

# 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 September 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>Statistical machine learning</i> <ul style="list-style-type: none"><li>• Learning from limited amounts of data, including multi-task and transfer learning, data augmentation, and self-supervised learning such as contrastive learning.</li><li>• Deep learning theory, including implicit regularization, and generalization theory more broadly.</li></ul> <i>Algorithms</i> <ul style="list-style-type: none"><li>• Network analysis: Network intervention algorithms using diffusion models.</li><li>• Fairness and bias in algorithms, in particular ML algorithms.</li></ul>	
<b>Previous Employment</b>	Postdoctoral Researcher Department of Statistics, The Wharton School <b>University of Pennsylvania</b>	October 2019 — July 2020  Philadelphia
<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	
<b>Publications</b>	<b>Refereed Conference Papers</b>  (asterisk indicates alphabetical authorship or equal contribution)	

- *Improving Regularization and Robustness for Fine-tuning in Neural Networks*  
Dongyue Li and *Hongyang R. Zhang*  
Neural Information Processing Systems (**NeurIPS**), 2021.
- *Observational Supervision for Medical Image Classification using Gaze Data*  
Khaled Sabb, Sarah Hooper, Nimit Sohoni, Jupinder Parmar, Brian Pogatchnik, Sen Wu, Jared Dunnmon, *Hongyang R. Zhang*, Daniel Rubin, and Christopher Ré  
International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2021.
- *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, and *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, and *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*\*  
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*\*  
The Twenty-Sixth Conference on Artificial Intelligence (**AAAI**), 2012. *Oral presentation.*
- *Incentive Ratios of Fisher Markets*  
Ning Chen, Xiaotie Deng, *Hongyang R. Zhang*\*, 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*\*  
Workshop on Internet and Economics (**WINE**), 2011.

### Manuscripts Under Submission

- *Analysis of Information Transfer from Heterogeneous Sources via Precise High-dimensional Asymptotics*  
Fan Yang, *Hongyang R. Zhang*, Sen Wu, Weijie Su, Christopher Ré  
<https://arxiv.org/abs/2010.11750>, 2021
- *Correct-N-Contrast: A Contrastive Approach for Improving Robustness to Spurious Correlations*  
Michael Zhang, Nimit Sohoni, *Hongyang R. Zhang*, Chelsea Finn, and Christopher Ré  
ICML Workshop on Uncertainty & Robustness in Deep Learning (ICML UDL), 2021
- *Incentive Ratio: A Game Theoretical Analysis of Market Equilibria?*  
Ning Chen, Xiaotie Deng, Bo Tang, *Hongyang R. Zhang*, and Jie Zhang  
Under submission, 2021

### Workshop Papers and Technical Reports

- *Fixed-parameter tractability of almost CSP problem with decisive relations*  
Chihao Zhang and *Hongyang R. Zhang*\*  
International Frontiers of Algorithms Workshop (**FAW**), 2012

### Teaching Experience

*Supervised Machine Learning and Learning Theory*, Northeastern University, Fall 2021.

*Advanced Machine Learning*, Northeastern University, Spring 2020. Teaching evaluation: 4.5.

*Algorithmic and Statistical Aspects of Deep Learning*, Northeastern University, Fall

2020. Teaching evaluation: 3.8.

## Students

### PhD Advising

Dongyue Li (since Fall 2021)

### Master's Students

Haotian Ju (since Spring 2021)

Virender Singh (since Fall 2021)

## Grants

Northeastern University Khoury Seed Grant/Proof of Concept Program, 2021. *Fairness and Inductive Bias of Machine Learning Algorithms across Disparate Populations*. Award amount: \$25,000. Co-PI: Huy Nguyen.

## Professional Services

Top 10% of high-scoring reviewers, NeurIPS'20.

Conference reviewing for NeurIPS (2019-2021), ICML (2019,2021), ICLR (2019-2022), AAAI (2019-2021), AISTATS (2021-2022), CVPR (2021), ITCS, STOC, FOCS, SODA, WINE, ICALP.

Journal reviewing for Algorithmica, TomPECS, IEEE Transactions on Information Theory.

## Selected Invited Talks

*Learning from Multiple Weakly-supervised Data: Theory and Algorithms*

\* Worcester Polytechnic Institute, October 2021

*Generalization Effects of Linear Transformations in Data Augmentation*

\* Northeastern University Data Lab, July 2020

\* Workshop on Equivariance and Data Augmentation, University of Pennsylvania, September 2020

*Information Transfer in Multi-task Learning*

\* ML + X Seminar, Brown University, December 2020.

*Better Algorithms and Generalization for Large-Scale Data*

\* Tsinghua University. Dec 2018

\* Hong Kong University of Science and Technology. Feb 2019

\* Chinese University of Hong Kong. Feb 2019

\* Google Research. March 2019

\* Northeastern University. March 2019

\* Peking University. April 2019

\* Rensselaer Polytechnic Institute. April 2019

\* Salesforce Research. April 2019

*Algorithmic Regularization in Over-parameterized Models*

- \* Conference on Learning Theory. July 2018
- \* UC Santa Cruz. July 2018
- \* Google Research. July 2018
- \* Peking University. Dec 2018

**Selected  
Conference  
Presentations**

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

- \* WWW'19, San Francisco

*Approximate Personalized PageRank on Dynamic Graphs*

- \* KDD'16, San Francisco

**Programming  
Skills**

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

**Reference letters**

Available upon request.

Last update: September 29, 2021