anonymous Messaging", *International Conference on Machine Learning (ICML)*, New York, 2016, (Acceptance rate: 322/1327=24.3%)
15. G. Fanti, P. Kairouz, S. Oh, K. Ramchandran and P. Viswanath, "Rumor Source Obfuscation on Irregular Trees", *ACM SIGMETRICS*, Antibes, France, 2016 (Accetance rate: 28/208=13.5%)
16. P. Kairouz, S. Oh, and P. Viswanath, "Secure Multi-party Differential Privacy", *Neural Information Processing Systems (NIPS)*, Montreal, Canada, 2015 (Acceptance rate: 403/1838=21.9%)

17. S. Oh, K. K. Thekumparampil, and J. Xu, "Collaboratively Learning Preferences from Ordinal Data", *Neural Information Processing Systems (NIPS)*, Montreal, Canada, 2015 (Acceptance rate: 403/1838=21.9%)
18. S. Krishnasamy, R. Sen, S. Oh, and S. Shakkottai, "Detecting Sponsored Recommendations", *Proceedings of the 2014 ACM SIGMETRICS* Portland, Oregon, June 2015 (Short paper acceptance rate: 57/239=23.8%)
19. G. Fanti, P. Kairouz, S. Oh, and P. Viswanath, "Spy vs. Spy: Rumor Source Obfuscation", *Proceedings of the 2014 ACM SIGMETRICS* Portland, Oregon, June 2015, **Best paper award**, (Acceptance rate: 32/239=13.4%)
20. P. Kairouz, S. Oh, and P. Viswanath, "Extremal Mechanisms for Local Differential Privacy", *Neural Information Processing Systems (NIPS)*, Montreal, Canada, 2014, (Acceptance rate:414/1678=24.7%)
21. P. Jain and S. Oh, "Provable Tensor Factorization with Missing Data", *Neural Information Processing Systems (NIPS)*, Montreal, Canada, 2014, (Acceptance rate:414/1678=24.7%)
22. B. Hajek, S. Oh, and J. Xu, "Minimax-optimal Inference from Partial Rankings", *Neural Information Processing Systems (NIPS)*, Montreal, Canada, 2014, (Acceptance rate:414/1678=24.7%)
23. S. Oh and D. Shah , "Learning Mixed Multinomial Logit Model from Ordinal Data", *Neural Information Processing Systems (NIPS)*, Montreal, Canada, 2014, (Acceptance rate:414/1678=24.7%)
24. P. Jain, S. Oh, "Learning Mixtures of Discrete Product Distributions using Spectral Decompositions", *Proceedings of the 27th annual conference on learning theory (COLT)*, Barcelona, Spain, June 2014, (Acceptance rate:52/140=37.1%)
25. A. Ammar, S. Oh, D. Shah, L. Voloch, "What's your choice? Learning the mixed multinomial logic model," *Proceedings of the 2014 ACM SIGMETRICS*, Austin, TX, June 2014, (Acceptance rate:40/238=16.8%)
26. A. Marcus, D. Karger, S. Madden, R. Miller, S. Oh, "Counting with the crowd", *Proceedings of the 39th international conference on very large data bases (VLDB)*, Riva del Garda, Trento, August 2013, (Acceptance rate:127/559=22.7%)
27. D. R. Karger, S. Oh, D. Shah, "Efficient Crowdsourcing for Multi-class Labeling," *Proceedings of the 2013 ACM SIGMETRICS*, CMU, Pittsburgh, PA, July 2013, (Acceptance rate:26/196=13.3%)
28. S. Negahban, S. Oh, and D. Shah, "Iterative Ranking from Pairwise Comparisons," *Neural Information Processing Systems (NIPS)*, Lake Tahoe, CA, December 2012, **(Spotlight Presentation)**, (Acceptance rate:370/1467=25.2%, Spotlight:72/1467=4.9%)
29. D. R. Karger, S. Oh, D. Shah, "Iterative learning for reliable crowdsourcing systems," *Neural Information Processing Systems (NIPS)*, Granada, Spain, December 2011. **(Oral Presentation)**, (Acceptance rate:305/1400=21.8%, Oral:20/1400=1.4%)
30. D. R. Karger, S. Oh, D. Shah, "Budget-optimal crowdsourcing using low-rank matrix approximations," *Proc. of the Allerton Conf. on Commun., Control and Computing*, Monticello, IL, September 2011.
31. S. Korada, A. Montanari, S. Oh, "Gossip PCA," *Proceedings of the 2011 ACM SIGMETRICS*, San Jose, CA, June 2011, (Acceptance rate:26/177=14.7%)
32. A. Montanari, S. Oh, "On positioning via distributed matrix completion," *Sensor Array and Multichannel Signal Processing Workshop*, Jerusalem, Israel, October 2010.
33. R. Parhizkar, A. Karbasi, S. Oh, M. Vetterli, "Ultrasound tomography calibration using structured matrix completion," *The 20th International Congress on Acoustics*, Sydney, Australia, August 2010.

34. A. Karbasi, S. Oh, "Distributed sensor network localization from local connectivity: performance analysis for the HOP-TERRAIN algorithm," *Proceedings of the 2010 ACM SIGMETRICS*, New York, NY, June 2010, **(Kenneth C. Sevcik Outstanding Student Paper Award)**, (Acceptance rate:29/184=15.8%)
35. S. Oh, A. Karbasi, A. Montanari, "Sensor network localization from local connectivity: performance analysis for the MDS-MAP algorithm," *Proc. of the IEEE Inform. Theory Workshop*, Cairo, Egypt, January 2010.
36. R. H. Keshavan, A. Montanari, S. Oh, "Matrix completion from noisy entries," *Neural Information Processing Systems (NIPS)*, Vancouver, Canada, December 2009, (Acceptance rate:264/1105=23.9%)
37. M. Bayati, R. H. Keshavan, A. Montanari, S. Oh, A. Saberi, "Generating random tanner-graphs with large girth," *Proc. of the IEEE Inform. Theory Workshop*, Taormina, Italy, October 2009.
38. R. H. Keshavan, A. Montanari, S. Oh, "Low-rank matrix completion with noisy observations: a quantitative comparison," *Proc. of the Allerton Conf. on Commun., Control and Computing* (invited), Monticello, IL, September 2009.
39. R. H. Keshavan, A. Montanari, S. Oh., "Matrix completion from a few entries," *Proc. of the IEEE Int. Symposium on Inform. Theory*, Seoul, Korea, June 2009.
40. R. H. Keshavan, A. Montanari, S. Oh, "Learning low rank matrices from O(n) entries," *Proc. of the Allerton Conf. on Commun., Control and Computing* (invited), Monticello, IL, September 2008.
41. J. Ezri, A. Montanari, S. Oh, R. Urbanke, "Computing the threshold shift for general channels," *Proc. of the IEEE Int. Symposium on Inform. Theory*, Toronto, Canada, June 2008.
42. J. Ezri, A. Montanari, S. Oh, R. Urbanke, "The slope scaling parameter for general channels," *Proc. of the IEEE Int. Symposium on Inform. Theory*, Toronto, Canada, June 2008.

Invited Talks

2017/03: "Achieving budget-optimality with adaptive schemes in crowdsourcing", Workshop on Statistical Physics, learning, inference, and networks, Les Houches, France
2017/02: "Achieving budget-optimality with adaptive schemes in crowdsourcing", ITA workshop, UCSD
2017/02: "Achieving budget-optimality with adaptive schemes in crowdsourcing", Statistics Department, University of Wisconsin
2017/01: "Achieving budget-optimality with adaptive schemes in crowdsourcing", CESG teleseminar, Texas A&M
2016/12: "Braking the bandwidth barrier: local adaptive entropy estimator", ICSA, Shanghai, China
2016/12: "Achieving budget-optimality with adaptive schemes in crowdsourcing", NIPS workshop on crowdsourcing, Barcelona, Spain
2016/11: "Achieving budget-optimality with adaptive schemes in crowdsourcing", INFORMS, Nashville, TN
2016/10: "Achieving budget-optimality with adaptive schemes in crowdsourcing", Machine Learning seminar, USC **2016/05:** "Rumor source obfuscation", ITA seminar, UCSD
2016/03: "Privacy region and its applications", invited talk, Nexus of information and computation theories, Institut Henri Poincare, Paris, France
2016/02: "Rumor source obfuscation", ITA workshop, UCSD
2015/11: "Rumor source obfuscation", LIDS Seminar, MIT
2015/10: "Rumor source obfuscation", Information Theory Workshop, Jeju Island, Korea
2015/09: "Rumor source obfuscation", WNCG seminar, University of Texas, Austin
2015/05: "Rumor source obfuscation", GRAMSIA 2015

2015/01: "Data processing inequalities for differential privacy", Invited Talk, ITA, San Diego, CA.
2015/01: "Ranking from pairwise comparisons", Invited Talk, Joint Mathematics Meeting, SIAM Minisymposium on Matrix Concentration Inequalities, San Antonio, TX.
2014/04: "Budget-optimal task allocation for reliable crowdsourcing systems", Invited Talk, Seoul National University, Seoul, Korea.
2014/02: "", Invited Talk, IMSE Hot TIME Symposium: Applied Geometry, Topology, and Networks, UIUC, Urbana, IL
2013/12: "Budget-optimal task allocation for reliable crowdsourcing systems", Invited Talk, ISL Colloquium, Stanford University, Stanford, CA.
2013/11: "Ranking from pairwise comparisons", Invited Talk, INFORMS Annual Meeting, Minneapolis, MN.
2013/05 "Spectral methods in machine learning", MidWest Numerical Analysis Day, University of Chicago, Chicago, IL.
2013/04: "Budget-optimal task allocation for reliable crowdsourcing systems", Invited Talk, Wireless Networking and Communications Seminar Series, University of Texas at Austin, TX.
2012/08: "Ranking from pairwise comparisons", Invited Talk, International Symposium on Mathematical Programming, Berlin, Germany.
2011/11: "Budget-optimal task allocation for reliable crowdsourcing systems", Invited Talk, INFORMS Annual Meeting, Charlotte, NC.
2010/10: "Positioning via Matrix Completion", Invited Talk, Sensor Array and Multichannel Workshop, Jerusalem, Israel.
2010/06 : "Matrix Completion from a few entries", IDEAS Seminar, Princeton University, Princeton, NJ.
2010/02: "Matrix Completion from a few entries", Information Theory and Applications Workshop (Graduation Day), UCSD, San Diego, CA.
2009/09: "Matrix Completion from a few entries", Allerton Conference, Monticello, IL.

Grants

1. "Optimal Mechanism Design for Private Data Sharing", Google Faculty Research Award, $50,000, 04/01/2017, gift money
2. "CIF: Medium: Anonymous Broadcasting over Networks: Fundamental Limits and Algorithms", NSF, Division of Computing and Communication Foundations, $292,280, 9/1/2017-8/31/2020
3. "CAREER: Social Computation: Fundamental Limits and Efficient Algorithms", NSF, Division of Computing and Communication Foundations, $176,120, 2/15/2016-2/14/2021
4. "TWC: Small: Fundamental Limits in Differential Privacy", NSF, Division Of Computer and Network Systems, $495,190.00, 09/01/2015-08/31/2018
5. "EAGER: A Graphical Approach for Choice Modeling", NSF, Division Of Civil, Mechanical & Manufacturing Innovation, $87,937, 01/01/2015-12/31/2015
6. "Adaptive learning via big-data, the future of student-focused instruction," with M. West, G. Dullerud, C. Zilles, University of Illinois, Strategic Instructional Initiatives Program, $240,000, 07/01/2013-06/30/2015
7. "Big-Data Analytics in Resource-constrained Regime: Statistical Limits and Computational Challenges," with Y. Wu, C. Chekuri, B. Hajek, R. Srikant, University of Illinois, Strategic Research initiatives, $150,000, 07/01/2014-06/30/2016