YONGZHENG DAI

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PERSONAL PROFILE

I am a Postdoctoral Fellow in ISyE at Georgia Tech. My research focuses on designing and implementing algorithms for large-scale mixed-integer (non)linear programming problems. I have extensive experience with scripting languages such as Julia, Python, and C, particularly for CPU- and GPU-based parallel computing. My primary application domains include machine learning, power systems, and transportation.

EDUCATION

The Ohio State University *Aug. 2020 - Aug. 2025*
Ph.D. Candidate of Integrated Systems Engineering, Operations Research & Analytics, supervised by Dr. Chen Chen
Thesis Title: Parallel Computation in Optimization Problems: Simplex Projection and Mixed Integer Programming.
Committee Members: Dr. Chen Chen, Dr. Guzin Bayraksan, Dr. Marc Posner

Beijing Jiaotong University *Aug. 2016 - Jun. 2020*
BS of Mathematics & Applied Mathematics, Zhixing Honor Program, supervised by Dr. Lingchen Kong

WORK EXPERIENCE

Postdoctoral Fellow Oct. 2025 - Present
Industrial and Systems Engineering, Georgia Institute of Technology, supervised by Dr. Nick Sahinidis
- Developed algorithms for global optimization involving compositions with norms.

Research Aide Technical - PhD May. 2025 - Aug. 2025
Argonne National Laboratory, supervised by Dr. Antonio J. Conejo and Dr. Feng Qiu
- Developed algorithms for solving the unit commitment problem with alternating current power flow constraints.

Statistics & Operations Research Intern May. 2023 - Aug. 2023
United Airlines, Inc. (United)
- Improved Fleet Assignment Model (FAM) with novel Turn-based requirements.

Graduate Teaching Associate Aug. 2022 - May. 2023
Department of Industrial and System Engineering, The Ohio State University
ISE 5200 Linear Programming, for Graduates, Autumn 2022
ISE 5110 Design of Experiments, for Undergraduates, Spring 2023

SELECTED AWARDS

- Runner-up of MIP Workshop 2025 Computational Competition, Twin Cities, MN (June. 2025)
- Winner of MIP Workshop 2024 Computational Competition, Lexington, KY (June. 2024)
- Top Rank in Innovation and Entrepreneurship Training Program for College Student, CN (May. 2019)

PUBLICATIONS

Yongzheng Dai, and Chen Chen. "Sparsity-exploiting distributed projections onto a simplex." INFORMS Journal on Computing 36.3 (2024): 820-835. [Link]

Xin Chen, Sukanya Kudva, **Yongzheng Dai**, Anil Aswani, Chen Chen. "Tensor Completion via Integer Optimization." 2025 IEEE 64th Conference on Decision and Control (CDC), Rio de Janeiro, Brazil, 2025, pp. 4015-4022. [Link]

PREPRINTS

1, **Yongzheng Dai**, "Modified Eigenvalue Method for Nonconvex MIQCQP and Parallel Local Branching," to appear in a special issue in Mathematical Programming Computation. [Link]
Runner up of MIP Workshop 2025 Computational Competition

2, **Yongzheng Dai**, Antonio J. Conejo, Feng Qiu, "A Robust Generation Scheduling Framework to Mitigate Severe Weather Impact," first-round review in European Journal of Operational Research.

3, **Yongzheng Dai**, Chen Chen, "Serial and Parallel Two-Column Probing for Mixed-Integer Programming," minor revision in Mathematical Programming Computation. [Link]
Winner of MIP Workshop 2024 Computational Competition

4, **Yongzheng Dai**, Chen Chen, "Parallelized Conflict Graph Cut Generation," third-round review in Mathematical Programming Computation. [Link]

RESEARCH EXPERIENCE

A Robust Generation Scheduling Framework to Mitigate Severe Weather Impact
Supervised by Dr. Antonio J. Conejo and Dr. Feng Qiu
- Built a tri-level adaptive robust optimization framework (based on MISCOP) for the AC Unit Commitment problem against hurricane trajectories (and the subsequent transmission lines disabled).
- Solved the tri-level model with column-and-constraint generation method and a proposed outer-inner linearized cutting-plane method (for large-scale MISOCP), which results in significant computational savings.

Modified Eigenvalue Approximation for Nonconvex MIQCQP [**Github Link (Unpublished)**]
- Proposed a robust eigenvalue approximation for nonconvex MIQCQP and modified feasibility pumps;
- Proposed a parallel local branching as a primal heuristic for nonconvex MIQCQP;
- Won the runner-up for MIP Workshop 2025 Computational Competition and updated 18 better solutions for QPLIB

Two-Column Probing for MIPs [**Github Link**]
Supervised by Dr. Chen Chen
- Extend the MIPs presolve technique probing to two-column probing, which can provide a potentially stronger reduction. Developed a parallel structure to accelerate two-column probing effectively.
- Experiments demonstrated that the proposed method led to substantial speedups (about 5%) for SCIP on the standard MIPLIB benchmark cases. This work won MIP Workshop 2024 Computational Competition.

Parallelized Conflict Graph Cut Generation[**Github Link**]
Supervised by Dr. Chen Chen
- Proposed a parallel conflict graph management strategy as a preprocessing method for MIPs. Both theoretical analysis and numerical experiments validate near-linear (i.e. ideal) speedups of the parallel method.
- Experiments demonstrated that the proposed method led to substantial speedups (about 10%) for Gurobi on the standard MIPLIB benchmark cases.

Tensor Completion via Integer Programming [**Github Link**]
Supervised by Dr. Chen Chen and Dr. Anil Aswani
- Proposed a new tensor completion method by mixed-integer multilinear programming, which satisfies the information-theoretic rate and can be solved by a Frank-Wolfe-like algorithm (BCG) in a linear number of oracles.
- Linearized the MINLP model and developed a heuristic to solve it effectively. Experiments demonstrated the advantages of our method.

Parallel Algorithms for Projection onto a Simplex [**Github Link**] [**INOFRMSJoC Repo**]
Supervised by Dr. Chen Chen
- Proposed a novel distributed structure that could parallelize almost all serial simplex projection methods. Numerical experiments demonstrated the practical effectiveness of the method.
- Provided theoretical explanations for our new parallel methods, as well as supplied complexity results for both our new algorithms and some existing sequential methods.

SERVICES

Liaison of OSU INFORMS Student Chapter Sept. 2022 - Apr. 2023
Institute for Operations Research and the Management Sciences

Volunteer for ISE Graduate Orientation Autumn, 2021 - Autumn, 2022
Department of Industrial and System Engineering, The Ohio State University