

Hongyang (Ryan) Zhang

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Education Ph.D. in Computer Science September 2013 — September 2019
Stanford University Stanford
Thesis: *Algorithms and Generalization for Large-Scale Matrices and Tensors*
Committee: Ashish Goel, Gregory Valiant, Tengyu Ma, Moses Charikar, Andrea Montanari

B.Eng. in Computer Science September 2008 — June 2012
Shanghai Jiao Tong University Shanghai

Employment Assistant Professor September 2020 — Present
Khoury College of Computer Sciences
Northeastern University Boston

Previous Employment Postdoctoral Researcher at Department of Statistics and Data Science, University of Pennsylvania, October 2019 — July 2020

Software Engineering Intern at Google, June 2018 - September 2018

Software Engineering Intern at Twitter, June 2014 - September 2014

Research Assistant at School of Physical and Mathematical Sciences, Nanyang Technological University, August 2012 - July 2013

**Recognition/
Fellowship** Featured Certification, Transactions on Machine Learning Research, 2023

New Faculty Highlights, Association for the Advancement of Artificial Intelligence, 2023

Best Paper Award, Annual Conference on Learning Theory, 2018

School of Engineering Fellowship, Stanford University, 2013

Research **Interests:** Machine learning (theory and methods), algorithmic foundations, and graphs (e.g., social and transportation networks).

Preprints¹

1. **Precise High-Dimensional Asymptotics for Quantifying Heterogeneous Transfers**, F. Yang, H. R. Zhang, S. Wu, C. Ré, and W. Su, last version Aug 2023
2. **Noise Stability Optimization for Flat Minima with Tight Rates**, H. Ju[†], D. Li[†], and H. R. Zhang, presented at NeurIPS Workshop on Optimization 2023

Publications

¹* indicates alphabetical authorship or equal contribution. [†] indicates that the student is advised by me during the project. See also DBLP for bibliographic information.

3. **Graph Neural Networks for Road Safety Modeling: Datasets and Evaluations for Accident Analysis**, A. Nippani[†], D. Li[†], H. Ju[†], H. N. Koutsopoulos, H. R. Zhang, NeurIPS '23 Data
4. **Improved Group Robustness via Classifier Retraining on Independent Splits**, T. H. Nguyen, H. R. Zhang, and H. L. Nguyen, TMLR '23
5. **Boosting Multitask Learning on Graphs through Higher-Order Task Affinities**, D. Li[†], H. Ju[†], A. Sharma, and H. R. Zhang, KDD '23
6. **Identification of Negative Transfers in Multitask Learning Using Surrogate Models**, D. Li[†], H. L. Nguyen, and H. R. Zhang, TMLR '23, *featured certification*
7. **Generalization in Graph Neural Networks: Improved PAC-Bayesian Bounds on Graph Diffusion**, H. Ju[†], D. Li[†], A. Sharma, and H. R. Zhang, AISTATS' 23
8. **Optimal Intervention on Weighted Networks via Edge Centrality**, D. Li[†], T. Eliassi-Rad, and H. R. Zhang, SDM' 23
9. **Robust Fine-Tuning of Deep Neural Networks with Hessian-based Generalization Guarantees**, H. Ju[†], D. Li[†], H. R. Zhang, ICML' 22
10. **Correct-N-Contrast: A Contrastive Approach for Improving Robustness to Spurious Correlations**, M. Zhang, N. Sohoni, H. R. Zhang, C. Finn, and C. Ré, ICML '22, *long presentation*
11. **Incentive Ratio: A Game Theoretical Analysis of Market Equilibria**, N. Chen, X. Deng, B. Tang, H. R. Zhang*, and J. Zhang, Information and Computation '22
12. **Improving Regularization and Robustness for Fine-tuning in Neural Networks**, D. Li[†] and H. R. Zhang, NeurIPS '21
13. **Observational Supervision for Medical Image Classification using Gaze Data**, K. Sabb, S. Hooper, N. Sohoni, J. Parmar, B. Pogatchnik, S. Wu, J. Dunnmon, H. R. Zhang, D. Rubin, and C. Ré, MICCAI '21
14. **Learning Over-Parametrized Two-Layer ReLU Neural Networks beyond NTK**, Y. Li, T. Ma, and H. R. Zhang*, COLT '20
15. **On the Generalization Effects of Linear Transformations in Data Augmentation**, S. Wu*, H. R. Zhang*, G. Valiant, and C. Ré, ICML '20
16. **Understanding and Improving Information Transfer in Multi-Task Learning**, S. Wu*, H. R. Zhang*, and C. Ré, ICLR '20
17. **Pruning based Distance Sketches with Provable Guarantees on Random Graphs**, H. Zhang, H. Yu, and A. Goel, WWW '19, *oral presentation*
18. **Recovery Guarantees for Quadratic Tensors with Sparse Observations**, H. Zhang, V. Sharan, M. Charikar, and Y. Liang, AISTATS '19
19. **Algorithmic Regularization in Over-parameterized Matrix Sensing and Neural Networks with Quadratic Activations**, Y. Li, T. Ma, and H. Zhang*, COLT '18, *best paper award*
20. **Approximate Personalized PageRank on Dynamic Graphs**, H. Zhang, P. Lofgren, and A. Goel, KDD' 16

21. **Incentives for Strategic Behavior in Fisher Market Games**, N. Chen, X. Deng, B. Tang, and H. Zhang^{*}, AAAI' 16
22. **A Note on Modeling Retweet Cascades on Twitter**, A. Goel, K. Munagala, A. Sharma, and H. Zhang^{*}, WAW' 15
23. **Connectivity in Random Forests and Credit Networks**, A. Goel, S. Khanna, S. Raghvendra, and H. Zhang^{*}, SODA '15
24. **Computing the Nucleolus of Matching, Cover and Clique Games**, N. Chen, P. Lu, and H. Zhang^{*}, AAAI '12, *oral presentation*
25. **Incentive Ratios of Fisher Markets**, N. Chen, X. Deng, H. Zhang^{*}, and J. Zhang, ICALP '12
26. **Fixed-parameter tractability of almost CSP problem with decisive relations**, C. Zhang and H. Zhang^{*}, FAW-AAIM '12
27. **On Strategy-proof Allocation without Payments or Priors**, L. Han, C. Su, L. Tang, and H. Zhang^{*}, WINE '11

Workshops

1. **Approximate Clustering for Extracting Task Relationships in Multi-Instruction Tuning**, D. Li[†], J. Yu[†], and H. R. Zhang, NeurIPS Workshop on Instruction Following and Instruction Tuning 2023

Advising

Ph.D. Students

Dongyue Li	2021
Haotian Ju	2024

Postdoctoral Researcher

Mahdi Haghifam (jointly mentored with Jonathan Ullman)	2023
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Master's Students

Abhinav Nippani	2023
Debankita Basu	2023

Undergraduate Students

Kailai Chen	2023
Yangnan Lin	2023
Allen Ye	2023

Graduates (All levels)

Virender Singh, MS in CS, Data Scientist at Salesforce	2021
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Minghao Liu, MS in CS, SDE at Palantir	2022
Shreya Singh, MS in CS, Data Scientist at Credit One Bank	2023
Jack Wilkins, Undergraduate in CS, joined Northeastern's CS Ph.D. program	2023
Jinhong Yu, MS in AI	2023
Ph.D. Thesis Committee (for students who are not advised by me)	
Chengzhi Shi, advised by Stratis Ioannidis Committee: Stratis Ioannidis, Jennifer Dy, and Hongyang Zhang	2023
Akshar Varma, advised by Ravi Sundaram Committee: Ravi Sundaram, Olin Shivers, and Hongyang Zhang	2023
Lydia Zakynthinou, advised by Huy Nguyen and Jon Ullman Committee: Huy Nguyen, Jon Ullman, Hongyang Zhang, and Adam Smith	2023
Leo Torres, advised by Tina Eliassi-Rad Committee: Tina Eliassi-Rad, Dima Krioukov, Hongyang Zhang, and Cris Moore	2021
Tim LaRock, advised by Tina Eliassi-Rad Committee: Tina Eliassi-Rad, Samuel Scarpino, Hongyang Zhang, and Ingo Scholtes	2021

- Activities**
- Departmental Service: Ph.D. Admissions Committee 2020 - 2023, Ph.D. Curriculum Committee 2023-2024
 - Conference Organization: INFORMS Session Chair 2023
 - Community Service
 - Program committee/Reviewer: COLT 2024; NeurIPS 2019 - 2023 (Top 10% of high-scoring reviewers at NeurIPS 2020); ICML 2019 - 2023; ICLR 2019 - 2023; KDD 2022 - 2023; AAAI 2019, 2021, 2023; AISTATS 2021 - 2022; WSDM 2023, 2024; WWW 2022.
 - Senior program committee: AISTATS 2023/2024, ALT 2024.
 - Conference reviewer: STOC, FOCS, SODA, ITCS, WINE, ICALP, CVPR.
 - Journal reviewer:
 - * Algorithmica
 - * ACM Transactions on Modeling and Performance Evaluation of Computing Systems
 - * IEEE Transactions on Information Theory
 - * Journal of Machine Learning Research
 - * Transactions on Machine Learning Research
 - Proposal reviewer and panelist
 - * NSF Information and Intelligent Systems 2022
 - * NSF Reviewer and Panelist 2024

Presentations

- *Algorithms and Their Generalization Performance for Deep Networks*. MIT, May 2023
- *Generalization in Neural Networks: Recent Trend and Future Outlook*. Yale University, March 2023

- *Information Transfer in Multitask Learning, Data Augmentation, and Beyond*. New Faculty Highlight talk at AAAI, February 2023
- *Information Transfer from Heterogeneous Sources via High-dimensional Asymptotics*. INFORMS annual meeting, October 2022
- *Mining social, mobility networks: A random walk*. Network Science Institute, Northeastern, April 2022
- *Understanding and improving generalization in multitask and transfer learning: One World Seminar Series on the Mathematics of Machine Learning*, May 2022; Northeastern University CS Theory Lunch Seminar, March 2022
- *Robust and Generalizable Algorithms for Learning from Multiple Datasets*: Shanghai Jiao Tong University, October 2021; Worcester Polytechnic Institute, November 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
- *Pruning based Distance Sketches with Provable Guarantees on Random Graphs*. The Web Conference, San Francisco, May 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
- *Approximate Personalized PageRank on Dynamic Graphs*: KDD'16, San Francisco, August 2016

Last update: January 1, 2024