Liyuan Cao

+1(610)653-2348 • liyuancao7@gmail.com • 11 Duh Drive, Bethlehem, PA 18015

Education

08/2016 – 08/2021	**Ph.D.** in Industrial & Systems Engineering, Lehigh University – Advisor: Dr. Katya Scheinberg
08/2014 – 05/2016	**M. Eng.** in Industrial & Systems Engineering, Lehigh University
09/2010 – 06/2014	**B.S.** in Mechanical Engineering & Automation, Nanjing University of Aeronautics & Astronautic

Academic Experience

09/2021 - present	**Boya Postdoc,** Beijing International Center for Mathematical Research, Peking University
08/2016 – 05/2021	**Research Assistant,** Lehigh University – Derivative Free Optimization Theory and Software Development – Optimization Algorithms in Machine Learning – Hyperparameter Tuning for Machine Learning

Publication

[5] Berahas, A. S., **Cao, L.**, & Scheinberg, K. *Analysis of a Trust Region Method with Errors* (in preparation)

[4] Berahas, A. S., **Cao, L.**, & Scheinberg, K. *Global Convergence Rate Analysis of a Generic Line Search Algorithm with Noise*. SIAM Journal on Optimization 31.2 (2021): 1489-1518

[3] Berahas, A. S., **Cao, L.**, Choromanski, K., & Scheinberg, K. *A Theoretical and Empirical Comparison of Gradient Approximations in Derivative-Free Optimization*. Foundations of Computational Mathematics (2021): 1-54

[2] Wang, Fenlan, and **Liyuan Cao**. *A New Algorithm for Quadratic Integer Programming Problems with Cardinality Constraint*. Japan Journal of Industrial and Applied Mathematics (2020): 1-12.

[1] Berahas, A. S., **Cao, L.**, Choromanski, K., & Scheinberg, K. *Linear Interpolation Gives Better Gradients Than Gaussian Smoothing in Derivative-free Optimization*. arXiv preprint arXiv:1905.13043 (2019).

Presentations

08/2021	A Theoretical and Empirical Comparison of Gradient Approximations, MOPTA, Virtual Meeting
11/2020	Derivative Free Optimization Software for Hyperparameter Tuning, *INFORMS Annual Meeting*, Virtual Meeting
02/2020	Lagrange Polynomial in Interpolation, *OptML Group Meeting*, Lehigh University
10/2019	Derivative Approximation of Some Model-based Derivative Free Methods, *INFORMS Annual Meeting*, Seattle, WA
09/2019	Introduction to Computer Vision, *OptML Group Meeting*, Lehigh University
08/2019	A Comparison on Model-based Derivative Free Methods, *Sixth International Conference on Continuous Optimization. ICCOPT 2019*, Berlin, Germany
11/2018	Introduction to Natural Evolution Strategy, *OptML Group Meeting*, Lehigh University
11/2018	Applying Model-based Derivative Free Methods in Reinforcement Learning, *INFORMS Annual Meeting*, Phoenix, AZ
03/2018	Scaling Up Model-based Derivative Free Method, *INFORMS Optimization Society Conference*, Denver, CO

Teaching Experience

01/2020 – 12/2020
11/2018 – 12/2018
08/2016 – 12/2017

Teaching Assistance, Lehigh University

- Worked as a TA for undergraduate, master's and doctoral level courses
- Gave tutorials on software and systems (AMPL, MATLAB, PyTorch, Linux)
- Graded homework assignments and quizzes

Courses: Production and Inventory Control (ISE 251), Product Quality (ISE 332), Introduction to Machine Learning (ISE 364), Introduction to Mathematical Optimization (ISE 406), Optimization Models and Applications (ISE426), Optimization in Machine Learning (ISE444), Optimization Algorithms and Software (ISE 455)

Internship Experience

04/2019 – 08/2019

Hyperparameter Auto Tuning, Robert Bosch LLC in Sunnyvale, CA

- Developed a method to automatically tune the hyperparameters of a machine learning task
- Explored seven derivative free optimization algorithms and experimented with various data manipulation methods to reduce the time cost of hyperparameter auto tuning

05/2018 – 08/2018

Givens Program Intern, Argonne National Laboratory in Lemont, IL

- Designed and coded a practical algorithm for derivative free multi-objective optimization
- Increased algorithm efficiency by using a variety of practical methods
- Achieved better numerical results against most state-of-the-art algorithms

06/2016 – 08/2016

Engineering Intern, Huakuo Auto&Eng Co., LTD in Shanghai, China

- Learned Kuka robot programming language
- Wrote algorithms to control robots to do locate-and-grab task
- Studied laser engraving machines market and investigated their technical details to help the company make purchase decisions

Other Activities

2019 – 2020 INFORMS Lehigh student chapter president
2018 – 2019 INFORMS Lehigh student chapter treasurer and secretary

Technical Skills

- Programming Languages: Python, C++
- Software and Packages: MATLAB, LaTeX, AMPL, PyTorch, Spark, TensorFlow

Honors

08/2016 Dean's Doctoral Assistantship, Lehigh University
05/2014 Distinguished Student, Nanjing University of Aeronautics & Astronautic
10/2013 Distinguished Student, Nanjing University of Aeronautics & Astronautic
10/2013 National Scholarship, Nanjing University of Aeronautics & Astronautic