MINSHUO CHEN

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RESEARCH INTEREST

My research focuses on developing principled methodologies and theoretical foundations of deep learning. I am particularly interested in nonconvex stochastic optimization, generalization and representation theories of deep learning.

EDUCATION

2017 - present Georgia Institute of Technology
Ph.D. in Machine Learning

2015 - 2017 University of California, Los Angeles
M.S. in Electrical Engineering

2011 - 2015 Zhejiang University
B.S. in Electrical and Information Engineering
– Graduated with honor from Chu Kochen Honor's College (advanced class of engineering education)

PREPRINTS AND PUBLICATIONS

Preprints

- **Towards Understanding Hierarchical Learning: Benefits of Neural Representations**
  Minshuo Chen, Yu Bai, Jason Lee, Tuo Zhao, Huan Wang, Caiming Xiong, and Richard Socher
  Submitted
- **Differentiable Top-k Operator with Optimal Transport**
  Yujia Xie, Hanjun Dai, **Minshuo Chen**, Bo Dai, Tuo Zhao, Hongyuan Zha, Wei Wei, and Tomas Pfister
  Submitted
- **Statistical Guarantees of Generative Adversarial Networks for Distribution Estimation**
  Minshuo Chen, Wenjing Liao, Hongyuan Zha, and Tuo Zhao (Alphabetical order)
  Submitted
- **Nonparametric Regression on Low Dimensional Manifolds using Deep ReLU Networks**
  Minshuo Chen, Haoming Jiang, Wenjing Liao, and Tuo Zhao (Alphabetical order)
  Submitted

Conference Publications

- **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
- **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 Yang, Mengdi Wang, and Tuo Zhao
  Annual Conference on Neural Information Processing Systems (NeurIPS), 2018

Research Experiences

2018.10 - present **Representation of deep neural networks**: Establish near optimal approximation theories for ReLU networks by leveraging intrinsic low dimensional structures in data: The size of ReLU network weakly depends on the ambient dimension, and is exponential with respect to the intrinsic dimension.

2018.3 - present **Generalization in deep learning models**: Study generalization properties of recurrent neural networks (RNNs, including LSTM, GRU, and Convolutional RNNs), generative adversarial networks (GANs), and generative adversarial imitation learning (GAIL) by exploiting the Lipschitz continuity in these networks: The analyses apply to both i.i.d. and dependent data, and the resulting gneralization bounds significantly improve existing results.

2017.8 - present **Model-based nonconvex stochastic optimization**: Develop convergence theories for dependent-data PCA and residual networks via diffusion approximation and partial dissipative condition, respectively: The analyses characterize how first order algorithms escape from saddle points and spurious local optima.

Awards

2019 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

Internships:

- Research Intern, Salesforce, Summer 2020

SERVICES

Reviewing:

- AAAI 2020, ICML 2020, NeurIPS 2020
- IEEE Transactions on Signal Processing

REFERENCES

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