YUWEN CHEN

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EDUCATION

University of Oxford Oct. 2020 - July 2024 (Expected)
DPhil Candidate in Engineering Science
Research topic: numerical algorithms for conic optimization

ETH, Zurich Sept. 2017 - Apr. 2020
M.S. in Electrical Engineering and Information Technology
Overall GPA: 5.73/6

Shanghai Jiao Tong University Sept. 2013 - Jul. 2017
B.S. in Electric Power Engineering and Automation
Overall GPA: 90/100

ONGING RESEARCH WORK

Interior Point Solver for Conic Optimization Jan. 2022 - Current
supervised by Prof. Paul Goulart, University of Oxford

- Building up an interior point solver in Julia with faster performance for problems with quadratic objectives compared with the state-of-art numerical solvers.
- Supporting a variety of conic optimization beyond LP and QP, e.g. second-order, semidefinite, exponential cones, power cones.
- An efficient interior point method for a class of nonsymmetric cones, which is 2-4x faster than the equivalent Mosek implementation of power cones
- Solver link: `https://github.com/oxfordcontrol/Clarabel.jl`.
- ***Our Rust version has become one of the default solver in cvxpy, which is the most popular optimization platform in python.***
- The research paper is coming out soon

Scalable Semidefinite Programming (SDP) Feb. 2021 - Sept. 2022
supervised by Prof. Paul Goulart, University of Oxford

- Having proposed a Burer-Monteiro ADMM for block-diagonally constrained SDPs with provable 1st & 2nd-order global convergence and current experiments showed it is faster than the state-of-art algorithms for large-scale SDPs.
- ***Numerical results shows our GPU (RX1070 on a laptop) implementation can solve block-diagonally constrained SDPs of*** $10,000$ ***dimensional matrix variables to the accuracy*** 10^{-4} ***within 2s.***

Early Termination in Mixed Integer Conic Programming Oct. 2020 - March. 2023
supervised by Prof. Paul Goulart, University of Oxford

- Proposed an ADMM-based early termination technique for Mixed Integer Programming with provable feasibility, shortened the time for computation.
- Generalize the early termination technique for both first-order (operator splitting methods) and second-order (interior point methods) primal dual algorithms.

· ***Numerical results show that we can save*** $10\% - 20\%$ ***time in a mixed integer conic problem.***

PREVIOUS RESEARCH WORK

Derivative-free adaptive methods Sept. 2019 - Mar. 2020
Master Thesis, supervised by Dr. Aurelien Lucchi and Prof. Thomas Hofmann
Data Analytic Laboratory, ETH

· Combined various variance-reduction frameworks with gradient-free algorithm method and proved a faster convergence rate for the proposed variance-reduction+momentum+gradient-free algorithm on finite-sum convex functions and extended it to nonconvex functions.

Distributed zeroth-order algorithm in stochastic game Feb. 2019 - Aug. 2019
Semester Project, supervised by Dr. Suli Zou and Prof. John Lygeros
Automatic Control Laboratory, ETH

· Extended an existing gradient-free algorithm to the Generalized Nash Equilibrium model and proved the convergence of it

Learning Trajectory Optimizer for Quadrotor's Camera Motion Mar. 2018 - Jun. 2018
Semester Project, supervised by Mr. Christoph Gebhardt and Prof. Otmar Hilliges
Advanced Interactive Technologies Lab, ETH

· Applied the Gaussian Process method to learn weights of trajectory optimizer of the quadrotor's camera

PUBLICATIONS

· *An Efficient IPM Implementation for A Class of Nonsymmetric Cones*, **Yuwen Chen** and Paul Goulart, *arXiv* (Submitted to *Journal of Optimization Theory and Applications*)
· *A Unified Early Termination Technique for Primal-dual Algorithms in Mixed Integer Conic Programming*, **Yuwen Chen** and Paul Goulart, *arXiv* (Accepted by *Control Systems Letters (L-CSS)*)
· *Burer-Monteiro ADMM for Large-Scale SDPs*, **Yuwen Chen** and Paul Goulart, *arXiv* (Submitted to *Mathematical Programming*)
· *Design Optimization for Bellow Soft Pneumatic Actuators in Shape-Matching*, Yao Yao, **Yuwen Chen**, Liang He, Perla Maiolino, 2023 IEEE International Conference on Soft Robotics (RoboSoft)
· *An Early Termination Technique for ADMM in Mixed Integer Conic Programming*, **Yuwen Chen** and Paul Goulart, 20th European Control Conference, ECC 2022
· *Burer-Monteiro ADMM for Large-Scale Diagonally Constrained SDPs*, **Yuwen Chen** and Paul Goulart, 20th European Control Conference, ECC 2022
· *An Accelerated DFO Algorithm for Finite-sum Convex Functions*, **Yuwen Chen**, Antonio Orvieto and Aurelien Lucchi, 37th International Conference on Machine Learning, ICML 2020
· *Game Theoretic Stochastic Energy Coordination under A Distributed Zeroth-order Algorithm*, **Yuwen Chen**, Suli Zou and John Lygeros, 21st IFAC World Congress, 2020

WORKING EXPERIENCE

Power Electronics Engineer Nov. 2016 - Apr. 2017
Internship, supervised by Carlton Zhang *Signify (Philips Lighting), Shanghai*

· Modelled parasitic parameters of the Flyback Converter and applied small-signal analysis for the converter; summarizing the modelling of the converter into a technical report

HONOURS & AWARDS

- EPSRC Impact Acceleration Account (IAA) Award (£79,826) 2023
- Clarendon Scholarship, University of Oxford (top 10%) 2020-2024
- Outstanding undergraduate of Shanghai Jiao Tong University (top 10%) 2017
- Academic Excellence Scholarship of Shanghai Jiao Tong University 2016
- Academic Excellence Scholarship of Shanghai Jiao Tong University 2015
- Academic Excellence Scholarship of Shanghai Jiao Tong University 2014
- First Class Prize of East China University-level Intelligent Car Race 2015

RELATED SKILLS & BACKGROUND

- **Academic background**: Convex optimization, nonlinear programming, numerical linear algebra, numerical optimization, model predictive control, machine learning, game theory, linear system theory, distributed optimization

- **Coding skills**: Julia, Matlab, Python, Latex, C++, Rust, CUDA