Yatong Bai

Optimization and Deep Learning

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EDUCATION

Ph. D., University of California, Berkeley *Aug 2020 – Aug 2025 (Expected)*

- **Advisor:** Somayeh Sojoudi. **Current GPA:** 4.00 / 4.00
- **Interests:** Deep learning (especially robustness), Optimization, Control.
- **Courses:** Convex optimization and algorithms, Deep neural networks, Statistical learning theory, Deep reinforcement learning, Advanced control systems, Theoretical statistics.

B. S., Georgia Institute of Technology *Aug 2016 – Aug 2020*

- **Double major** in computer engineering and mechanical engineering. **GPA:** 4.00 / 4.00
- **Courses:** Machine learning, Computer vision, Signals and systems, Embedded systems, Computer architecture.

PUBLICATIONS

Efficient Global Optimization of Two-layer ReLU Networks: Adversarial Training and Quadratic-time Algorithms

Yatong Bai, Tanmay Gautam, and Somayeh Sojoudi. arxiv.org/abs/2201.01965

- 2021 INFORMS Data Mining Best Paper Competition (Student Track) Runner-up (2nd out of 48 papers).
- Develops efficient algorithms for the convex training formulation and proved their polynomially improved complexities.

Practical Convex Formulation of Robust One-hidden-layer Neural Network Training

Yatong Bai, Tanmay Gautam, Yu Gai, and Somayeh Sojoudi. In 2022 *American Control Conference*. arxiv.org/abs/2105.12237

- Develops efficient convex programs that train robust one-hidden-layer ReLU neural networks via adversarial training.
- Built simulations in MATLAB and Python (PyTorch & CvxPy) and demoed improvements with datasets including CIFAR.

Avoiding the Accuracy-Robustness Trade-off of Classifiers via Local Adaptive Smoothing

Yatong Bai, Brendon G. Anderson, and Somayeh Sojoudi.

- Proposes an adaptive smoothing method that turns adversary detectors into classifiers that treat benign and attacked data differently.

EXPERIENCE

University of California, Berkeley Graduate Student Researcher

Professor Somayeh Sojoudi Research Group *Aug 2020 – Present*

- Presenter at ACC 2022, INFORMS 2021 and MOPTA 2021. See publications for details.
- Graduate Student Instructor (GSI) for Spring 2022 "IEOR 160: Nonlinear and Discrete Optimization".

Scale AI, Machine Learning Research Intern *San Francisco, CA, May 2022 – Aug 2022*

- Working on a deep learning dataset research project.

Georgia Institute of Technology Undergraduate Student Researcher

TINKER Group, RoboMed Group, and Meaud Research Group *Jan 2018 – Jan 2020*

- Used the Gem5 computer architecture simulator to build debug trace files based on the ARM binary files compiled from the SPEC2017 benchmark.
- Designed and fabricated PCB board for pressure sensor and used Electromagnetic trackers to reconstruct catheter position.
- Built Graphical User Interfaces (GUIs) for a cochlear dynamics simulator. The GUIs control simulations, process data, and display results.

Senior design project: Avionics and test stand controller for a "Monocopter" aircraft

- Implemented the avionics of a novel unmanned "Monocopter" and a PID-controlled testbed using C++. Also developed a Windows C# GUI.
- The avionics filters noisy magnetometer readings to accurately recover aircraft heading and then controls the actuators.

Honda Aircraft Company, Intern *Greensboro, NC, May 2019 – Aug 2019*

- Constructed a dynamic model of flap linkages in MSC ADAMS and evaluated the stress, deflection, and kinematics via Finite Element (FEA).
- Defined flap skew & asymmetry warning threshold and designed the flap control logic in MATLAB.

Tesla, Inc., Intern *Palo Alto, CA, May 2018 – Aug 2018*

- Wrote scripts that converted simulation models between different tolerance stack-up (GD&T) simulators.

AWARDS

INFORMS Data Mining Best Paper Competition (Student Track) Runner-up *Oct 2021*
UC Berkeley Graduate Division Block Grant Fellowship *April 2021*
Georgia Tech School of ECE Roger P. Webb ECE Senior Scholar Awards *April 2021*

SKILLS

Python (PyTorch, CvxPy), MATLAB, LaTeX, C, C++, C#, R, Java, cloud computing (Google Colab, MS Azure, AWS EC2).