

Yu Bai

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EDUCATION

Ph.D. in Statistics, Stanford University

Stanford, CA

Specialization in Machine Learning.

Sep 2014 - Sep 2019

Advisor: Prof. John C. Duchi.

Thesis: *When do gradient methods work well in non-convex learning problems?*

B.S. in Mathematics, Peking University

Beijing, China

GPA: 3.9 / 4, Honored Graduate

Sep 2010 - July 2014

EXPERIENCE

Research Scientist, Salesforce Research

Palo Alto, CA

Research on the foundations of deep learning and reinforcement learning. Oct 2019 - current

Research Intern, Amazon AI

Palo Alto, CA

Host: Edo Liberty & Yu-Xiang Wang

June 2018 - Sep 2018

Proposed ProxQuant, a prox-gradient method with quantization-inducing regularizers for training quantized neural networks. Paper published in ICLR 2019.

Research Intern, Google Research

Mountain View, CA

Host: Li Zhang

June 2016 - Sep 2016

Proposed adaptive sampling strategies for softmax in deep networks for extreme classification which achieved state-of-the-art accuracy on a large-scale Youtube benchmark dataset. Algorithm implemented in Tensorflow (`tf.contrib.nn.rank_sampled_softmax_loss`).

RESEARCH INTERESTS

Reinforcement learning. Foundations of deep learning.

PUBLICATIONS

I. Preprints

- (1) **Towards Understanding Hierarchical Learning: Benefits of Neural Representations.**

Minshuo Chen, Yu Bai, Jason D. Lee, Tuo Zhao, Huan Wang, Caiming Xiong, Richard Socher.

arXiv preprint arXiv:2006.13436. *Submitted to NeurIPS 2020.*

- (2) **Near-Optimal Reinforcement Learning via Self-Play.**

Yu Bai, Chi Jin, Tiancheng Yu.

arXiv preprint arXiv:2006.12007. *Submitted to NeurIPS 2020.*

Oral presentation at ICML 2020 Workshop on Theoretical Foundations of Reinforcement Learning.

- (3) **Taylorized Training: Towards Better Approximation of Neural Network Learning.**

Yu Bai, Ben Krause, Huan Wang, Caiming Xiong, Richard Socher.

arXiv preprint arXiv:2002.04010. *Submitted to NeurIPS 2020.*

- (4) **Near Optimal Provable Uniform Convergence in Off-Policy Evaluation for Reinforcement Learning.**

Ming Yin, Yu Bai, Yu-Xiang Wang.
arXiv preprint 2007.03760. *Submitted to NeurIPS 2020.*

II. Conference and Journal Publications

- (1) **Provable Self-Play Algorithms for Competitive Reinforcement Learning.**
Yu Bai, Chi Jin.
International Conference on Machine Learning (ICML) 2020.
- (2) **Beyond Linearization: On Quadratic and Higher-Order Approximation of Wide Neural Networks.**
Yu Bai, Jason D. Lee.
International Conference on Learning Representations (ICLR) 2020.
- (3) **Provably Efficient Q-Learning with Low Switching Cost.**
Yu Bai, Tengyang Xie, Nan Jiang, Yu-Xiang Wang.
Neural Information Processing Systems (NeurIPS) 2019.
- (4) **ProxQuant: Quantized Neural Networks via Proximal Operators**
Yu Bai, Edo Liberty, Yu-Xiang Wang.
International Conference on Learning Representations (ICLR) 2019.
- (5) **Subgradient Descent Learns Orthogonal Dictionaries.**
Yu Bai, Qijia Jiang, Ju Sun.
International Conference on Learning Representations (ICLR) 2019.
- (6) **Approximability of Discriminators Implies Diversity in GANs.**
Yu Bai, Tengyu Ma, Andrej Risteski.
International Conference on Learning Representations (ICLR) 2019.
- (7) **The Landscape of Empirical Risk for Non-convex Losses.**
Song Mei, Yu Bai, Andrea Montanari.
The Annals of Statistics 46 (6A), 2747-2774, 2018.

TALKS & PRESENTATIONS

Subgradient Descent Learns Orthogonal Dictionaries
ICLR, May 2019.

ProxQuant: Quantizing Neural Networks via Proximal Operators
ICLR, May 2019.
Bytedance AI Lab, December 2018.
Amazon AI, September 2018.

On the Generalization and Approximation in GANs
ICLR, May 2019.
Google Brain, November 2018.
Salesforce Research, November 2018.
Stanford ML Seminar, October 2018.

Optimization Landscape of Some Non-convex Learning Problems
Stanford Theory Seminar, April 2018.
Stanford ML Seminar, April 2017.

REVIEWING EXPERIENCE

Conference reviewing: NeurIPS (top 30% reviewer in 2018), ICML, ICLR, COLT, AISTATS, IEEE-ISIT.

Journal reviewing: The Annals of Statistics, Journal of the American Statistical Association

(JASA), Journal of Machine Learning Research (JMLR), IEEE Transactions on Signal Processing (IEEE-TSP), SIAM Journal on Control and Optimization (SICON).

SELECTED COURSEWORK

Reinforcement Learning (CS234).
Convolutional Neural Networks for Visual Recognition (CS231N).
Theories of Deep Learning (Stats385).
Numerical Linear Algebra (CME302).
Inference, Estimation, and Information Processing (EE378B).
Machine Learning Theory (CS229T).
Convex Optimization (EE364A).
Information Theory and Statistics (Stats311/EE377).
Theory of Statistics (Stats300A/B/C).
Theory of Probability (Stats310A/B/C).

TEACHING EXPERIENCE

As Instructor:

Guest Lecturer, Nonparametric Statistics (Stats205), Fall 2019.
Guest Lecturer, Theory of Statistics (Stats300B), Spring 2018.
Session Instructor, Theory of Probability (Stats310A), Fall 2017.

As Teaching Assistant (selected):

Statistical Learning Theory (CS229T), as head TA.
Modern Markov Chains (Stats 318).
Theory of Probability (Stats310A/B/C).
Theory of Statistics (Stats300A/B).
Statistical Inference (Stats200).
Introduction to Stochastic Processes (Stats217).