# Hongyang Ryan Zhang

Physical address: 177 Huntington Avenue, Floor 22, Room #2211, Boston, MA 02115, US
Email: ho.zhang@northeastern.edu and hongyang90@gmail.com
Homepage: https://www.hongyangzhang.com/

## Education

2019   *Ph.D.* in *Computer Science*, Stanford University, Stanford, CA, U.S.
Summer internship at Twitter (2014) and Google (2018)

2012   *B.Eng.* in *Computer Science*, Shanghai Jiao Tong University, Shanghai, China
Visiting student at Nanyang Technological University, Sep 2011 - Feb 2012
Advisors: Pinyan Lu, Xiaotie Deng, Yong Yu

## 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[1][2][3]

**Journal Publications**

1. **Noise Stability Optimization for Finding Flat Minima: A Hessian-based Regularization Approach**, by H. R. Zhang, D. Li[†], and H. Ju[†], in *Transactions on Machine Learning Research* (TMLR) 2024

2. **Learning Tree-Structured Composition of Data Augmentation**, by D. Li[†], K. Chen[†], P. Radivojac, and H. R. Zhang, in *Transactions on Machine Learning Research* (TMLR) 2024

3. **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* (TMLR) 2023

4. **Identification of Negative Transfers in Multitask Learning Using Surrogate Models**, by D. Li[†], H. L. Nguyen, and H. R. Zhang, in *Transactions on Machine Learning Research* (TMLR) 2023, *featured certification*

5. **Incentive Ratio: A Game Theoretical Analysis of Market Equilibria**, by N. Chen[*], X. Deng[*], B. Tang[*], H. R. Zhang[*], and J. Zhang[*], in *Information and Computation* (Inf. Comput.) 2022

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[1] [*] indicates alphabetical authorship or equal contribution
[2] [†] indicates that the student is advised by me during the project
[3] See also Google Scholar for further information

**Conference Publications**

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

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

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

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

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

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

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

8. **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*

9. **Improving Regularization and Robustness for Fine-tuning in Neural Networks**, by D. Li[†] and H. R. Zhang, in *Proceedings of NeurIPS* 2021

10. **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

11. **Learning Over-Parametrized Two-Layer ReLU Neural Networks beyond NTK**, by Y. Li[*], T. Ma[*], and H. R. Zhang[*], in *Proceedings of COLT* 2020

12. **On the Generalization Effects of Linear Transformations in Data Augmentation**, by S. Wu[*], H. R. Zhang[*], G. Valiant, and C. Ré, in *Proceedings of ICML* 2020

13. **Understanding and Improving Information Transfer in Multi-Task Learning**, by S. Wu[*], H. R. Zhang[*], and C. Ré, in *Proceedings of ICLR* 2020

14. **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*

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

16. **Algorithmic Regularization in Over-parameterized Matrix Sensing and Neural Networks with Quadratic Activations**, by Y. Li[*], T. Ma[*], and H. Zhang[*], in *Proceedings of COLT* 2018, *best paper award*

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

18. **Incentives for Strategic Behavior in Fisher Market Games**, by N. Chen[*], X. Deng[*], B. Tang[*], and H. Zhang[*], in *Proceedings of AAAI* 2016

19. **A Note on Modeling Retweet Cascades on Twitter**, by A. Goel[*], K. Munagala[*], A. Sharma[*], and H. Zhang[*], in *Proceedings of WAW* 2015

20. **Connectivity in Random Forests and Credit Networks**, by A. Goel[*], S. Khanna[*], S. Raghvendra[*], and H. Zhang[*], in *Proceedings of SODA* 2015

21. **Computing the Nucleolus of Matching, Cover and Clique Games**, by N. Chen[*], P. Lu[*], and H. Zhang[*], in *Proceedings of AAAI* 2012, *oral presentation*

22. **Incentive Ratios of Fisher Markets**, by N. Chen[*], X. Deng[*], H. Zhang[*], and J. Zhang[*], in *Proceedings of ICALP* 2012 (Track C)

23. **Fixed-parameter tractability of almost CSP problem with decisive relations**, by C. Zhang[*] and H. Zhang[*], in *Proceedings of FAW-AAIM* 2012

24. **On Strategy-proof Allocation without Payments or Priors**, L. Han[*], C. Su[*], L. Tang[*], and H. Zhang[*], 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- Michael Zhang, PhD

2024- Zhenshuo Zhang, PhD

2025- Minxuan Duan, PhD

2021-2024 Haotian Ju, MS student

2023-2024 Abhinav Nippani, MS student

2023-2024 Kailai Chen, Undergraduate visiting 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; IN-FORMS; 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 and AI classes (typically $\sim 60$ to $80$ students)

- Artificial Intelligence                                         Fall 2025
- *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