

Xi Chen

Curriculum Vitae

Department of Tech, Ops, and Stats, NYU Stern School of Business
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Updated on November 3, 2022

PROFESSIONAL EXPERIENCE

- 02/2020–present **New York University, Stern School of Business, Department of Technology, Operations, and Statistics.**
Associate Professor (with Tenure), Andre Meyer Faculty Fellow.
- 09/2014–02/2020 **New York University, Stern School of Business, Department of Technology, Operations, and Statistics.**
Assistant Professor
- 05/2017–present **New York University, Courant Institute (Computer Science).**
Affiliated Faculty
- 09/2014–present **New York University, Center for Data Science.**
Affiliated Faculty
- 08/2013–08/2014 **UC Berkeley, Department of Statistics and Department of EECS.**
Postdoctoral Research Scientist under Prof. Michael I. Jordan

EDUCATION

- 2008–2013 **Carnegie Mellon University, School of Computer Science.**
PhD in Machine Learning Department
- 2007–2009 **Carnegie Mellon University, Tepper School of Business.**
MS in Operations Research

SELECTED AWARDS & GRANTS

- 2022 **Andre Meyer Faculty Fellowship**, Stern School of Business, New York University.
- 2022 **COPSS (Committee of Presidents of Statistical Societies) Leadership Academy.**
Citation: “For notable contributions to statistical inference for distributed, online, and high-dimensional data, to stochastic optimization, and to statistical applications in business domains, for outstanding educational efforts to the next generation of business leaders, and for significant industrial impacts”.
- 2021 **Elected Member of the International Statistical Institute (ISI).**
Highest recognition by ISI to “individuals who are established in their careers and have made significant contributions to the statistical profession”.
- 2021 **Poets & Quants: The World’s Best 40 Under 40 MBA Professors.**
The Poets & Quants annual list recognizing 40 best business-school professors in MBA education under the age of 40.

- 2020 **Facebook Faculty Research Award.**
Award: *Differentially Private Deep Learning, with Applications to Online Advertising.*
- 2020 **J.P.Morgan AI Research Award.**
Award: *Distributional Outcome Fairness-aware Decision-making with Financial Applications.*
- 2019 **NSF Faculty Early Career Development (CAREER) Award.**
Funding (sole PI): *A Sequential Learning Framework with Applications to Learning from Crowds.*
- 2019 **The Inaugural ICSA Outstanding Young Researcher Award.**
By the International Chinese Statistical Association (ICSA) to young researchers “in recognition of outstanding research achievement in statistical theory, methodology, and/or applications.”
- 2019 **Honorable Mention in INFORMS Junior Faculty Interest Group Paper Award (JFIG).**
- 2018 **Bloomberg Data Science Research Award.**
Award: *Large-scale Ranking and Selection with Financial Applications.*
- 2017 **Forbes 30 Under 30 in Science.**
The Forbes annual list recognizing 30 leading researchers in science under the age of 30.
- 2017 **Adobe Data Science Research Award.**
Award: *Real-Time Learning and Optimization with Applications to Personalized Product/Ad Recommendation.*
- 2017 **The 2017 CSAMSE Annual Conference Best Paper Award (first prize).**
CSAMSE: Chinese Scholars Association for Management Science and Engineering.
- 2017 **Marquis Who’s Who in the World.**
[Who’s Who in the World for Achievements in Data Science](#)
- 2015 **Google Faculty Research Award.**
Award: *Cost-effective Complex Crowdsourcing Systems.*
- 2013 **Simons-Berkeley Research Fellowship.**

EDITORIAL APPOINTMENTS

- 2022-present **Associate Editor**, *Annals of Statistics*.
- 2020-present **Associate Editor**, *Operations Research*.
Department of Machine Learning and Data Science
- 2019-present **Associate Editor**, *Management Science*.
Department of Data Science (formerly Big Data Analytics)
- 2020 **Area Chair**, *International Conference on Machine Learning (ICML)*.
- 2019 **Associate Editor**, *Management Science*, Special Issue on Data-Driven Prescriptive Analytics.

JOURNAL PUBLICATIONS †

†Papers are also available at my Google scholar profile <https://scholar.google.com/citations?user=qjJg6akAAAAJ> (4,300+ citations as of Sept. 2022).

- [1] **Xi Chen**, David Simchi-Levi, and Yining Wang. [Privacy-Preserving Dynamic Personalized Pricing with Demand Learning](#). *Management Science*, 68(7), 4878–4898, 2022.
- [2] **Xi Chen**, Quanquan Liu, and Yining Wang. [Active Learning for Contextual Search with Binary Feedback](#). *Management Science (forthcoming)*, 2022.
- [3] **Xi Chen**, Zachary Owen, Clark Pixton and David Simchi-Levi. [A Statistical Learning Approach to Personalization in Revenue Management](#). *Management Science*, 68(3), 1923–1937, 2022.
- [4] Wanrong Zhu, **Xi Chen**, and Weibiao Wu. [Online Covariance Matrix Estimation in Stochastic Gradient Descent](#). *Journal of American Statistical Association (Theory and Methods, forthcoming)*, 2022.
- [5] **Xi Chen**, Jason D. Lee, He Li, and Yun Yang. [Distributed Estimation for Principal Component Analysis: An Enlarged Eigenspace Analysis](#). *Journal of American Statistical Association (Theory and Methods, forthcoming)*, 2022.
- [6] **Xi Chen**, Weidong Liu, and Yichen Zhang. [First-order Newton-type Estimator for Distributed Estimation and Inference](#). *Journal of American Statistical Association (Theory and Methods, forthcoming)*, 2022.
- [7] **Xi Chen**, Yang Ha Cho, Yiwei Dou, and Baruch Lev. [Predicting Future Earnings Changes Using Machine Learning and Detailed Financial Data](#). *Journal of Accounting Research*, 60(2), 467–515, 2022.
- [8] **Xi Chen**, and Yining Wang. [Robust Dynamic Pricing with Demand Learning in the Presence of Outlier Customers](#). *Operations Research (forthcoming)*, 2022.
- [9] **Xi Chen**, Sentao Miao, and Yining Wang. [Differential Privacy in Personalized Pricing with Nonparametric Demand Models](#). *Operations Research (forthcoming)*, 2022.
- [10] Rui Gao, **Xi Chen**, and Anton J. Kleywegt. [Wasserstein Distributionally Robust Optimization and Variation Regularization](#). *Operations Research (forthcoming)*, 2022.
- [11] Ilai Bistriz, Zhengyuan Zhou, **Xi Chen**, Nicholas Bambos, and Jose Blanchet. [No Weighted-Regret Learning in Adversarial Bandits with Delays](#). *Journal of Machine Learning Research*, 23(139), 1–43, 2022.
- [12] **Xi Chen**, Bo Jiang, Tianyi Lin, and Shuzhong Zhang. [Accelerating Adaptive Cubic Regularization of Newton’s Method via Random Sampling](#). *Journal of Machine Learning Research*, 23(90), 1–38, 2022.
- [13] **Xi Chen**, Yunxiao Chen, and Xiaoou Li. [Asymptotically Optimal Sequential Design for Rank Aggregation](#). *Mathematics of Operations Research (forthcoming)*, 2022.
- [14] **Xi Chen**, Qiang Liu, and Xin T. Tong. [Dimension Independent Excess Risk by Stochastic Gradient Descent](#). *Electronic Journal of Statistics*, 16(2), 4547–4603, 2022.
- [15] **Xi Chen**, Jianjun Gao, Dongdong Ge, and Zizhuo Wang. [Bayesian Dynamic Learning and Pricing with Strategic Customers](#). *Production and Operations Management*, 31(8), 3125–3142, 2022.
- [16] Sentao Miao, **Xi Chen**, Xiuli Chao, Jiayi Liu, and Yidong Zhang. [Context-Based Dynamic Pricing with Online Clustering](#). *Production and Operations Management (forthcoming)*, 2022.

- [17] **Xi Chen**, Qihang Lin, Guanglin Xu. [Distributionally Robust Optimization with Confidence Bands for Probability Density Functions](#). *INFORMS Journal on Optimization*, 4(1), 65–89, 2022.
- [18] Jiyuan Tu, Weidong Liu, Xiaojun Mao, and **Xi Chen**. [Variance Reduced Median-of-Means Estimator for Byzantine-Robust Distributed Inference](#). *Journal of Machine Learning Research*, 22(84), 1–67, 2021.
- [19] **Xi Chen**, Victor Chernozhukov, Iván Fernández-Val, Scott Kostyshka, and Ye Luo. [Shape-Enforcing Operators for Point and Interval Estimators](#). *Journal of Machine Learning Research*, 22(220), 1–42, 2021.
- [20] Xiaou Li, Yunxiao Chen, **Xi Chen**, Jingchen Liu, and Zhiliang Ying. [Optimal Stopping and Worker Selection in Crowdsourcing: an Adaptive Sequential Probability Ratio Test Framework](#). *Statistica Sinica*, 31, 519–546, 2021.
- [21] **Xi Chen**, Simai He, Bo Jiang, Christopher Thomas Ryan, and Teng Zhang. [The Discrete Moment Problem with Nonconvex Shape Constraints](#). *Operations Research*, 69(1), 279–296, 2021.
- [22] **Xi Chen**, Yining Wang, and Yuan Zhou. [Optimal Policy for Dynamic Assortment Planning Under Multinomial Logit Models](#). *Mathematics of Operations Research*, 46(4), 1639–1657, 2021.
- [23] Yining Wang, **Xi Chen**, Xiangyu Chang, and Dongdong Ge. [Uncertainty Quantification for Demand Prediction in Contextual Dynamic Pricing](#). *Production and Operations Management*, 30(6), 1703–1717, 2021.
- [24] **Xi Chen**, Chao Shi, Yining Wang, and Yuan Zhou. [Dynamic Assortment Selection under Nested Logit Models](#). *Production and Operations Management*, 30(1), 85–102, 2021.
- [25] **Xi Chen**, Simon S. Du, and Xin T. Tong. [On Stationary-Point Hitting Time and Ergodicity of Stochastic Gradient Langevin Dynamics](#). *Journal of Machine Learning Research*, 21(68), 1–41, 2020.
- [26] **Xi Chen**, Weidong Liu, Xiaojun Mao, and Zhuoyi Yang. [Distributed High-dimensional Regression Under a Quantile Loss Function](#). *Journal of Machine Learning Research*, 21(182): 1–43, 2020.
- [27] **Xi Chen**, Yining Wang, and Yuan Zhou. [Dynamic Assortment Optimization with Changing Contextual Information](#). *Journal of Machine Learning Research*, 21(216), 1–44, 2020.
 - Honorable Mention in INFORMS Junior Faculty Interest Group Paper Award (JFIG).
- [28] **Xi Chen**, Jason D. Lee, Xin T. Tong, and Yichen Zhang. [Statistical Inference for Model Parameters in Stochastic Gradient Descent](#). *Annals of Statistics*, 48(1), 251–273, 2020.
- [29] **Xi Chen** and Wen-Xin Zhou. [Robust Inference via Multiplier Bootstrap](#). *Annals of Statistics*, 48(3), 1665–1691, 2020.
- [30] **Xi Chen**, Qihang Lin, and Bodhisattva Sen. [On Degrees of Freedom of Projection Estimators with Applications to Multivariate Shape Restricted Regression](#). *Journal of American Statistical Association (Theory and Methods)*, 115(529): 173–186, 2020.
- [31] **Xi Chen**, Qihang Lin and Zizhuo Wang. [Comparison-Based Algorithms for One-Dimensional Stochastic Convex Optimization](#). *INFORMS Journal on Optimization*, 2(1): 34–56, 2020.

- [32] **Xi Chen**, Weidong Liu, and Yichen Zhang. [Quantile Regression under Memory Constraint](#). *Annals of Statistics*, 47(6), 3244–3273, 2019.
- [33] Xiaozhou Wang, Zhuoyi Yang, **Xi Chen**, and Weidong Liu. [Distributed Inference for Linear Support Vector Machine](#). *Journal of Machine Learning Research*, 20(113), 1–41, 2019.
- [34] **Xi Chen**, Yining Wang, and Yuxiang Wang. [Technical Note–Nonstationary Stochastic Optimization Under \$L_{p,q}\$ -Variation Measures](#). *Operations Research*, 67(6), 1752–1765, 2019.
- [35] **Xi Chen**, Tengyu Ma, Jiawei Zhang, and Yuan Zhou. [Optimal Design of Process Flexibility for General Production Systems](#). *Operations Research*, 67(2), 516–531, 2019.
- [36] **Xi Chen** and Weidong Liu. [Graph Estimation for Matrix-variate Gaussian Data](#). *Statistica Sinica*, 29, 479–504, 2019.
- [37] **Xi Chen** and Weidong Liu. [Testing Independence with High-dimensional Correlated Samples](#). *Annals of Statistics*, 46(2), 866–894, 2018.
- [38] **Xi Chen**, Sivakanth Gopi, Jieming Mao, and Jon Schneider. [Optimal Instance Adaptive Algorithm for the Top- \$K\$ Ranking Problem](#). *IEEE Transactions on Information Theory*, 64(9), 6139–6160, 2018.
- [39] **Xi Chen** and Yining Wang. [A Note on Tight Lower Bound for MNL-Bandit Assortment Selection Models](#). *Operations Research Letters*, 46(5), 534–537, 2018.
- [40] **Xi Chen**, Adityanand Guntuboyina, and Yuchen Zhang. [A Note on the Approximate Admissibility of Regularized Estimators in the Gaussian Sequence Model](#). *Electronic Journal of Statistics*, 11(2): 4746–4768, 2017.
- [41] **Xi Chen**, Adityanand Guntuboyina, and Yuchen Zhang. [On Bayes Risk Lower Bounds](#). *Journal of Machine Learning Research*, 17(218): 1–58, 2016.
- [42] **Xi Chen**, Kevin Jiao, and Qihang Lin. [Bayesian Decision Process for Cost-Efficient Dynamic Ranking via Crowdsourcing](#). *Journal of Machine Learning Research*, 17(216): 1–40, 2016.
- [43] Yuchen Zhang, **Xi Chen**, Dengyong Zhou, and Michael I. Jordan. [Spectral Methods Meet EM: A Provably Optimal Algorithm for Crowdsourcing](#). *Journal of Machine Learning Research*, 17(102): 1–44, 2016.
- [44] **Xi Chen**, Qihang Lin, and Dengyong Zhou. [Statistical Decision Making for Optimal Budget Allocation in Crowd Labeling](#). *Journal of Machine Learning Research*, 16: 1–46, 2015.
- [45] **Xi Chen**, Jiawei Zhang, and Yuan Zhou. [Optimal Sparse Designs for Process Flexibility via Probabilistic Expanders](#). *Operations Research*, 63(5): 1159–1176, 2015.
- [46] Qihang Lin, **Xi Chen**, and Javier Peña. [A Trade Execution Model Under a Composite Dynamic Coherent Risk Measure](#). *Operations Research Letters*, 43(1): 52–58, 2015.
- [47] Qihang Lin, **Xi Chen**, and Javier Peña. [A Smoothing Stochastic Gradient Method for Composite Optimization](#). *Optimization Methods and Software*, 29(6): 1281–1301, 2014.
- [48] Qihang Lin, **Xi Chen**, and Javier Peña. [A Sparsity Preserving Stochastic Gradient Method for Composite Optimization](#). *Computational Optimization and Applications*, 58(2): 455–482, 2014.

- [49] **Xi Chen**, Qihang Lin, Seyoung Kim, Jaime Carbonell, and Eric P. Xing. [Smoothing Proximal Gradient Method for General Structured Sparse Regression](#). *Annals of Applied Statistics*, 6(2): 719–752, 2012.
- [50] **Xi Chen** and Han Liu. [An Efficient Optimization Algorithm for Structured Sparse CCA with Applications to eQTL Mapping](#). *Statistics in Biosciences*, 4(1): 3–26, 2012.

BOOK AND BOOK CHAPTER

- [51] **Xi Chen**, Stefanus Jasin, Cong Shi (co-editing). *The Elements of Joint Learning and Optimization in Operations Management*, Springer Series in Supply Chain Management (forthcoming), 2022.
- [52] Eric P. Xing, Mladen Kolar, Seyoung Kim, and **Xi Chen**. *High-dimensional Sparse Structured Input-output Models, with Applications to GWAS: Practical Applications of Sparse Modeling*. (Edited by Irina Rish, Guillermo A. Cecchi, Aurelie Lozano and Alexandru Niculescu-Mizil), MIT Press, 2014

PREPRINTS

- [53] **Xi Chen**, Xuan Zhang, and Yuan Zhou. [Fairness-aware Online Price Discrimination with Nonparametric Demand Models](#). *arXiv preprint arXiv:2111.08221*, Submitted.
- [54] **Xi Chen**, Zehua Lai, He Li, and Yichen Zhang. [Online Statistical Inference for Stochastic Optimization via Gradient-free Kiefer-Wolfowitz Methods](#). *arXiv preprint arXiv:2102.03389*.
- [55] Weidong Liu, Jiyuan Tu, Xiaojun Mao, **Xi Chen**. [Majority Vote for Distributed Differentially Private Sign Selection](#). *arXiv preprint arXiv:2209.00077*.
- [56] Jingyi Duan, Yang Ning, **Xi Chen**, Yong Chen. [Two-stage Hypothesis Tests for Variable Interactions with FDR Control](#). *arXiv preprint arXiv:2209.00077*.
- [57] **Xi Chen**, Wenbo Jing, Weidong Liu, and Yichen Zhang. [Distributed Estimation and Inference for Semi-parametric Binary Response Models](#). *arXiv preprint arXiv:2210.08393*.
- [58] **Xi Chen**, Akshay Krishnamurthy, and Yining Wang. [Robust Dynamic Assortment Optimization in the Presence of Outlier Customers](#). *arXiv preprint arXiv:1910.04183*, Submitted.
- [59] **Xi Chen**, Jiameng Lyu, Yining Wang, and Yuan Zhou. [Fairness-aware Network Revenue Management with Demand Learning](#). *arXiv preprint arXiv:2207.11159*, Submitted.
- [60] Wenlong Mou, Wen Zheng, and **Xi Chen**. [On the Sample Complexity of Reinforcement Learning with Policy Space Generalization](#). *arXiv preprint arXiv:2008.07353*, Submitted.
- [61] **Xi Chen**, Will Ma, David Simchi-Levi, and Linwei Xin. [Assortment Planning for Recommendations at Checkout under Inventory Constraints](#).
- The 2017 CSAMSE Annual Conference Best Paper Award (first prize)
- [62] Zishuo Zhao, **Xi Chen**, and Yuan Zhou. [Bayesian-Nash-Incentive-Compatible Mechanism for Blockchain Transaction Fee Allocation](#). *arXiv preprint arXiv:2209.13099*, Submitted.
- Accepted by Crypto Economics Security Conference (CESC).

- [63] Adam Khakhar, and **Xi Chen**. [Delta Hedging Liquidity Positions on Automated Market Makers](#). *arXiv preprint arXiv:2208.03318, Submitted*.
 - Accepted by Crypto Economics Security Conference (CESC).
- [64] Jingfan Yu, Mengqian Zhang, **Xi Chen**, and Zhixuan Fang. [SoK: Play-to-Earn Projects](#). *arXiv preprint arXiv:2211.01000*.
- [65] Xiaotong Sun, **Xi Chen**, Charalampos Stasinakis, Georgios Sermpinis. [Multiparty Democracy in Decentralized Autonomous Organization \(DAO\): Evidence from MakerDAO](#). *arXiv preprint arXiv:2210.11203*.

REFEREED PROCEEDING PAPERS

- [66] Zishuo Zhao, **Xi Chen**, Xuefeng Zhang, and Yuan Zhou. [Dynamic Car Dispatching and Pricing: Revenue and Fairness for Ridesharing Platforms](#). *International Joint Conference on Artificial Intelligence (IJCAI), 2022*. (Long presentation: 3.75% acceptance rate)
- [67] Yanjun Han, Yining Wang, and **Xi Chen**. [Adversarial Combinatorial Bandits with General Non-linear Reward Functions](#). *International Conference on Machine Learning (ICML), 2021*. (21% acceptance rate)
- [68] Yingkai Li, Yining Wang, **Xi Chen**, and Yuan Zhou. [Tight Regret Bounds for Infinite-armed Linear Contextual Bandits](#). *International Conference on Artificial Intelligence and Statistics (AISTATS), 2021*. (29% acceptance rate)
- [69] Tianyi Lin, Nhat Ho, **Xi Chen**, Marco Cuturi, and Michael Jordan. [Fixed-Support Wasserstein Barycenters: Computational Hardness and Fast Algorithm](#). In *Proceedings of the Advances in Neural Information Processing Systems (NeurIPS), 2020*. (20% acceptance rate)
- [70] Yichong Xu, **Xi Chen**, Aarti Singh, and Artur Dubrawski. [Thresholding Bandit Problem with Both Duels and Pulls](#). *International Conference on Artificial Intelligence and Statistics (AISTATS), 2020*. (30% acceptance rate)
- [71] Xiaozhou Wang, **Xi Chen**, Qihang Lin, and Weidong Liu. [Bayesian Decision Process for Budget-efficient Crowdsourced Clustering](#). *International Joint Conference on Artificial Intelligence (IJCAI), 2020*. (12.6% acceptance rate)
- [72] Chuheng Zhang, Yifei Jin, Yuanqi Li, Jian Li, **Xi Chen**, and Pingzhong Tang. [DoubleEnsemble: A New Ensemble Method Based on Sample Reweighting and Feature Selection for Financial Data Analysis](#). *International Conference on Data Mining (ICDM), 2020*. (9.8% acceptance rate)
- [73] Ilai Bistriz, Zhengyuan Zhou, **Xi Chen**, Nicholas Bambos, and Jose Blanchet. [Online EXP3 Learning in Adversarial Bandits with Delayed Feedback](#). In *Proceedings of the Advances in Neural Information Processing Systems (NeurIPS), 2019*. (21% acceptance rate)
 - This paper is extended in *Journal of Machine Learning Research* (journal pub [11]).
- [74] Yining Wang, **Xi Chen**, and Yuan Zhou. [Near-Optimal Policies for Dynamic Multinomial Logit Assortment Selection Models](#). In *Proceedings of the Advances in Neural Information Processing Systems (NeurIPS), 2018*. (21% acceptance rate)
 - This paper is extended in *Mathematics of Operations Research* (journal pub [22]).

- [75] **Xi Chen**, Yuanzhi Li, and Jieming Mao. [A Nearly Instance Optimal Algorithm for Top- \$k\$ Ranking under the Multinomial Logit Model](#). In *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2018. (33% acceptance rate)
- [76] Qianqian Hu, Jiechao Xiong, **Xi Chen**, Qiming Huang, and Yuan Yao. [HodgeRank with Information Maximization for Crowdsourced Pairwise Ranking Aggregation](#). In *Proceedings of the AAAI Conference on Artificial Intelligence*, 2018. (25% acceptance rate)
- [77] Jiecao Chen, **Xi Chen**, Qin Zhang, and Yuan Zhou. [Adaptive Multiple-Arm Identification](#). In *Proceedings of the International Conference on Machine Learning (ICML)*, 2017. (25% acceptance rate)
- [78] **Xi Chen**, Sivakanth Gopi, Jieming Mao, and Jon Schneider. [Competitive Analysis of the Top- \$K\$ Ranking Problem](#). In *Proceedings of the ACM-SIAM Symposium on Discrete Algorithms (SODA)*, 2017. (28% acceptance rate)
 - This paper is extended in *IEEE Transactions of Information Theory* (journal pub [38]).
- [79] Yasin Abbasi-Yadkori, Peter Bartlett, **Xi Chen**, and Alan Malek. [Large-Scale Markov Decision Problems with KL Control Cost and its Application to Crowdsourcing](#). In *Proceedings of the International Conference on Machine Learning (ICML)*, 2015. (26% acceptance rate)
- [80] Yuchen Zhang, **Xi Chen**, Dengyong Zhou, and Michael I. Jordan. [Spectral Methods Meet EM: A Provably Optimal Algorithm for Crowdsourcing](#). In *Proceedings of the Advances in Neural Information Processing Systems (NIPS)*, 2014. (Spotlight: 5% acceptance rate)
 - This paper is extended in *Journal of Machine Learning Research* (journal pub [43]).
- [81] Yuan Zhou, **Xi Chen**, and Jian Li. [Optimal PAC Multiple Arm Identification with Applications to Crowdsourcing](#). In *Proceedings of the International Conference on Machine Learning (ICML)*, 2014. (22% acceptance rate)
- [82] Chong Wang, **Xi Chen**, Alex Smola, and Eric P. Xing. [Variance Reduction for Stochastic Gradient Optimization](#). In *Proceedings of the Advances in Neural Information Processing Systems (NIPS)*, 2013. (25% acceptance rate)
- [83] **Xi Chen**, Qihang Lin, and Dengyong Zhou. [Optimistic Knowledge Gradient Policy for Optimal Budget Allocation in Crowdsourcing](#). In *Proceedings of the International Conference on Machine Learning (ICML)*, 2013. (24% acceptance rate)
 - This paper is extended in *Journal of Machine Learning Research* (journal pub [44]).
- [84] **Xi Chen**, Paul N. Bennett, Kevyn Collins-Thompson, and Eric Horvitz. [Pairwise Ranking Aggregation in a Crowdsourced Setting](#). In *Proceedings of the International Conference on Web Search and Data Mining (WSDM)*, 2013. (19% acceptance rate)
- [85] **Xi Chen**, Qihang Lin, and Javier Peña. [Optimal Regularized Dual Averaging Methods for Stochastic Optimization](#). In *Proceedings of the Advances in Neural Information Processing Systems (NIPS)*, 2012. (25% acceptance rate)
- [86] **Xi Chen**, Han Liu, and Jaime Carbonell. [Structured Sparse Canonical Correlation Analysis](#). In *Proceedings of the International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2012. (Oral: 6% acceptance rate)

- [87] Junming Yin, **Xi Chen**, and Eric P. Xing. [Group Sparse Additive Models](#). In *Proceedings of the International Conference on Machine Learning (ICML)*, 2012. (27% acceptance rate)
- [88] **Xi Chen**, Jingrui He, Rick Lawrence, and Jaime Carbonell, [Adaptive Multi-task Sparse Learning with an Application to fMRI Study](#). In *Proceedings of the SIAM International Conference on Data Mining (SDM)*, 2012. (Oral: 15% acceptance rate)
- [89] **Xi Chen**, Qihang Lin, Seyoung Kim, Jaime Carbonell, and Eric P. Xing. [Smoothing Proximal Gradient Method for General Structured Sparse Learning](#). In *Proceedings of the Uncertainty in Artificial Intelligence (UAI)*, 2011. (34% acceptance rate)
 - o This paper is extended in *Annals of Applied Statistics* (journal pub [49]).
- [90] **Xi Chen**, Yanjun Qi, Bing Bai, Qihang Lin, and Jaime Carbonell. [Sparse Latent Semantic Analysis](#). In *Proceedings of the SIAM International Conference on Data Mining (SDM)*, 2011. (25% acceptance rate)
- [91] Xiong Liang, **Xi Chen**, and Jeff Schneider. [Direct Robust Matrix Factorization for Anomaly Detection](#). In *Proceedings of the International Conference on Data Mining (ICDM)*, 2011. (13% acceptance rate)
- [92] Han Liu, **Xi Chen**, John Lafferty, and Larry Wasserman. [Graph-valued Regression](#). In *Proceedings of the Advances in Neural Information Processing Systems (NIPS)*, 2010. (Spotlight: 6% acceptance rate)
- [93] Han Liu and **Xi Chen**. [Multivariate Dyadic Regression Trees for Sparse Learning Problems](#). In *Proceedings of the Advances in Neural Information Processing Systems (NIPS)*, 2010. (24% acceptance rate)
- [94] **Xi Chen**, Bing Bai, Yanjun Qi, Qihang Lin, and Jaime Carbonell. [Learning Preferences with Millions of Parameters by Enforcing Sparsity](#). In *Proceedings of the International Conference on Data Mining (ICDM)*, 2010. (19% acceptance rate)
- [95] **Xi Chen**, Yan Liu, Han Liu, and Jaime Carbonell. [Learning Spatial-Temporal Varying Graphs with Applications to Climate Data Analysis](#). In *Proceedings of the AAAI Conference on Artificial Intelligence*, 2010. (27% acceptance rate)
- [96] Xiong Liang, **Xi Chen**, T.K. Huang, Jeff Schneider, and Jaime Carbonell. [Temporal Collaborative Filtering with Bayesian Probabilistic Tensor Factorization](#). In *Proceedings of the SIAM International Conference on Data Mining (SDM)*, 2010. (23% acceptance rate)
- [97] Han Liu and **Xi Chen**. [Nonparametric Greedy Algorithms for the Sparse Learning Problem](#). In *Proceedings of the Advances in Neural Information Processing Systems (NIPS)*, 2009. (24% acceptance rate)
- [98] **Xi Chen**, WeiKe Pan, James Kwok, and Jaime Carbonell. [Accelerated Gradient Method for Multi-Task Sparse Learning Problem](#). In *Proceedings of the International Conference on Data Mining (ICDM)*, 2009. (18% acceptance rate)

TEACHING EXPERIENCE

STERN SCHOOL OF BUSINESS, NEW YORK UNIVERSITY

- Spring 2021 **Instructor**, *Statistics and Data Analysis (COR1-GB 1305 30)*.
Evaluation of the instructor: 4.3/5.0
- Fall 2020 **Instructor**, *Statistics and Data Analysis (COR1-GB 1305 10)*.
Evaluation of the instructor: 4.7/5.0
- Fall 2020 **Instructor**, *Statistics and Data Analysis (COR1-GB 1305 04)*.
Evaluation of the instructor: 4.5/5.0
- Fall 2020 **Instructor**, *Statistics and Data Analysis (COR1-GB 1305 13)*.
Evaluation of the instructor: 4.5/5.0
- Summer 2020 **Instructor**, *Concepts in Risk Management: Statistical Models (Executive Master Program in Risk Management)*.
Evaluation of the instructor: 4.73/5.0
- Spring 2020 **Instructor**, *Regression and Forecasting Models* .
Evaluation of the instructor: 4.8/5.0
- Spring 2020 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 4.7/5.0
- Fall 2019 **Instructor**, *From Machine Learning to Decision-making with Applications to Business* .
Evaluation of the instructor: 4.9/5.0
- Fall 2019 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 4.6/5.0
- Spring 2019 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 4.6/5.0
- Fall 2018 **Instructor**, *Regression and Forecasting Models* .
Evaluation of the instructor: 4.9/5.0
- Fall 2018 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 4.8/5.0 (The evaluation system changed to 5.0-scale since Fall 2018)
- Spring 2018 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 6.5/7.0
- Spring 2018 **Instructor**, *Statistics for Business Control* .
Evaluation of the instructor: 6.6/7.0
- Fall 2016 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 6.2/7.0
- Spring 2016 **Instructor**, *Regression and Forecasting Models* .
Evaluation of the instructor: 6.3/7.0
- Spring 2016 **Instructor**, *Statistics for Business Control* .
Evaluation of the instructor: 5.9/7.0
- Fall 2015 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 6.0/7.0
- Spring 2015 **Instructor**, *Statistics for Business Control, Regression, and Forecasting Models* .
Evaluation of the instructor: 6.3/7.0

Spring 2015 **Instructor**, *Regression and Forecasting Models* .

Evaluation of the instructor: 6.2/7.0

MACHINE LEARNING DEPARTMENT, CARNEGIE MELLON UNIVERSITY

Spring 2011 **Teaching Assistant**, *Machine Learning (10701)*.

Instructor: Tom Mitchell

Spring 2010 **Teaching Assistant**, *Statistical Machine Learning (10702)*.

Instructors: John Lafferty and Larry Wasserman

PROFESSIONAL ACTIVITIES

COMMITTEE OF AWARD AND PAPER COMPETITION

2022 **Committee**, *Lanchester Prize*, INFORMS.

2021-2022 **Committee**, *APS student paper competition*, INFORMS Applied Probability Society.

2021-22 **Committee**, *CSAMSE best paper competition*, Chinese Scholars Association for Management Science and Engineering (CSAMSE).

SELECTED WORKSHOP/SESSION ORGANIZATION (PRE-PANDEMIC)

2019 **Organizer and Session Chair**, *Machine Learning for Revenue Management*, INFORMS Annual Meeting.

2018 **Organizer and Session Chair**, *Statistical Inference for Distributed Data and Online Streaming Data*, Annual Symposium for ICSA (International Chinese Statistical Association).

2018 **Organizer and Session Chair**, *Bridging Machine Learning and Revenue Management*, INFORMS Annual Meeting.

2017 **Organizer and Session Chair**, *Multi-armed Bandits and Applications to Revenue Management*, INFORMS Annual Meeting.

2017 **Organizer and Session Chair**, *Modern Statistical Learning for Ranking and Crowdsourcing*, Joint Statistical Meetings (JSM).

2016 **Program Committee**, INFORMS Revenue Management and Pricing Conference.

2016 **Organizer and Session Chair**, *Session on Demand Learning with Strategic Customers*, INFORMS Annual Meeting.

2016 **Organizer and Session Chair**, *Session on Robust Optimization and Learning*, INFORMS Annual Meeting.

2015 **Session Chair**, *Session on Computational Stochastic Dynamic Optimization*, INFORMS Annual Meeting.

2014 **Organizer**, *Workshop on Crowdsourcing and Human Computing*, International Conference on Machine Learning (ICML).

2013 **Organizer**, *Workshop on Crowdsourcing: Theory, Algorithms and Applications*, Advances in Neural Information Processing Systems (NIPS).

2013 **Organizer**, *Workshop on Machine Learning Meets Crowdsourcing*, International Conference on Machine Learning (ICML).

PANELS

- 2018 **Panelist**, *AI and Machine Learning For Business and Society Panel*, Conference of Information Systems and Technology.
- 2016 **Panel Reviewer**, *National Science Foundation (NSF)*, Critical Techniques, Technologies and Methodologies for Advancing Foundations and Applications of Big Data Sciences and Engineering (BIGDATA).

JOURNAL REVIEWER (SELECTED)

Annals of Statistics (AOS)
Journal of the American Statistical Association (JASA)
Journal of the Royal Statistical Society: Series B (JRSSB)
Biometrika
Annals of Applied Statistics (AOAS)
Journal of Machine Learning Research (JMLR)
Operations Research (OR)
Management Science (MS)
Production and Operations Management Journal (POMS)
Journal of Artificial Intelligence Research (JAIR)
IEEE Transactions on Information Theory (TIT)
Statistica Sinica
Journal of Computational and Graphical Statistics (JCGS)
Annales de l'Institut Henri Poincaré (AIHP)
Scandinavian Journal of Statistics
Information Systems Research (ISR)
IEEE Transactions on Knowledge and Data Engineering (TKDE)
Data Mining and Knowledge Discovery (DAMI)
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)
IEEE Transactions on Signal Processing (SP)
IEEE Signal Processing Letters (SPL)
Applied and Computational Harmonic Analysis (ACHA)

CONFERENCE REVIEWER (SELECTED)

Advances in Neural Information Processing Systems (NeurIPS)
International Conference on Machine Learning (ICML)
International Conference on Artificial Intelligence and Statistics (AISTATS)

SELECTED INVITED TALKS

ACADEMIC INSTITUTIONS (SELECTED)

- (1) **Shanghai University of Finance and Economics**, *School of Statistics and Management*, 07/2022

- (2) **Online Seminar of Mathematical Foundations of Data Science**, *Jointly by ETH, Gatech, Harvard, Northwestern, PSU, Princeton (Most speakers are distinguished professors from top universities)*, 01/2022
- (3) **University of Iowa**, *Business Analytics Thought Leaders Symposium, Tippie College of Business*, 02/2021
- (4) **City University of Hong Kong**, *College of Business*, 01/2020
- (5) **Stanford University**, *Department of Statistics*, 06/2019
- (6) **Iowa State University**, *Department of Statistics*, 04/2019
- (7) **Columbia University**, *Department of Statistics*, 03/2019
- (8) **University of Miami**, *Miami Business School*, 03/2019
- (9) **The University of Chicago**, *Booth School of Business, Econometrics and Statistics Seminar*, 03/2019
- (10) **Harvard University**, *Department of Statistics*, 02/2019
- (11) **Carnegie Mellon University**, *Statistical Machine Learning Seminar, Department of Statistics and Department of Machine Learning*, 01/2019
- (12) **The University of Hong Kong**, *Faculty of Business and Economics*, 01/2019
- (13) **The University of North Carolina at Chapel Hill**, *Department of Statistics and Operations Research*, 11/2018
- (14) **Texas A&M University**, *Department of Statistics*, 10/2018
- (15) **The Chinese University of Hong Kong**, *Institute for Data and Decision Analytics*, 05/2018
- (16) **Stanford University**, *Operations Research Seminar, Department of Management Science and Engineering*, 05/2018
- (17) **The University of Chicago**, *Booth School of Business, Operations/Management Science Seminar*, 05/2018
- (18) **Cornell University**, *The School of Operations Research and Information Engineering (ORIE)*, 05/2018
- (19) **Rice University**, *Machine Learning Seminar*, 03/2018
- (20) **The University of Chicago**, *Department of Statistics*, 03/2018
- (21) **Carnegie Mellon University**, *Operations Research Seminar, Tepper School of Business*, 01/2018
- (22) **Carnegie Mellon University**, *Statistical Machine Learning Seminar, Department of Statistics and Department of Machine Learning*, 01/2018
- (23) **University of Wisconsin–Madison**, *Department of Statistics*, 11/2017
- (24) **Harvard University**, *Prof. Jun Liu’s group seminar*, 11/2017

- (25) **Massachusetts Institute of Technology**, *Operations Management Seminar, Sloan School of Management*, 11/2017
- (26) **Yale University**, *Department of Statistics and Data Science*, 10/2017
- (27) **University of Minnesota Twin Cities**, *School of Statistics*, 10/2017
- (28) **New York University**, *Center for Data Science, Data Science and Statistics Showcase*, 10/2017
- (29) **Fudan University**, *School of Data Science*, 06/2017
- (30) **Columbia University**, *IEOR-DRO Seminar*, 04/2017
- (31) **University of Southern California**, *Data Sciences and Operations, The Marshall School of Business*, 04/2017
- (32) **Princeton University**, *Guest Lecture for ORF360: Decision Modeling in Business Analytics*, 04/2017
- (33) **University of Pennsylvania**, *Statistics Department, The Wharton School of Business*, 04/2017
- (34) **The University of Texas at Austin**, *Department of Statistics and Data Sciences*, 03/2017
- (35) **University of Michigan–Ann Arbor**, *The Industrial and Operations Engineering Department*, 03/2017
- (36) **New York University**, *Machine Learning Ph.D. Seminar, Courant Institute of Mathematical Sciences*, 02/2017
- (37) **The Hong Kong University of Science and Technology**, *Department of Mathematics*, 01/2017
- (38) **Michigan State University**, *Department of Statistics and Probability*, 11/2016
- (39) **Temple University**, *Department of Statistics, Fox School of Business*, 10/2016
- (40) **New Jersey Institute of Technology**, *Department of Mathematical Sciences*, 10/2016
- (41) **University of Illinois at Urbana–Champaign**, *Department of Industrial and Enterprise Systems Engineering*, 09/2016
- (42) **Fudan University**, *Shanghai Center for Mathematical Sciences*, 01/2016
- (43) **Princeton University**, *Wilks Statistics Seminar*, 11/2015
- (44) **New York University**, *Colloquium of the Department of Technology, Operations, and Statistics*, 11/2015
- (45) **Columbia University**, *Department of Statistics*, 02/2015
- (46) **Simons Institute for the Theory of Computing**, *UC Berkeley*, 12/2014
- (47) **UC Berkeley**, *Department of Industrial Engineering and Operations Research*, 02/2014
- (48) **Duke University**, *Fuqua School of Business*, 02/2014

(49) **Stanford University**, *Data Science Seminar*, 01/2014

CONFERENCES (SELECTED)

(50) **INFORMS Revenue Management and Pricing Section Conference**, *Chicago*, 06/2022

(51) **The Eleventh POMS-HK International Conference**, *Hong Kong*, 01/2020

(52) **INFORMS Annual Meeting**, *Seattle*, 10/2019

(53) **Joint Statistical Meetings (JSM)**, *Colorado*, 07/2019

(54) **IMS China International Conference on Statistics and Probability**, *Dalian, China*, 07/2019

(55) **INFORMS Revenue Management and Pricing Section Conference**, *Stanford Graduate School of Business*, 06/2019

(56) **ICSA Applied Statistics Symposium**, *North Carolina*, 06/2019

(57) **CMU Summer Workshop on Machine Learning**, *Tepper School of Business, Carnegie Mellon University (providing an introductory machine learning course to business school Ph.D. students in the U.S.)*, 05/2019

(58) **Annual Conference of Production and Operations Management Society (POMS)**, *Washington D.C.*, 05/2019

(59) **ICSA Conference on Data Science**, *Yunnan*, 01/2019

(60) **The Tenth POMS-HK International Conference**, *Hong Kong*, 01/2019

(61) **INFORMS Annual Meeting**, *Phoenix*, 11/2018

(62) **Institute for Math and its Applications (IMA)**, *Workshop on Data-driven Supply Chain Management*, 10/2018

(63) **A Symposium on Optimal Stopping**, *Rice University*, 06/2018

(64) **Conference on Statistical Learning and Data Science/Nonparametric Statistics**, *Columbia University*, 06/2018

(65) **ICSA Applied Statistics Symposium: The New Era of Data Science and Inference**, *New Jersey*, 06/2018

(66) **Conference on Information Sciences and Systems (CISS)**, *Princeton*, 03/2018

(67) **International Data-Driven Optimization Workshop (for celebrating Yinyu Ye's 70th birthday)**, *Shanghai*, 12/2017

(68) **Fudan International Conference on Data Science**, *Shanghai*, 12/2017

(69) **INFORMS Annual Meeting**, *Houston*, 10/2017

(70) **Joint Statistical Meetings (JSM)**, *Baltimore*, 08/2017

(71) **International Conference on Econometrics and Statistics (EcoStat)**, *Hong Kong*, 06/2017

(72) **The Third International Conference on Engineering and Computational Mathematics (ECM)**, *Hong Kong*, 05/2017

- (73) **International Workshop on Advanced Topics in Operations Management (Mostly OM)**, *Beijing*, 05/2017
- (74) **The Eighth POMS-HK International Conference**, *Hong Kong*, 01/2017
- (75) **The 10th ICSA International Conference on Global Growth of Modern Statistics in the 21st Century**, *Shanghai*, 12/2016
- (76) **Fudan International Conference on Data Science**, *Shanghai*, 12/2016
- (77) **INFORMS Annual Meeting**, *Nashville*, 11/2016
- (78) **Joint Statistical Meetings (JSM)**, *Chicago*, 08/2016
- (79) **INFORMS Revenue Management and Pricing Section Conference**, *New York*, 06/2016
- (80) **International Chinese Statistical Association (ICSA) Applied Statistical Symposium**, *Atlanta*, 06/2016
- (81) **Conference on Statistical Learning and Data Science**, *University of North Carolina at Chapel Hill*, 06/2016
- (82) **INFORMS Optimization Society Conference**, *Princeton*, 03/2016
- (83) **IMS-China International Conference on Statistics and Probability**, *Kunming*, 07/2015
- (84) **New Researchers Conference on High-Dimensional Statistics in the Age of Big Data**, *Beijing*, 06/2015
- (85) **Allerton Conference**, *Urbana*, 10/2014
- (86) **Manufacturing & Service Operations Management (MSOM) Conference**, *Seattle*, 06/2014
- (87) **INFORMS Annual Meeting**, *Minneapolis*, 10/2013
- (88) **INFORMS Annual Meeting**, *Phoenix*, 10/2012
- (89) **International Conference on Artificial Intelligence and Statistics (AISTATS)**, *La Palma, Canary Islands*, 04/2012
- (90) **Annual Conference on Neural Information Processing Systems (NIPS) Spotlight**, *Vancouver*, 12/2010
- (91) **Joint Statistical Meetings (JSM)**, *Vancouver*, 08/2010
- (92) **International Conference on Data Mining (ICDM)**, *Miami*, 12/2009

RESEARCH LAB

- (93) **Amazon**, *New York*, 03/2021
- (94) **Bloomberg**, *New York*, 05/2020
- (95) **Google Research**, *New York*, 09/2017
- (96) **Google Research**, *Mountain View*, 03/2014

- (97) **Microsoft Research**, *New York*, 04/2013
- (98) **Microsoft Research Redmond**, *Machine Learning Seminar*, 10/2012
- (99) **Microsoft Research Redmond**, *Seminar at Context, Learning, and User Experience for Search (CLUES)*, 07/2012
- (100) **Microsoft Research Asia**, *Beijing, China*, 12/2011
- (101) **NEC Lab America**, *Princeton*, 08/2011
- (102) **IBM Thomas J. Watson Research Center**, *Yorktown Heights*, 07/2010

STUDENT ADVISING

DOCTORAL ADVISEE

- 2015-2020 **Yichen Zhang**, *Statistics (co-advising with Clifford Hurvich)*, Stern School of Business, New York University.
First placement: Assistant Professor at the Krannert School of Management, Purdue University
- 2017-2022 **Zhuoyi Yang**, *Statistics (co-advising with Peter Lakner and Joshua Reed)*, Stern School of Business, New York University.
First placement: Applied Scientist at Amazon
- 2018-present **He Li**, *Statistics (co-advising with Rohit Deo)*, Stern School of Business, New York University.
- 2020-present **Wenbo Jing**, *Statistics (co-advising with Jeffrey Simonoff)*, Stern School of Business, New York University.

DOCTORAL THESIS COMMITTEE MEMBER

- 2022 **Tengyang Xie**, *Computer Science*, University of Illinois Urbana-Champaign, Advisor: Nan Jiang.
- 2022 **Yiming Zhang**, *Computer Science, Courant Institute*, New York University, Advisor: Keith Ross.
- 2022 **Jiashuo Jiang**, *Operations, Stern School of Business*, New York University, Advisor: Jiawei Zhang.
- 2018 **Shixin Wang**, *Operations, Stern School of Business*, New York University, Advisor: Jiawei Zhang.
- 2017 **Kevin Jian Jiao**, *Operations, Stern School of Business*, New York University, Advisor: Maxime Cohen.
- 2017 **Xinshang Wang**, *Department of Industrial Engineering and Operations Research (IEOR)*, Columbia University, Advisor: Van-anh Truong.
First placement: Postdoc at Massachusetts Institute of Technology (Group of David Simchi-Levi)
- 2016 **Xuan Wang**, *Operations, Stern School of Business*, New York University, Advisor: Jiawei Zhang.
First placement: Assistant Professor at the Hong Kong University of Science and Technology
- 2016 **Xiaoou Li**, *Department of Statistics*, Columbia University, Advisor: Zhiliang Ying and Jingchen Liu.
First placement: Assistant Professor at the University of Minnesota Twin Cities

DOCTORAL COMPREHENSIVE EXAM COMMITTEE MEMBER

- 2020 **Sandeep Chitla**, *Operations, Stern School of Business, New York University.*
- 2020 **Ozgecan Gumusbas**, *Operations, Stern School of Business, New York University.*
- 2020 **Sen Yang**, *Operations, Stern School of Business, New York University.*
- 2019 **Jiashuo Jiang**, *Operations & Statistics, Stern School of Business, New York University.*

MASTER MENTOR

- 2015 **Yuan Feng**, *Independent Study, Center for Data Science, New York University.*

INDUSTRIAL INTERNSHIPS

- Fall 2012 **Microsoft Research Redmond**, *Machine Learning Department.*
Mentor: Dengyong (Denny) Zhou
Building cost-efficient and reliable crowdsourcing systems for multi-class classification.
- Summer 2012 **Microsoft Research Redmond**, *Context, Learning, and User Experience for Search (CLUES).*
Mentor: Paul N. Bennett and Eric Horvitz
Developing cost-efficient ranking aggregation algorithms in *crowdsourcing systems* to improve search relevance.
- Summer 2011 **IBM Thomas J. Watson Research Center.**
Helping to build large-scale parallel system based on NIMBLE@IBM for online web-text classification.
- Summer 2010 **NEC Lab America.**
Developing efficient and scalable sparse learning algorithms for ranking and latent semantic analysis for text data.

PATENTS

- 2012 **System and methods for finding hidden topics of documents and preference ranking documents**, Assignee: NEC Corp.
Inventors: **Xi Chen**, Yanjun Qi, and Bing Bai
- 2014 **Budget optimal crowdsourcing**, Assignee: Microsoft Corp.
Inventors: **Xi Chen**, Qihang Lin, and Dengyong Zhou