Chenyang Yuan

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Work

Research Scientist 2022–Present
Toyota Research Institute, Cambridge, MA

Education

PhD in Electrical Engineering and Computer Science 2018 – 2022
Massachusetts Institute of Technology, Cambridge, MA GPA: 5/5
Thesis: *Polynomial Structure in Semidefinite Relaxations and Non-Convex Formulations*

SM in Electrical Engineering and Computer Science 2016 – 2018
Massachusetts Institute of Technology, Cambridge, MA GPA: 5/5
Thesis: *Focused Polynomials, Random Projections and Approximation Algorithms for Polynomial Optimization over the Sphere*

BA in Computer Science 2012–2016
The University of Berkeley at California, Berkeley, CA GPA: 3.94/4

Preprints

Nikos Arechiga*, Frank Permenter*, Binyang Song* and **Chenyang Yuan***, " Drag-guided diffusion models for vehicle image generation", *Preprint, arxiv:2306.09935*

Frank Permenter* and **Chenyang Yuan***, "Interpreting and Improving Diffusion Models Using the Euclidean Distance Function", *Preprint, arxiv:2306.04848*

Chenyang Yuan and Pablo Parrilo, "Rounding Semidefinite Relaxations of Quadratic Maps", *In preparation*

Chenyang Yuan and Pablo Parrilo, "Semidefinite Relaxations of Products of Nonnegative Forms on the Sphere", *Preprint, arxiv:2102.13220*

(* denotes equal contribution / alphabetical ordering)

Publications

Binyang Song, **Chenyang Yuan**, Frank Permenter, Nikos Arechiga and Faez Ahmed, "Surrogate Modeling of Car Drag Coefficient with Depth and Normal Renderings", *International Design Engineering Technical Conferences (IDETC 2023)*

Benoît Legat*, **Chenyang Yuan*** and Pablo Parrilo, "Low Rank Univariate Sum of Squares Has No Spurious Local Minima", *To appear in SIAM Journal on Optimization (SIOPT 2023)*

Chenyang Yuan and Pablo Parrilo, "Maximizing Products of Linear Forms, and the Permanent of Positive Semidefinite Matrices", *Mathematical Programming Series A (MAPL 2022)*

J. Thai, **C. Yuan**, A. Bayen, "Resiliency of Mobility-as-a-Service Systems to Denial-of-Service Attacks", *IEEE Transactions on Control of Network Systems (TCNS 2016)*

C. Yuan, J. Thai, A. Bayen, "ZUbers against ZLyfts Apocalypse: An Analysis Framework for DoS Attacks on Mobility-as-a-Service Systems", *ACM/IEEE International Conference on Cyber-Physical Systems (ICCPS 2015)*

(* denotes equal contribution / alphabetical ordering)

Internships

Research Intern, *Lyft Inc.* *June – September 2016*

- Worked with locations team on estimation of travel times using real-time traffic data derived from driver GPS routes.

Undergraduate Student Researcher, *UC Berkeley* *Spring 2015 – Spring 2016*

- With professor Alex Bayen's group, worked on applying optimization to traffic control, inferring route flows of cars from cellular connection data and using queueing theory to investigate possible attacks on on-demand rideshare networks.

Undergraduate Student Researcher, *UC Berkeley* *Spring 2014 – Spring 2015*

- With professor Ras Bodik's group on the synthesis of a layout engine for an experimental browser, Servo, using SAT/SMT solvers.

Software Engineering Intern, *Clover Network Inc.* *June – September 2013*

- Amongst other projects, designed and built an API auto-documentation system and API Explorer.

Programming Skills

Proficient in Python, Julia, PyTorch, Javascript, LaTeX, Emacs, Git, Docker

Experience in Java, C, Rust, Haskell, Scheme, HTML/CSS, Android, SQL, Assembly

Talks

ICCOPT Invited talk in Session on Algorithms for Large-scale Conic and Polynomial Optimization *Jul 2022*
MIT LIDS and Stats Tea Talk *Dec 2021*

INFORMS Annual Meeting Optimization in Julia Session *Oct 2021*

Fields Institute Workshop on Real Algebraic Geometry and Algorithms *Jun 2021*

MIT LIDS Student Conference *Jan 2021*

MIT CS Theory Lunch *Feb 2020*

Teaching

Algebraic Techniques and Semidefinite Programming (6.256), *MIT* *Spring 2021*

Linear Algebra and Optimization (6.S084/18.061), *MIT* *Fall 2020/2021*

Nonlinear Optimization (6.252), *MIT* *Spring 2020*

Efficient Algorithms and Intractable Problems (CS170), *UC Berkeley* *Spring 2016*

Designing Information Devices and Systems (EE16A), *UC Berkeley* *Fall 2015*

Discrete Mathematics and Probability Theory (CS70), *UC Berkeley* *Spring 2015*

Structure and Interpretation of Computer Programs (CS61A), *UC Berkeley* *Fall 2013 – Fall 2014*

Math/Physics Olympiad Trainer, *NUS High School of Math and Science* *March-August 2012*

Selected Software Projects

SumOfSquares.py `https://github.com/yuanchenyang/SumOfSquares.py`
Sum of squares optimization modeller built on top of picos. Features easy access to pseudoexpectation operators for both formulating problems and extracting solutions via rounding algorithms

Interactive SICP Textbook / coding.js `http://xuanji.appspot.com/isicp/1-1-elements.html`
An interactive version of the classic Structure and Interpretation of Computer Programs book, created together with a friend. I wrote the asynchronous Javascript-based Scheme interpreter used on the website.

Selected Awards

Outstanding Course Development and Teaching Award, for developing a new linear algebra course (EE16A) at UC Berkeley *May 2016*

First Place, Cal vs Stanford Big Hack *Apr 2013*
Created a scheme interpreter in C on my TI-89 graphing calculator

Honorable Mention, 12th Asian Physics Olympiad *May 2011*
One of the 8 students representing Singapore in this competition.

Reviewing Experience

Journal of Machine Learning Research (JMLR); SIAM Journal on Optimization (SIOPT); Conference on Decision and Control (CDC); IEEE Control Systems Letters (L-CSS); Optimization Letters; Journal of Combinatorics; International Colloquium on Automata, Languages, and Programming (ICALP); Sum of Squares: Theory and Applications (book chapter)

Selected Coursework

CS: *Berkeley:* Graduate Algorithms and Theory, Compilers, Security, AI, Randomized Algorithms. *MIT:* Advanced Algorithms, Inference and Information, Geometric Computing, Algebraic Techniques and Semidefinite Programming

EE: *Berkeley:* Information Theory, *MIT:* Dynamic Systems and Control

Math: *Berkeley:* Complex Analysis, Honors Abstract Algebra. *MIT:* High-dimensional Statistics

Physics: *Berkeley:* Analytical Mechanics, Quantum Mechanics, General Relativity, Electronics Lab