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

WORK EXPERIENCE

Senior Research Scientist, *Salesforce AI Research* — Palo Alto, CA
Fundamental AI/ML research on reinforcement learning and games, uncertainty quantification, and foundations of deep learning. — Oct 2019 - current

RESEARCH INTERESTS

Reinforcement learning and games, deep learning, uncertainty quantification, and their theory.

PUBLICATIONS

Preprints

1. Near-Optimal Learning of Extensive-Form Games with Imperfect Information.
   Yu Bai, Chi Jin, Song Mei, Tiancheng Yu.
   Preprint, 2022. arXiv preprint arXiv:2202.01752.
2. Finding General Equilibria in Many-Agent Economic Simulations using Deep Reinforcement Learning.
   Michael Curry, Alexander R Trott, Soham Phade, Yu Bai, Stephan Zheng.
   Preprint, 2022. arXiv preprint arXiv:2201.01163.

Conference and Journal Publications

1. When Can We Solve General-Sum Markov Games with a Large Number of Players Sample-Efficiently?
   Ziang Song, Song Mei, Yu Bai.
   International Conference on Learning Representations (ICLR) 2022.
2. Efficient and Differentiable Conformal Prediction with General Function Classes.
   Yu Bai, Song Mei, Huan Wang, Yingbo Zhou, Caiming Xiong.
   International Conference on Learning Representations (ICLR) 2022.
3. Understanding the Under-Coverage Bias in Uncertainty Esitmation.
   Yu Bai, Song Mei, Huan Wang, Caiming Xiong.
   Neural Information Processing Systems (NeurIPS) 2021. Spotlight presentation.
4. Policy Finetuning: Towards Bridging Sample-Efficient Online and Offline Reinforcement Learning.
   Tengyang Xie, Nan Jiang, Huan Wang, Caiming Xiong, Yu Bai.
   Neural Information Processing Systems (NeurIPS) 2021.

5. Sample-Efficient Learning of Stackelberg Equilibria in General-Sum Games.
   Yu Bai, Chi Jin, Huan Wang, Caiming Xiong.
   Neural Information Processing Systems (NeurIPS) 2021.
6. Near-Optimal Offline Reinforcement Learning via Double Variance Reduction.
   Ming Yin, Yu Bai, Yu-Xiang Wang.
   Neural Information Processing Systems (NeurIPS) 2021.
7. Don't Just Blame Over-parameterization for Over-confidence: Theoretical Analysis of Calibration in Binary Classification.
   Yu Bai, Song Mei, Huan Wang, Caiming Xiong.
   International Conference on Machine Learning (ICML) 2021.
8. Exact Gap between Generalization Error and Uniform Convergence in Random Feature Models.
   Zitong Yang, Yu Bai, Song Mei.
   International Conference on Machine Learning (ICML) 2021.
9. 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, Caiming Xiong.
   International Conference on Machine Learning (ICML) 2021.
10. A Sharp Analysis of Model-based Reinforcement Learning with Self-Play.
    Qinghua Liu, Tiancheng Yu, Yu Bai, Chi Jin.
    International Conference on Machine Learning (ICML) 2021.
11. Near Optimal Provable Uniform Convergence in Off-Policy Evaluation for Reinforcement Learning.
    Ming Yin, Yu Bai, Yu-Xiang Wang.
    Artificial Intelligence and Statistics (AISTATS) 2021. Oral presentation.
12. Towards Understanding Hierarchical Learning: Benefits of Neural Representations.
    Minshuo Chen, Yu Bai, Jason D. Lee, Tuo Zhao, Huan Wang, Caiming Xiong, Richard Socher.
    Neural Information Processing Systems (NeurIPS) 2020.
13. Near-Optimal Reinforcement Learning via Self-Play.
    Yu Bai, Chi Jin, Tiancheng Yu.
    Neural Information Processing Systems (NeurIPS) 2020.
14. Provable Self-Play Algorithms for Competitive Reinforcement Learning.
    Yu Bai, Chi Jin.
    International Conference on Machine Learning (ICML) 2020.
15. Beyond Linearization: On Quadratic and Higher-Order Approximation of Wide Neural Networks.
    Yu Bai, Jason D. Lee.
    International Conference on Learning Representations (ICLR) 2020.
16. Provably Efficient Q-Learning with Low Switching Cost.
    Yu Bai, Tengyang Xie, Nan Jiang, Yu-Xiang Wang.
    Neural Information Processing Systems (NeurIPS) 2019.
17. ProxQuant: Quantized Neural Networks via Proximal Operators
    Yu Bai, Edo Liberty, Yu-Xiang Wang.
    International Conference on Learning Representations (ICLR) 2019.
18. Subgradient Descent Learns Orthogonal Dictionaries.
    Yu Bai, Qijia Jiang, Ju Sun.
    International Conference on Learning Representations (ICLR) 2019.
19. Approximability of Discriminators Implies Diversity in GANs.
    Yu Bai, Tengyu Ma, Andrej Risteski.

International Conference on Learning Representations (ICLR) 2019.

20. 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

Understanding the Under-Coverage Bias in Uncertainty Estimation
Statistics Department Seminar, Rutgers University, October 2021.
Spotlight presentation at ICML 2021 Workshop on Distribution-free Uncertainty Quantification, July 2021.

Sample-Efficient Learning of Stackelberg Equilibria in General-Sum Games
Spotlight presentation at ICML 2021 Workshop on Reinforcement Learning Theory, July 2021.

How Important is the Train-Validation Split in Meta-Learning?
One World Seminar on the Mathematics of Machine Learning, October 2020.

Provable Self-Play Algorithms for Competitive Reinforcement Learning.
Facebook AI Research, March 2020.

Beyond Linearization: On Quadratic and Higher-Order Approximation of Wide Neural Networks.
Simons Institute on the Theory of Computing, August 2020.

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

On the Generalization and Approximation in GANs
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.

INTERNSHIPS

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`).

REVIEWING EXPERIENCE

Conference reviewing: NeurIPS (2018-2021, top 30% reviewer in 2018), ICML (2019-2021),

ICLR (2019-2022), COLT (2019-2020), AISTATS (2020), IEEE-ISIT (2018).

Journal reviewing: The Annals of Statistics, Journal of the American Statistical Association (JASA), Journal of the Royal Statistical Society, Series B (JRSS-B), 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 Statitics (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).