

# Hongyang Ryan Zhang

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## Education

- 2019 *Ph.D. in Computer Science*, Stanford University, Stanford, CA, U.S.  
Advisors: Ashish Goel and Gregory Valiant  
Research internship at Twitter (2014) and Google (2018)
- 2012 *B.Eng. in Computer Science*, Shanghai Jiao Tong University, Shanghai, China  
Visited Nanyang Technological University during Sep 2011 - Feb 2012

## Professional Experiences

- 2020- Assistant Professor, Khoury College of Computer Sciences, Northeastern University, Boston, MA
- 2019-2020 Postdoc, Department of Statistics and Data Science, University of Pennsylvania, Philadelphia, PA
- 2012-2013 Project Officer, School of Physical and Mathematical Sciences, Nanyang Technological University, Singapore

## Publications<sup>123</sup>

### Journal Publications

**Noise Stability Optimization for Finding Flat Minima: A Hessian-based Regularization Approach**, by H. R. Zhang, D. Li<sup>†</sup>, and H. Ju<sup>†</sup>, in *Transactions on Machine Learning Research* 2024

**Learning Tree-Structured Composition of Data Augmentation**, by D. Li<sup>†</sup>, K. Chen<sup>†</sup>, P. Radivojac, and H. R. Zhang, in *Transactions on Machine Learning Research* 2024

**Improved Group Robustness via Classifier Retraining on Independent Splits**, by T. H. Nguyen, H. R. Zhang, and H. L. Nguyen, in *Transactions on Machine Learning Research* 2023

**Identification of Negative Transfers in Multitask Learning Using Surrogate Models**, by D. Li<sup>†</sup>, H. L. Nguyen, and H. R. Zhang, in *Transactions on Machine Learning Research* 2023, *featured certification*

**Incentive Ratio: A Game Theoretical Analysis of Market Equilibria**, by N. Chen<sup>\*</sup>, X. Deng<sup>\*</sup>, B. Tang<sup>\*</sup>, H. R. Zhang<sup>\*</sup>, and J. Zhang<sup>\*</sup>, in *Information and Computation* 2022

<sup>1\*</sup> indicates alphabetical authorship or equal contribution

<sup>2†</sup> indicates that the student is advised by me during the project

<sup>3</sup>See also Google Scholar for further information

## Conference Publications

**Scalable Fine-tuning From Multiple Data Sources: A First-order Approximation Approach**, by D. Li<sup>†</sup>, Z. Zhang<sup>†</sup>, L. Wang, and H. R. Zhang, in *Findings of Empirical Methods in Natural Language Processing 2024 (EMNLP)*

**Scalable Multitask Learning Using Gradient-based Estimation of Task Affinity**, by D. Li<sup>†</sup>, A. Sharma, and H. R. Zhang, in *Proceedings of KDD 2024 (Research Track)*

**Graph Neural Networks for Road Safety Modeling: Datasets and Evaluations for Accident Analysis**, by A. Nippani<sup>†</sup>, D. Li<sup>†</sup>, H. Ju<sup>†</sup>, H. N. Koutsopoulos, and H. R. Zhang, in *Proceedings of NeurIPS 2023 (Datasets & Benchmarks Track)*

**Boosting Multitask Learning on Graphs through Higher-Order Task Affinities**, by D. Li<sup>†</sup>, H. Ju<sup>†</sup>, A. Sharma, and H. R. Zhang, in *Proceedings of KDD 2023 (Research Track)*

**Generalization in Graph Neural Networks: Improved PAC-Bayesian Bounds on Graph Diffusion**, by H. Ju<sup>†</sup>, D. Li<sup>†</sup>, A. Sharma, and H. R. Zhang, in *Proceedings of AISTATS 2023*

**Optimal Intervention on Weighted Networks via Edge Centrality**, by D. Li<sup>†</sup>, T. Eliassi-Rad, and H. R. Zhang, in *Proceedings of SDM 2023*

**Robust Fine-Tuning of Deep Neural Networks with Hessian-based Generalization Guarantees**, by H. Ju<sup>†</sup>, D. Li<sup>†</sup>, and H. R. Zhang, in *Proceedings of ICML 2022*

**Correct-N-Contrast: A Contrastive Approach for Improving Robustness to Spurious Correlations**, by M. Zhang, N. Sohoni, H. R. Zhang, C. Finn, and C. Ré, in *Proceedings of ICML 2022, long presentation*

**Improving Regularization and Robustness for Fine-tuning in Neural Networks**, by D. Li<sup>†</sup> and H. R. Zhang, in *Proceedings of NeurIPS 2021*

**Observational Supervision for Medical Image Classification using Gaze Data**, by K. Sabb, S. Hooper, N. Sohoni, J. Parmar, B. Pogatchnik, S. Wu, J. Dunnmon, H. R. Zhang, D. Rubin, and C. Ré, in *Proceedings of MICCAI 2021*

**Learning Over-Parametrized Two-Layer ReLU Neural Networks beyond NTK**, by Y. Li<sup>\*</sup>, T. Ma<sup>\*</sup>, and H. R. Zhang<sup>\*</sup>, in *Proceedings of COLT 2020*

**On the Generalization Effects of Linear Transformations in Data Augmentation**, by S. Wu<sup>\*</sup>, H. R. Zhang<sup>\*</sup>, G. Valiant, and C. Ré, in *Proceedings of ICML 2020*

**Understanding and Improving Information Transfer in Multi-Task Learning**, by S. Wu<sup>\*</sup>, H. R. Zhang<sup>\*</sup>, and C. Ré, in *Proceedings of ICLR 2020*

**Pruning based Distance Sketches with Provable Guarantees on Random Graphs**, by H. Zhang, H. Yu, and A. Goel, in *Proceedings of WWW 2019, oral presentation*

**Recovery Guarantees for Quadratic Tensors with Sparse Observations**, by H. Zhang, V. Sharan, M. Charikar, and Y. Liang, in *Proceedings of AISTATS 2019*

**Algorithmic Regularization in Over-parameterized Matrix Sensing and Neural Networks with Quadratic Activations**, by Y. Li<sup>\*</sup>, T. Ma<sup>\*</sup>, and H. Zhang<sup>\*</sup>, in *Proceedings of COLT 2018, best paper award*

**Approximate Personalized PageRank on Dynamic Graphs**, by H. Zhang, P. Lofgren, and A. Goel, in *Proceedings of KDD 2016*

**Incentives for Strategic Behavior in Fisher Market Games**, by N. Chen<sup>\*</sup>, X. Deng<sup>\*</sup>, B. Tang<sup>\*</sup>, and H. Zhang<sup>\*</sup>, in *Proceedings of AAAI 2016*

**A Note on Modeling Retweet Cascades on Twitter**, by A. Goel<sup>\*</sup>, K. Munagala<sup>\*</sup>, A. Sharma<sup>\*</sup>, and H. Zhang<sup>\*</sup>, in *Proceedings of WAW 2015*

**Connectivity in Random Forests and Credit Networks**, by A. Goel<sup>\*</sup>, S. Khanna<sup>\*</sup>, S. Raghvendra<sup>\*</sup>, and H. Zhang<sup>\*</sup>, in *Proceedings of SODA 2015*

**Computing the Nucleolus of Matching, Cover and Clique Games**, by N. Chen<sup>\*</sup>, P. Lu<sup>\*</sup>, and H. Zhang<sup>\*</sup>, in *Proceedings of AAAI 2012, oral presentation*

**Incentive Ratios of Fisher Markets**, by N. Chen<sup>\*</sup>, X. Deng<sup>\*</sup>, H. Zhang<sup>\*</sup>, and J. Zhang<sup>\*</sup>, in *Proceedings of ICALP 2012 (Track C)*

**Fixed-parameter tractability of almost CSP problem with decisive relations**, by C. Zhang<sup>\*</sup> and H. Zhang<sup>\*</sup>, in *Proceedings of FAW-AAIM 2012*

**On Strategy-proof Allocation without Payments or Priors**, L. Han<sup>\*</sup>, C. Su<sup>\*</sup>, L. Tang<sup>\*</sup>, and H. Zhang<sup>\*</sup>, in *Proceedings of WINE 2011*

## Manuscripts

**Precise High-Dimensional Asymptotics for Quantifying Heterogeneous Transfers**, by F. Yang, H. R. Zhang, S. Wu, C. Ré, and W. Su

## Advising

2021-	Dongyue Li, PhD
2024-	Ziniu (Michael) Zhang, PhD
2024-	Zhenshuo Zhang, PhD
2021-2024	Haotian Ju, MS student
2023-2024	Abhinav Nippani, MS student

## Research Grants

PI in an NSF grant (2412008): “RI: SMALL: Multitask Learning and Fine-Tuning: Measurements and Algorithms for Representational Transfer” (\$600,000, 2024-2027, PIs: Zhang, *personal share*:

\$600,000)

PI in an internal Northeastern Univ. TIER-1 grant: “Data Analytics for Aiding Road Safety with Graph Neural Networks” (\$50,000, 2023-2024, PIs: Zhang and Koutsopoulos, *personal share*: \$50,000)

PI in an internal Northeastern CS Dept. grant: “Fairness and Inductive Bias of Machine Learning Algorithms across Disparate Populations” (\$40,000, 2021-2022, PIs: Zhang and Nguyen, *personal share*: \$20,000)

## Professional Services

*Departmental Service*: Ph.D. Admissions Committee 2020-2022, Ph.D. Curriculum Committee 2023, MS in Data Science Curriculum Committee 2024

*Conference Organization*: INFORMS Session Chair 2023-2024

*Program Committee/Reviewer*: COLT 2024, NeurIPS 2019-2024, ICML 2019-2023, ICLR 2019-2024, KDD 2022-2024, EMNLP 2024, AAAI 2019-2023, AISTATS 2021-2022, WSDM 2023-2024, ACML 2024, WWW 2022

*Senior Program Committee/Meta-Reviewer/Action Editor*: ICML 2024-2025, AISTATS 2023-2025, ALT 2024, AAAI 2025, Journal of Data-Centric Machine Learning Research (2024-)

*External Conference Reviewer*: STOC (2017, 2018, 2022), FOCS (2015, 2024), SODA (2016, 2021), ITCS (2018, 2019), WINE (2014), ICALP (2014), CVPR (2021)

*External 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 2024, NeurIPS’24 Workshop Proposals

## Selected Talks

- 2024 Northeastern University Theory Seminar, Northeastern University Expeditions in AI Seminar; INFORMS; MSOM
- 2023 New Faculty Highlight, AAAI 2023; MIT; Yale University; MSOM
- 2022 Network Science Institute, Northeastern University; INFORMS; One World Seminar Series on the Mathematics of Machine Learning (virtual)
- 2021 Worcester Polytechnic Institute; Shanghai Jiao Tong University
- 2020 Workshop on Equivariance and Data Augmentation, University of Pennsylvania; ML+X Seminar, Brown University
- 2019 Hong Kong University of Science and Technology; Chinese University of Hong Kong; Google Research; Northeastern University; Peking University; Rensselaer Polytechnic Institute; Salesforce

## Research

2018 Tsinghua University; Stanford University (Theory lunch seminar and ML lunch seminar)

## Teaching

Introductory machine learning classes (typically  $\sim$  60 to 80 students)

- *Machine Learning and Data Mining I* Spring 2023
- *Supervised Machine Learning* Fall 2021, 2022, 2024
- *Machine Learning* Fall 2023

Advanced machine learning classes (typically  $\sim$  15 to 30 students)

- *Advanced Machine Learning* Spring 2021, 2022, 2023, 2025
- *Special Topics in AI: Algorithmic and Statistical Aspects of Deep Learning* Fall 2020

## Recognition

2023 Featured Certification, Transactions on Machine Learning Research (TMLR)

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

2018 Best Paper Award, Annual Conference on Learning Theory (COLT)

2013 School of Engineering Fellowship, Stanford University

2008 Silver Medal at Chinese Mathematics Olympiad; First Prizes ( $\times 2$ ) of High School Mathematics Competition at Hubei Province