

Liyuan Cao

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

Education

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| 08/2016 – Present | 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

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| 08/2016 – Present | Research Assistant , Lehigh University
– Derivative Free Optimization Theory and Software Development
– Optimization Algorithms in Machine Learning
– Hyperparameter Tuning for Machine Learning |
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Publication

- [6] Berahas, A. S., **Cao, L.**, & Scheinberg, K. *Analysis of a Trust Region Method with Errors* (in preparation)
- [5] Cao, L., Menickelly, M., & Wild, S.M. *A Model-based Approach to Derivative-free Multiobjective Optimization* (in preparation)
- [4] 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.
- [3] Berahas, A. S., **Cao, L.**, Choromanski, K., & Scheinberg, K. (2019). *A Theoretical and Empirical Comparison of Gradient Approximations in Derivative-Free Optimization*. Under Revision: Foundations of Computational Mathematics
- [2] Berahas, A. S., **Cao, L.**, & Scheinberg, K. (2019). *Global Convergence Rate Analysis of a Generic Line Search Algorithm with Noise*. Under 3rd Round of Review: SIAM Journal on Optimization
- [1] Berahas, A. S., **Cao, L.**, Choromanski, K., & Scheinberg, K. (2019). *Linear Interpolation Gives Better Gradients Than Gaussian Smoothing in Derivative-free Optimization*. arXiv preprint arXiv:1905.13043.

Presentations

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| 11/2020 | Derivative Free Optimization Software for Hyperparameter Tuning, <i>INFORMS Annual Meeting</i> , Virtual Meeting |
| 02/2020 | Lagrange Polynomial in Interpolation, <i>OptML Group Meeting</i> , Lehigh University |
| 10/2019 | Derivative Approximation of Some Model-based Derivative Free Methods, <i>INFORMS Annual Meeting</i> , Seattle, WA |
| 09/2019 | Introduction to Computer Vision, <i>OptML Group Meeting</i> , Lehigh University |
| 08/2019 | A Comparison on Model-based Derivative Free Methods, <i>Sixth International Conference on Continuous Optimization. ICCOPT 2019</i> , Berlin, Germany |
| 11/2018 | Introduction to Natural Evolution Strategy, <i>OptML Group Meeting</i> , Lehigh University |
| 11/2018 | Applying Model-based Derivative Free Methods in Reinforcement Learning, <i>INFORMS Annual Meeting</i> , Phoenix, AZ |

03/2018 | Scaling Up Model-based Derivative Free Method, *INFORMS Optimization Society Conference*, Denver, CO

Teaching Experience

01/2020 – 05/2020 | **Teaching Assistance**, Lehigh University
11/2018 – 12/2018 | – Worked as a TA for undergraduate, master’s and doctoral level courses
08/2016 – 12/2017 | – 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 Mathematical Optimization (ISE 406), Optimization Models and Applications (ISE426), Optimization in Machine Learning (ISE444)

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