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. [Paper Link, Github Link, INOFRMSJoC Repo]

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. [Paper Link, Github Link]

Yongzheng Dai, Chen Chen, "Parallelized Conflict Graph Cut Generation," published online in Mathematical Programming Computation. [Paper Link, Github Link]

Yongzheng Dai, Chen Chen, "Serial and Parallel Two-Column Probing for Mixed-Integer Programming," accepted by Mathematical Programming Computation. [Paper Link, Github Link]
Winner of MIP Workshop 2024 Computational Competition

PREPRINTS

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

Yongzheng Dai, Antonio J. Conejo, Feng Qiu, "Scheduling Electricity Production Units to Mitigate Severe Weather Impact: An Efficient Computational Implementation," first-round review in Computers & Operational Research.

Yongzheng Dai, "Progressive Integrality Outer-Inner Approximation for AC Unit Commitment with Conic Formulation." [Paper Link]

Yongzheng Dai, Antonio J. Conejo, "Solving the Conic Formulation of the Security-Constrained Unit Commitment Problem via Decomposition," submitted to INFORMS Journal on Computing.

UNPUBLISHED RESEARCH EXPERIENCE

Progressive Integrality Outer-Inner Approximation for AC Unit Commitment with Conic Formulation [**Github Link (Unpublished)**]
- We proposed a progressive integrality outer-inner approximation method to solve large-scale second-order cone relaxations of the AC network-constrained unit commitment problem (SOC AC-UC).
- The proposed method incorporates alternating solving outer approximation and inner approximation to the SOC AC-UC, a progressive integrality strategy, and time-block Benders-type cuts for expedited convergence.

Solving the Conic Formulation of the Security-Constrained Unit Commitment Problem via Decomposition
Supervised by Dr. Antonio J. Conejo
- We proposed a hybrid decomposition method, which is based on Benders decomposition, column and constraint generation, and an outer-inner approximation for MISOCPs, for efficiently solving the second-order cone relaxations of the $N-1$ security-constrained AC unit commitment problem.

Scheduling Electricity Production Units to Mitigate Severe Weather Impact: An Efficient Computational Implementation
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

SERVICES

Session Chairs for Multiple INFORMS Conferences 2025 - 2026
Institute for Operations Research and the Management Sciences

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 Systems Engineering, The Ohio State University