

# Hongyang Ryan Zhang

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<b>Current Position</b>	Assistant Professor of Computer Science Khoury College of Computer Sciences <b>Northeastern University</b>	Since August 2020  Boston
<b>Education</b>	Ph.D. in Computer Science <b>Stanford University</b>	September 2013 — September 2019 Stanford  PhD thesis: <i>Algorithms and Generalization for Large-Scale Matrices and Tensors</i> . Advised by Ashish Goel and Gregory Valiant.
	B.Eng. in Computer Science <b>Shanghai Jiao Tong University</b>	September 2008 — June 2012 Shanghai, China  Undergraduate thesis on <i>algorithmic game theory</i> . Advised by Ning Chen, Xiaotie Deng, and Pinyan Lu. Part of the ACM Honored class advised by Yong Yu.
<b>Research Interests</b>	<i>Machine learning, in particular deep learning</i> <ul style="list-style-type: none"><li>• Weak supervision: Learning from limited labeled data such as data augmentation and multi-task learning.</li><li>• Neural networks and its theory: Generalization in over-parametrized models, convergence theory of gradient descent in neural networks.</li></ul> <i>Network analysis</i> <ul style="list-style-type: none"><li>• Algorithms for large-scale social networks such as shortest path and PageRank.</li><li>• Network modeling for diffusion dynamics.</li></ul> <i>Machine learning for healthcare</i>	
<b>Previous Employment</b>	Postdoctoral Researcher Department of Statistics, The Wharton School <b>University of Pennsylvania</b>	October 2019 — July 2020  Philadelphia
	Software Engineering Intern <b>Google</b>	June 2018 - September 2018 Mountain View
	Software Engineering Intern <b>Twitter</b>	June 2014 - September 2014 San Francisco
	Project Officer with Ning Chen <b>Nanyang Technological University</b>	August 2012 - July 2013 Singapore
<b>Awards &amp; Fellowships</b>	Best Paper Award at Conference on Learning Theory, 2018  School of Engineering Fellowship, Stanford University, 2013 - 2014  Silver Medal in Chinese Mathematics Olympiad, 2008	

## Publications

## Refereed Conference Papers

(asterisk indicates alphabetical authorship or equal contribution)

- *Learning Over-Parametrized Two-Layer ReLU Neural Networks beyond NTK*  
Yuanzhi Li, Tengyu Ma and *Hongyang R. Zhang*<sup>\*</sup>  
Conference on Learning Theory (**COLT**), 2020
- *On the Generalization Effects of Linear Transformations in Data Augmentation*  
Sen Wu<sup>\*</sup>, *Hongyang R. Zhang*<sup>\*</sup>, Gregory Valiant and Christopher Ré  
International Conference on Machine Learning (**ICML**), 2020
- *Understanding and Improving Information Transfer in Multi-Task Learning*  
Sen Wu<sup>\*</sup>, *Hongyang R. Zhang*<sup>\*</sup> and Christopher Ré  
International Conference on Learning Representations (**ICLR**), 2020
- *Pruning based Distance Sketches with Provable Guarantees on Random Graphs*  
*Hongyang R. Zhang*, Huacheng Yu and Ashish Goel  
The Web Conference (**WWW**), 2019. *Oral presentation*
- *Recovery Guarantees for Quadratic Tensors with Limited Observations*  
*Hongyang R. Zhang*, Vatsal Sharan, Moses Charikar and Yingyu Liang  
International Conference on AI and Statistics (**AISTATS**), 2019
- *Algorithmic Regularization in Over-parameterized Matrix Sensing and Neural Networks with Quadratic Activations*  
Yuanzhi Li, Tengyu Ma and *Hongyang R. Zhang*<sup>\*</sup>  
Conference on Learning Theory (**COLT**), 2018. **Best Paper Award**
- *Approximate Personalized PageRank on Dynamic Graphs*  
*Hongyang R. Zhang*, Peter Lofgren and Ashish Goel  
International Conference on Knowledge Discovery and Data Mining (**KDD**), 2016. *Oral presentation*
- *Incentives for Strategic Behavior in Fisher Market Games*  
Ning Chen, Xiaotie Deng, Bo Tang, *Hongyang R. Zhang*<sup>\*</sup>  
The Thirtieth Conference on Artificial Intelligence (**AAAI**), 2016
- *A Note on Modeling Retweet Cascades on Twitter*  
Ashish Goel, Kamesh Munagala, Aneesh Sharma, *Hongyang R. Zhang*<sup>\*</sup>  
International Workshop on Algorithms and Models for the Web Graph (**WAW**), 2015
- *Connectivity in Random Forests and Credit Networks*  
Ashish Goel, Sanjeev Khanna, Sharath Raghvendra and *Hongyang R. Zhang*<sup>\*</sup>  
ACM-SIAM Symposium on Discrete Algorithms (**SODA**), 2015
- *Computing the Nucleolus of Matching, Cover and Clique Games*  
Ning Chen, Pinyan Lu and *Hongyang R. Zhang*<sup>\*</sup>  
The Twenty-Sixth Conference on Artificial Intelligence (**AAAI**), 2012. *Oral presentation*
- *Incentive Ratios of Fisher Markets*  
Ning Chen, Xiaotie Deng, *Hongyang R. Zhang*<sup>\*</sup> and Jie Zhang  
International Colloquium on Automata, Languages and Programming (**ICALP**), 2012

- *On Strategy-proof Allocation without Payments or Priors*  
Li Han, Chunzhi Su, Linpeng Tang and *Hongyang R. Zhang*<sup>\*</sup>  
Workshop on Internet and Economics (**WINE**), 2011

### Manuscripts In Submission

- *Revisiting the Bias-Variance Tradeoff of Multi-Task Learning in High Dimensions*  
*Hongyang R. Zhang*<sup>\*</sup>, Fan Yang<sup>\*</sup>, Sen Wu, Weijie Su, Christopher Ré  
Manuscript, 2020

### Workshop Papers and Technical Reports

- *Balancing Fairness and Efficiency in Resource Allocation*  
Ning Chen, Xiaohui Bei and *Hongyang R. Zhang*<sup>\*</sup>  
Unpublished manuscript, 2014
- *Fixed-parameter tractability of almost CSP problem with decisive relations*  
Chihao Zhang and *Hongyang R. Zhang*<sup>\*</sup>  
International Frontiers of Algorithms Workshop (**FAW**), 2012

### Teaching Experience

*Algorithmic and Statistical Frontiers in Deep Learning*, Northeastern University, Fall 2020

### Professional Services

Conference reviewing for NeurIPS'19-20, ICML'19, ICLR'19-21, AAAI'19-20, ITCS, STOC, FOCS, SODA, WINE, ICALP.

Journal reviewing for *Algorithmica*, *ToMPECS*.

Organizer for Stanford TheoryCS lunch meeting, 2017 - 2018.

### Invited Talks

*Better Algorithms and Generalization for Large-Scale Data*

\* Tsinghua Institute for Interdisciplinary Information Sciences, Peking University, Hong Kong University of Science and Technology, Chinese University of Hong Kong, Northeastern University, Rensselaer Polytechnic Institute, Google Research, Salesforce Research

*Recovery Guarantees for Quadratic Tensors with Limited Observations*

\* ML lunch and Theory lunch at Stanford

*Algorithmic Regularization in Over-parameterized Models*

\* COLT'18, Stockholm, Sweden

\* Theory lunch, ML lunch, Deep Learning reading group at Stanford

\* Theory reading group, UCSC, Google MTV

\* Applied Math and Stats Youth Forum, Peking University, Dec 2018

*Pruning based Distance Sketches with Provable Guarantees on Random Graphs*

\* Theory lunch, Stanford

*Approximate Personalized PageRank on Dynamic Graphs*

- \* KDD'16, San Francisco, USA
- \* Social Algorithms group, Stanford

*Connectivity in Random Forests and Credit Networks*

- \* SODA'15, San Diego, USA
- \* Theory Lunch, Stanford

*Computing the Nucleolus of Matching, Cover and Clique Games*

- \* AAAI'12, Toronto, Canada

*On Strategy-proof Allocation without Payments or Priors*

- \* WINE'11, Singapore

**Programming Skills**      Competent in Matlab, Python, Scala, TensorFlow, PyTorch; Prior experiences in C++, Java, SQL.

**Reference letters**    Available upon request.