

Yuchen Zhang

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ADDRESS

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Education

University of California, Berkeley Doctor of Philosophy in Computer Science Advised by Michael I. Jordan and Martin J. Wainwright	2011 - 2016
University of California, Berkeley Master of Arts in Statistics	2011 - 2013
Tsinghua University Bachelor of Engineering in Computer Science Supervised by Andrew C. Yao	2007 - 2011

Employment

Post-doc Researcher at Stanford University Hosted by Percy Liang and Moses Charikar	2016 - Now
Intern at Baidu Project: burst detection in web search	Winter, 2015
Intern at Microsoft Research Redmond Project: convex optimization	Summer, 2014
Intern at Google Mountain View Project: personalized recommender systems	Summer, 2013
Intern at Microsoft Research Asia Project: click modeling for web search and online advertising	2010 - 2011

Selected Awards & Honors

2017	Best Paper Award, Conference on Learning Theory (COLT).
2016	Outstanding Reviewer Award, International Conference on Machine Learning (ICML).
2015	Baidu Fellowship (awards 8 PhD students every year worldwide).
2013	Microsoft Research PhD Fellowship Finalist.
2011	Outstanding Undergraduate Dissertation Award, Tsinghua University.
2006	Silver Medal in Asian Physics Olympiad.
2006	Gold Medal in Chinese Physics Olympiad (5 th among 400,000 participants).

Research Projects

My research interest lies in the generic field of *artificial intelligence*. My past projects span machine learning, natural language processing and statistical methods. They consist of novel algorithms, fundamental theory and practical software. Below is a list of my research projects (with publication references):

Natural language processing

- Semantic parsing for question answering systems [C1].
 - Efficient algorithm for parsing natural language into executable logical forms.
 - 11x-16x faster and 13% more accurate than the state-of-the-art parser.

Machine learning and optimization

- Deep learning and non-convex optimization [C2,C3,C4,C5,C6].
 - Algorithms for non-convex optimization (with applications to deep learning).
 - Stronger theoretical guarantee and improved empirical performance on DNN/CNN/LSTM.
- Convex optimization [J1,C9].
 - Algorithm for convex optimization.
 - Superior efficiency: orders-of-magnitude faster than SGD in theory and in practice.
- Crowdsourcing [J4,C10].
 - Algorithm for estimating the true labels from noisy crowdsourced data.
 - First algorithm to achieve the best possible statistical rate.
- Personalized recommender systems [C12].
 - Non-parametric model for modeling very sparse user-item relations.
 - Improved the quality of online-shopping recommendation.
- Web search and online advertising [C16,C17,C18,C19,C20,C21].
 - Data mining from massive search & ads click logs.
 - Improved Microsoft Bing’s ranking quality (NDCG metric) by $\sim 1\%$.

Distributed computing

- Distributed algorithms for machine learning [J5,J6,C7,C8,C14,C15].
 - Communication-efficient algorithms for distributed machine learning on large clusters.
 - Optimal guarantee: best possible accuracy, least possible computation and communication.
- Fundamental theory of distributed computing [C11,C13,M2].
 - Understanding the fundamental trade-offs between communication, computation and statistical accuracy on any distributed system.
- Programming interface for parallelizing stochastic algorithms [M1].
 - A user-friendly framework for implementing parallel online algorithms on Spark.
 - Open source project: received 80+ Github stars.

Other projects

- Theoretical statistics [J2,J3].
- Theoretical computer science [J7,C22].

Manuscripts

- [M1] **Y. Zhang** and MI. Jordan. Splash: User-friendly Programming Interface for Parallelizing Stochastic Algorithms. *arXiv:1506.07552*, 2015.
- [M2] J. Duchi, MI. Jordan, M. Wainwright and **Y. Zhang** (alpha-beta order). Optimality Guarantees for Distributed Statistical Estimation. *arXiv:1405.0782*, 2014.

Journal Publications

- [J1] **Y. Zhang** and L. Xiao. Stochastic Primal-Dual Coordinate Method for Regularized Empirical Risk Minimization. *Journal of Machine Learning Research*.

- [J2] **Y. Zhang**, M. Wainwright and M.I. Jordan. Optimal prediction for sparse linear models? Lower bounds for coordinate-separable M-estimators. *Electronic Journal of Statistics*.
- [J3] X. Chen, A. Guntuboyina and **Y. Zhang** (alpha-beta order). On Bayes Risk Lower Bounds. *Journal of Machine Learning Research*.
- [J4] **Y. Zhang**, X. Chen, D. Zhou and M.I. Jordan. Spectral Methods meet EM: A Provably Optimal Algorithm for Crowdsourcing. *Journal of Machine Learning Research*.
- [J5] **Y. Zhang**, J. Duchi and M. Wainwright. Divide and Conquer Kernel Ridge Regression: A Distributed Algorithm with Minimax Optimal Rates. *Journal of Machine Learning Research*.
- [J6] **Y. Zhang**, J. Duchi and M. Wainwright. Communication-Efficient Algorithms for Statistical Optimization. *Journal of Machine Learning Research*.
- [J7] **Y. Zhang** and X. Sun. The Antimagicalness of the Cartesian Product of Graphs. *Theoretical Computer Science*.

Conference Publications

- [C1] **Y. Zhang**, P. Pasupat, P. Liang. Macro Grammars and Holistic Triggering for Efficient Semantic Parsing. *Empirical Methods on Natural Language Processing (EMNLP)*, 2017.
- [C2] **Y. Zhang**, P. Liang, M. Wainwright. Convexified Convolutional Neural Networks. *International Conference on Machine Learning (ICML)*, 2017.
- [C3] **Y. Zhang**, P. Liang, M. Charikar. A Hitting Time Analysis of Stochastic Gradient Langevin Dynamics. *Conference on Learning Theory (COLT)*, 2017 (**Best paper award**).
- [C4] **Y. Zhang**, J.D. Lee, M. Wainwright and M.I. Jordan. On the Learnability of Fully-connected Neural Networks. *Artificial Intelligence and Statistics (AISTATS)*, 2017.
- [C5] C. Jin, **Y. Zhang**, S. Balakrishnan, M. Wainwright, M.I. Jordan. Local Maxima in the Likelihood of Gaussian Mixture Models: Structural Results and Algorithmic Consequences. *Neural Information Processing Systems (NIPS)*, 2016.
- [C6] **Y. Zhang**, J.D. Lee, M.I. Jordan. ℓ_1 -regularized Neural Networks are Improperly Learnable in Polynomial Time. *International Conference on Machine Learning (ICML)*, 2016.
- [C7] **Y. Zhang**, M. Wainwright and M.I. Jordan. Distributed Estimation of Generalized Matrix Rank: Efficient Algorithms and Lower Bounds. *International Conference on Machine Learning (ICML)*, 2015.
- [C8] **Y. Zhang** and L. Xiao. DiSCO: Communication-Efficient Distributed Optimization of Self-Concordant Loss. *International Conference on Machine Learning (ICML)*, 2015.
- [C9] **Y. Zhang** and L. Xiao. Stochastic Primal-Dual Coordinate Method for Regularized Empirical Risk Minimization. *International Conference on Machine Learning (ICML)*, 2015.
- [C10] **Y. Zhang**, X. Chen, D. Zhou and M.I. Jordan. Spectral Methods meet EM: A Provably Optimal Algorithm for Crowdsourcing. *Neural Information Processing Systems (NIPS)*, 2014. (**Spotlight presentation, 4.8% acceptance rate**)
- [C11] **Y. Zhang**, M. Wainwright and M.I. Jordan. Lower Bounds on the Performance of Polynomial-time Algorithms for Sparse Linear Regression. *Conference on Learning Theory (COLT)*, 2014.
- [C12] **Y. Zhang**, A. Ahmed, V. Josifovski and A. Smola. Taxonomy Discovery for Personalized Recommendation. *ACM International Conference on Web Search and Data Mining (WSDM)*, 2014.
- [C13] **Y. Zhang**, J. Duchi, M. Wainwright and M.I. Jordan. Information-theoretic Lower Bounds for Distributed Statistical Estimation with Communication Constraints. *Neural Information Processing Systems (NIPS)*, 2013. (**Oral presentation, 1.4% acceptance rate**)

- [C14] **Y. Zhang**, J. Duchi and M. Wainwright. Divide and Conquer Kernel Ridge Regression. *Conference on Learning Theory (COLT)*, 2013.
- [C15] **Y. Zhang**, J. Duchi and M. Wainwright. Communication-Efficient Algorithms for Statistical Optimization. *Neural Information Processing Systems (NIPS)*, 2012.
- [C16] W. Chen, D. Wang, **Y. Zhang** and Q. Yang. Understanding Click Noise: A Noise-aware Click Model for Web Search. *ACM International Conference on Web Search and Data Mining (WSDM)*, 2012.
- [C17] **Y. Zhang**, W. Chen and D. Wang, Q. Yang. User-click Modeling for Understanding and Predicting Search-behavior. *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2011.
- [C18] B. Hu, **Y. Zhang**, G. Wang, Q. Yang, W. Chen. Characterize Search Intent Diversity into Click Models. *International World Wide Web Conference (WWW)*, 2011.
- [C19] **Y. Zhang**, D. Wang, G. Wang, W. Chen, Z. Zhang, B. Hu and L. Zhang. Learning Click Model via Probit Bayesian Inference. *ACM International Conference on Information and Knowledge Management (CIKM)*, 2010.
- [C20] D. Wang, W. Chen, G. Wang, **Y. Zhang** and B. Hu. Explore Click Models for Search Ranking. *ACM International Conference on Information and Knowledge Management (CIKM)*, short paper, 2010.
- [C21] F. Zhong, D. Wang, G. Wang, W. Chen, **Y. Zhang**, Z. Chen and H. Wang. Incorporating Post-Click Behaviors Into a Click Model. *Annual International ACM SIGIR Conference (SIGIR)*, 2010.
- [C22] **Y. Zhang** and L. Zhang. Extracting Independent Rules: a New Perspective of Boosting. *International Symposium on Artificial Intelligence and Mathematics (ISAIM)*, 2010.

Teaching

Graduate Student Instructor, Introduction to machine learning, UC Berkeley **Spring, 2015**
 Graduate Student Instructor, Randomized algorithms for matrices and data, UC Berkeley **Fall, 2013**

Service

Journal Reviewer: Journal of Machine Learning Research, Annals of Statistics, Mathematical Programming, ACM Transactions on the Web.

Conference Reviewer: ICML (2013 -), NIPS (2013 -), AISTAT (2015 -), IJCAI (2015 -).

Programming

Capable of Python, C/C++, C#, Java, Scala, MATLAB.

References

Michael I. Jordan

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Martin J. Wainwright

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