# Minshuo CHEN

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## RESEARCH INTEREST

My research focuses on developing principled methodologies and theoretical foundations of machine learning and statistics.

I am particularly interested in

*(i).* function approximation theory of neural networks and their statistical guarantees in learning applications;

*(ii).* (deep) reinforcement learning;

*(iii).* nonconvex optimization.

## EDUCATION

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|---|---|
| *2017 - 2022* | Georgia Institute of Technology<br>**Ph.D. in Machine Learning** |
| *2015 - 2017* | University of California, Los Angeles<br>**M.S. in Electrical Engineering** |
| *2011 - 2015* | Zhejiang University<br>**B.S. in Electrical and Information Engineering**<br>– Graduated with honor from Chu Kochen Honor's College (advanced class of engineering education) |

## EMPLOYMENT

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| *2022 -* | Princeton University<br>**Postdoctoral Research Associate**<br>– Supervisor: Mengdi Wang |

## PREPRINTS AND PUBLICATIONS

### *Preprints*

- **Sample Complexity of Nonparametric Off-Policy Evaluation on Low-Dimensional Manifolds using Deep Networks**
  Xiang Ji, **Minshuo Chen**, Mengdi Wang, and Tuo Zhao

- **Deep nonparametric estimation of operators between infinite dimensional spaces**
  Hao Liu, Haizhao Yang, **Minshuo Chen**, Tuo Zhao, and Wenjing Liao

- **High Dimensional Binary Classification under Label Shift: Phase Transition and Regularization**
  Jiahui Cheng, **Minshuo Chen**, Hao Liu, Tuo Zhao, and Wenjing Liao

- **Statistical Guarantees of Generative Adversarial Networks for Distribution Estimation**
  **Minshuo Chen**, Wenjing Liao, Hongyuan Zha, and Tuo Zhao (Alphabetical order)

*Journal Publications*

- **Doubly Robust Off-Policy Learning on Low-Dimensional Manifolds by Deep Neural Networks**
  **Minshuo Chen**\*, Hao Liu\*, Wenjing Liao, and Tuo Zhao (Equal contribution)
  *Submitted to Operations Research, under revision*

- **Nonparametric Regression on Low-Dimensional Manifolds using Deep ReLU Networks : Function Approximation and Statistical Recovery**
  **Minshuo Chen**, Haoming Jiang, Wenjing Liao, and Tuo Zhao (Alphabetical order)
  *Information and Inference: A Journal of the IMA, 2022*

*Conference Publications*

- **Benefits of Overparameterized Convolutional Residual Networks: Function Approximation under Smoothness Constraint**
  Hao Liu, **Minshuo Chen**, Siawpeng Er, Wenjing Liao, Tong Zhang, Tuo Zhao
  *International Conference on Machine Learning (ICML)*, 2022

- **Large Learning Rate Tames Homogeneity: Convergence and Balancing Effect**
  Yuqing Wang, **Minshuo Chen**, Tuo Zhao, and Molei Tao
  *International Conference on Learning Representations (ICLR)*, 2022

- **Pessimism Meets Invariance: Provably Efficient Offline Mean-Field Multi-Agent RL**
  **Minshuo Chen**, Yan Li, Zhuoran Yang, Zhaoran Wang, and Tuo Zhao
  *Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2021

- **Besov Function Approximation and Binary Classification on Low-Dimensional Manifolds Using Convolutional Residual Networks**
  Hao Liu, **Minshuo Chen**, Tuo Zhao, and Wenjing Liao
  *International Conference on Machine Learning (ICML)*, 2021

- **How Important is the Train-Validation Split in Meta-Learning?**
  Yu Bai, **Minshuo Chen**, Pan Zhou, Tuo Zhao, Jason D. Lee, Sham Kakade, Huan Wang, and Caiming Xiong
  *International Conference on Machine Learning (ICML)*, 2021

- **Super Tickets in Pre-Trained Language Models: From Model Compression to Improving Generalization**
  Chen Liang, Simiao Zuo, **Minshuo Chen**, Haoming Jiang, Xiaodong Liu, Pengcheng He, Tuo Zhao, and Weizhu Chen
  *International Joint Conference on Natural Language Processing (ACL-IJCNLP)*, 2021

- **Deep Learning Assisted End-to-End Synthesis of mm-Wave Passive Networks with 3D EM Structures: A Study on A Transformer-Based Matching Network**
  Siawpeng Er, Edward Liu, **Minshuo Chen**, Yan Li, Yuqi Liu, Tuo Zhao, and Hua Wang
  *International Microwave Symposium (IMS)*, **Oral presentation**, 2021

- **Towards Understanding Hierarchical Learning: Benefits of Neural Representations**
  **Minshuo Chen**, Yu Bai, Jason D. Lee, Tuo Zhao, Huan Wang, Caiming Xiong, and Richard Socher
  *Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2020

- **Differentiable Top-$k$ Operator with Optimal Transport**
  Yujia Xie, Hanjun Dai, **Minshuo Chen**, Bo Dai, Tuo Zhao, Hongyuan Zha, Wei Wei, and Tomas Pfister
  *Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2020

- **On Generalization Bounds of a Family of Recurrent Neural Networks**
  **Minshuo Chen**, Xingguo Li, and Tuo Zhao
  *International Conference on Artificial Intelligence and Statistics (AISTATS)*, 2020

- **Residual Network Based Direct Synthesis of EM Structures: A Study on One-to-One Transformers**
  David Munzer, Siawpeng Er, **Minshuo Chen**, Yan Li, Naga S. Mannem, Tuo Zhao, and Hua Wang
  *IEEE Radio Frequency Integrated Circuits Symposium (RFIC)*, 2020

- **On Computation and Generalization of Generative Adversarial Imitation Learning**
  **Minshuo Chen**, Yizhou Wang, Tianyi Liu, Zhuoran Yang, Xingguo Li, Zhaoran Wang, and Tuo Zhao
  *International Conference on Learning Representations (ICLR)*, 2020

- **Efficient Approximation of Deep ReLU Networks for Functions on Low Dimensional Manifolds**
  **Minshuo Chen**, Haoming Jiang, Wenjing Liao, and Tuo Zhao (Alphabetical order)
  *Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2019

- **Towards Understanding the Importance of Shortcut Connections in Residual Networks**
  Tianyi Liu*, **Minshuo Chen**\*, Mo Zhou, Simon S. Du, Enlu Zhou, and Tuo Zhao (Equal contribution)
  *Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2019

- **On Scalable and Efficient Computation of Large Scale Optimal Transport**
  Yujia Xie, **Minshuo Chen**, Haoming Jiang, Tuo Zhao, and Hongyuan Zha
  *International Conference on Machine Learning (ICML)*, 2019

- **On Computation and Generalization of Generative Adversarial Networks under Spectrum Control**
  Haoming Jiang, Zhehui Chen, **Minshuo Chen**, Feng Liu, Dingding Wang, and Tuo Zhao
  *International Conference on Learning Representations (ICLR)*, 2019

- **Dimensionality Reduction for Stationary Time Series via Stochastic Nonconvex Optimization**
  **Minshuo Chen**, Lin F. Yang, Mengdi Wang, and Tuo Zhao
  *Annual Conference on Neural Information Processing Systems (NeurIPS)*, 2018

## AWARDS

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| *2021* | IDEaS-TRIAD Scholarship |
| *2019, 2022* | ICML Travel Award |
| *2019* | ARC-TRIAD Student Fellowship |
| *2018, 2019* | NeurIPS Travel Award |
| *2017 - 2018* | William S. Green Fellowship |

## EXPERIENCES

Teaching Assistantships:

- Computational Data Analysis / Machine Learning (CSE6740/ISYE6740), Fall 2017, Fall 2019
- Business Analytics (ISYE 4803), Spring 2018
- Regression Analysis (ISYE 6414), Fall 2018
- Basic Statistical Methods (ISYE 2028), Summer 2018, Summer 2019

Guest lecture "Representation and Statistical Properties of Deep Neural Networks on Structured Data" in Advanced Machine Learning (ISYE 8813), Fall 2021.

Internships:

- Research Intern, Salesforce, Summer 2020
- Research Intern, Microsoft, Fall 2020 2021

## SERVICES

Reviewing:

- AAAI 2020 2021, ICML 2020 2021 2022, NeurIPS 2020 2021, ICLR 2021 2022 2023
- IEEE Transactions on Signal Processing, IEEE Transactions on Information Theory, IEEE Transactions on Pattern Analysis and Machine Intelligence, Operations Research,