

# Site “Cedar” Bai

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## EDUCATION

- Purdue University** Jan. 2021 – Dec. 2025 (Exp.)  
*Ph.D. in Computer Science (Machine Learning / Optimization)* Grade: 3.9/4.0  
*M.S. in Statistics & Computer Science (along the way)* M.S. conferred May. 2024
- Xi'an Jiaotong University (XJTU)** Sep. 2016 – Jun. 2020  
*B.S. in Computer Science (Qian Xuesen Honors College)* Grade: 85.7/100  
Selected Awards: “Siyuan” Scholarship (twice); National 2<sup>nd</sup> Prize in Mathematical Contest in Modeling of China (top 3%)

## PROFESSIONAL TECHNIQUES

**Machine learning:** deep learning optimizer, federated learning, recommendation system, deep reinforcement learning, adversarial training  
**Programming:** Python, MATLAB (Proficient); Shell script, C/C++, R, Java, SQL, HTML;  
**Packages / Tools:** PyTorch, NumPy, Matplotlib, Linux Command, Git (Proficient); scikit-learn, TensorFlow, Pandas, Slurm.

## INDUSTRY EXPERIENCE

- TikTok, Machine Learning Engineer Intern** May. 2024 – Aug. 2024  
Worked on **ranking models in ads recommendation systems** Manager: [Du Zhang, Dr. Yan Yan](#)
  - Delivered two launches that improved advertiser value by 1.63% and 5.94%, a **\$X0,000 increase in daily profits**
  - Applied neural architecture search to select the best features and embedding sizes, reducing the model size while improving accuracy
  - Adapted Deep Cross Network as the feature crossing module for improved conversion rate (CVR) prediction on sequential data

## SELECTED PROJECTS

- ▷ Department of Computer Science, Purdue Advisor: [Prof. Brian Bullins](#)
  - Deep Learning Optimization | Faster Acceleration for Steepest Descent**
    - Proposed accelerated steepest descent for  $\ell_p$ -smooth functions based on the interpolation of steepest descent and mirror descent
    - Derived convergence rates for convex and (stochastic) non-convex settings, and implemented the optimizer with PyTorch
    - Achieved faster convergence and higher precision than Adam and Lion on **ImageNet and pertaining large language models**
  - Optimization & Federated Learning | Federated Composite Saddle Point Optimization**
    - Proposed the first distributed optimization algorithm for min-max problems with non-smooth structure-inducing regularization
    - Derived convergence rate, wrote the optimizer with PyTorch, and conducted distributed learning experiments with FedLab
    - Applied the optimizer to the **universal adversarial training** on  $l_1$ -regularized logistic regression with real-world data
    - Achieved **faster convergence and better structure** (e.g. sparse solution) than (projected) gradient-descent-ascent
- ▷ Institute of Artificial Intelligence and Robotics, XJTU Advisor: [Dr. Hanbo Zhang, Prof. Xuguang Lan](#)
  - Deep Reinforcement Learning | Hindsight Trust Region Policy Optimization**
    - Proposed a deep reinforcement learning algorithm that improves **sample efficiency** in environments with **sparse reward**;
    - Applied goal-conditioned policy with **(weighted) importance sampling** to learn with both succeeded samples and failed ones.
    - Proposed a Quadratic KL constraint with **math-provable variance reduction** to stabilize training;
    - Implemented experiments with PyTorch on games with image input and robot motion planning simulation in OpenAI Gym.

## PUBLICATION

- [1] **S. Bai\***, Y. Zheng\*, B. Bullins, R. Yeh. Model Immunization from a Condition Number Perspective, *Preprint. 2025*.
- [2] **S. Bai\***, X. Luo\*, B. Li\*, P. Drineas, R. Zhang, B. Bullins. Stochastic Steepest Descent with Acceleration for  $\ell_p$ -Smooth Non-convex Optimization, *Preprint. 2024*. [\[Abstract\]](#)
- [3] **S. Bai**, B. Bullins. Faster Acceleration for Steepest Descent, *Preprint. 2024*. [\[PDF\]](#)
- [4] **S. Bai**, B. Bullins. Tight Lower Bounds under Asymmetric High-Order Hölder Smoothness and Uniform Convexity, *Oral(Top 1.8%), ICLR 2025*. [\[PDF\]](#)
- [5] **S. Bai**, B. Bullins. Local Composite Saddle Point Optimization, *ICLR 2024*. [\[PDF\]](#)
- [6] **S. Bai**, C. Ke, J. Honorio. On the Dual Problem of Convexified Convolutional Neural Networks, *Transactions on Machine Learning Research (TMLR) 2024*. [\[PDF\]](#)
- [7] H. Zhang, **S. Bai**, X. Lan, D. Hsu, N. Zheng. Hindsight Trust Region Policy Optimization, *IJCAI 2021*. [\[PDF\]](#)
- [8] H. Zhang, X. Lan, **S. Bai**, X. Zhou, Z. Tian, N. Zheng. ROI-based Robotic Grasp Detection for Object Overlapping Scenes, *IROS 2019*. [\[PDF\]](#)
- [9] H. Zhang, X. Lan, **S. Bai**, L. Wan, C. Yang, N. Zheng. A Multi-task Convolutional Neural Network for Autonomous Robotic Grasping in Object Stacking Scenes, *IROS 2019*. [\[PDF\]](#)



SELECTED COURSES

**Machine Learning (ML):** Statistical ML, ML Theory, Computer Vision, Data Mining, Artificial Intelligence, etc.;

**Math & Statistics:** Convex Optimization, Probability, Mathematical Statistics, Computational Statistics, Multivariate Analysis;

**Computer Science:** Data Structures, Algorithms, Database, Machine Structure, Operating Systems, Networks, etc.



TEACHING & ACADEMIC SERVICE

Purdue CS571 Artificial Intelligence TA (Fall 23)

Purdue CS182 Foundations of Computer Science (Discrete Mathematics) TA (Spring 23)

Purdue CS251 Data Structures and Algorithms TA (Fall 21, Spring 22, Fall 22)

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- ICLR 2025, 2024
  - NeurIPS 2024, 2023
  - ICML 2025, 2024
  - AISTATS 2025, 2023
  - AAAI 2025
  - TMLR
- Reviewer

Reviewer

Reviewer

Reviewer

Reviewer

Reviewer