Alex L. Wang

Curriculum Vitae
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ACADEMIC POSITIONS

Purdue University   Jan. 2023–present
Assistant Professor in Krannert School of Management, Quantitative Methods

Centrum Wiskunde & Informatica   July 2022–Dec. 2022
Postdoctoral Researcher
Advisor: Monique Laurent

EDUCATION

Carnegie Mellon University   Sept. 2017–June 2022
Ph.D., Computer Science
Advisor: Fatma Kılınç-Karzan
Thesis: On semidefinite program relaxations of quadratically constrained quadratic programs

Northwestern University   Sept. 2013–June 2017
B.S., Double Major Computer Science, Mathematics
Honors: *summa cum laude*

PUBLICATIONS

Articles under review

Accelerated Objective Gap and Gradient Norm Convergence for Gradient Descent via Long Steps
(α) B. Grimmer, K. Shu, and A. L. Wang

Sharpness and well-conditioning of nonsmooth convex formulations in statistical signal recovery
(α) L. Ding and A. L. Wang

New notions of simultaneous diagonalizability of quadratic forms with applications to QCQPs
A. L. Wang and R. Jiang

Journal publications

Hidden convexity and algorithms in constrained optimization over the rotation group
(α) A. Ramachandran, K. Shu, and A. L. Wang
Math. Oper. Res., 2024

On semidefinite descriptions for convex hulls of quadratic programs
A. L. Wang and F. Kılınç-Karzan
Oper. Res. Letters, 2024

Accelerated first-order methods for a class of semidefinite programs
A. L. Wang and F. Kılınç-Karzan
Math. Program., 2024

Implicit regularity and linear convergence for the generalized trust-region subproblem
A. L. Wang and Y. Lu and F. Kılınç-Karzan
SIAM J. Optim., 2023

(α) indicates alphabetical author order

Necessary and sufficient conditions for rank-one generated cones
(α) C. Argue, F. Kılınç-Karzan, and A. L. Wang
Math. Oper. Res., 2021

Exactness in SDP relaxations of QCQPs: Theory and applications
(α) F. Kılınç-Karzan and A. L. Wang
Tut. in Oper. Res., 2021

On the tightness of SDP relaxations of QCQPs
A. L. Wang and F. Kılınç-Karzan
Math. Program., 2021
Winner of INFORMS Optimization Society's 2021 Student Paper Prize

The generalized trust region subproblem: Solution complexity and convex hull results
A. L. Wang and F. Kılınç-Karzan
Math. Program., 2020

Refereed conference proceedings

Solving Stackelberg prediction games with least squares loss via spherically constrained least squares reformulation
J. Wang and W. Huang and R. Jiang and X. Li and A. L. Wang
International Conf. on Machine Learning
Winner of ICML 2022 Outstanding Paper Award (1/10)

On convex hulls of epigraphs of QCQPs
A. L. Wang and F. Kılınç-Karzan
Integer Program. and Comb. Optim., 2020

Hardy-Muckenhoupt bounds for Laplacian eigenvalues
(α) G. L. Miller, N. J. Walkington, and A. L. Wang
Approx. Algorithms for Comb. Optim. Prob., 2019

Clustering stable instances of Euclidean k-means
(α) A. Dutta, A. Vijayaraghavan, and A. L. Wang
Adv. in Neural Inf. Process. Syst., 2017

Talks

Hidden convexity, optimization, and algorithms on rotation matrices
International Symposium on Mathematical Programming, *Montréal, Canada*   July 2024

New first-order methods in modern/classical settings
The University of Sydney Business School Research Seminar, *Sydney, Australia*   Nov. 2023
Daniels School of Business Quantitative Methods Seminar, *West Lafayette, IN*   Sept. 2023

Sharp exact penalty formulations in signal recovery
INFORMS Annual Meeting, *Phoenix, AZ*   Oct. 2023
ICIAM23 (Int. Congr. on Ind. and Appl. Math.), *Tokyo, Japan*   Aug. 2023

Accelerated first-order methods for a class of semidefinite programs
OP23 (SIAM Conf. on Optim.), *Seattle, WA*   May. 2023
Workshop on semidefinite and polynomial optimization, *Amsterdam, Netherlands*   Aug. 2022
ICCOPT (Int. Conf. on Continuous Optim.), *Bethlehem, PA*   July 2022
Networks and Optimization Seminar, Centrum Wiskunde & Informatica, *Online*   Feb. 2022

Accurately and efficiently solving structured nonconvex optimization problems
ISE, University of Illinois Urbana-Champaign, *Online*   Mar. 2022
Quantitative Methods, Purdue University Krannert School of Business, *West Lafayette, IN*   Jan. 2022
Mathematics of Data & Decisions Seminar, UC Davis, *Online*   Jan. 2022
Argonne National Labroratory, *Online*   Jan. 2022
CAAM Colloquium, Rice University, *Houston, TX*   Dec. 2021

Exactness in SDP relaxations of QCQPs: Theory and applications
INFORMS Annual Meeting, *invited tutorial talk*, *Anaheim, CA*   Oct. 2021

New notions of simultaneous diagonalizability of quadratic forms

INFORMS Annual Meeting, *Anaheim, CA*	Oct. 2021
MOPTA (Model. and Optim.: Theory and Appl.), *Online*	Aug. 2021
CMU Theory Lunch, *Online*	Apr. 2021

A geometric treatment of SDP exactness in QCQPs and its applications

INFORMS Annual Meeting, *Online*	Nov. 2020

Exactness in semidefinite programming

CMU ChemE Seminar, *Online*	Oct. 2020
CMU Theory Lunch, *Online*	Sept. 2020

On convex hulls of epigraphs of QCQPs

IPCO (Conf. on Integer Programming and Comb. Optim.), *Online*	June 2020

Sufficient conditions for exact SDP reformulations of QCQPs

INFORMS Annual Meeting, *Anaheim, CA*	Oct. 2021
OP20 (SIAM Conf. on Optim.), *canceled due to COVID-19*	May 2020
IOS (INFORMS Optim. Soc. Conf.), *canceled due to COVID-19*	Mar. 2020
INFORMS Annual Meeting, *Seattle, WA*	Oct. 2019

Hardy-Muckenhoupt bounds for Laplacian eigenvalues

APPROX (Int. Workshop on Approx. Algorithms for Comb. Optim. Prob.), *Boston, MA*	Sept. 2019
CMU Theory Lunch, *Pittsburgh, PA*	May 2019

A linear-time algorithm for generalized trust region subproblem based on a convex quadratic reformulation

ICCOPT (Int. Conf. on Continuous Optim.), *Berlin, Germany*	Aug. 2019

TEACHING

Purdue University

MGMT 690 Convex Optimization	Spring 2024
MGMT 306 Management Science, Instructor	Spring 2023, Spring 2024

Carnegie Mellon University

Optimization, Head Teaching Assistant	Spring 2021
Advanced Algorithms, Teaching Assistant	Fall 2020
Modern Convex Optimization, Teaching Assistant	Spring 2020

Northwestern University

Mathematical Foundations of CS, Teaching Assistant	Fall 2016

HONORS AND AWARDS

ICML 2022 Outstanding Paper Award   July 2022

Awarded to *Solving Stackelberg prediction games with least squares loss via a spherically constrained least squares reformulation*

CMU Graduate Student Service Award   Mar. 2022

Group award for development of *DEI in Computer Science and Society* course

INFORMS Optimization Society Best Student Paper Award   Aug. 2021

Awarded to *On the tightness of SDP relaxations of QCQPs*

summa cum laude, Northwestern University   June 2017

Awarded to the top 5% of the graduating class

Outstanding Senior in CS, Northwestern University   June 2017

1 of 2 recipients

Tau Beta Pi Engineering Honor Society   Nov. 2015

PROFESSIONAL ACTIVITIES

Journal and conference reviewing

INFORMS J. Optim., IPCO, J. Optim. Theory Appl., Math. Oper. Res., Math. Prog., Optim. Lett., SIAM J. Optim.

INFORMS Optimization Society Conference, Session co-organizer	March 2024
Recent advances in semidefinite programming	
INFORMS Annual Meeting, Session co-organizer	Oct. 2023
The interplay between learning, optimization, and statistics	
SIAM Conference on Optimization, Minisymposium co-organizer	May. 2023
Advances in optimal storage semidefinite programming	
INFORMS Annual Meeting, Session co-organizer(joint with F. Kılınç-Karzan)	Oct. 2021
Recent developments in semidefinite programming	
INFORMS Annual Meeting, Session co-organizer	Nov. 2020
Advances in nonconvex quadratic programs and their relaxations	
SIAM Conference on Optimization, Minisymposium co-organizer	May 2020 (*canceled*)
Recent advances in structure in semidefinite programs	
INFORMS Optimization Society Conference, Session co-organizer	Mar. 2020 (*canceled*)
Semidefinite Programming: Theory and Algorithms	

Departmental service

Graduate Student Teaching Award Committee	Feb. 2022
Graduate Student Ombudsperson	May 2020–May 2022
Doctoral Review Committee, Graduate Student Member	May 2020–May 2022
DEI in Computer Science and Society Course, Working Group	Sept. 2020–Jan. 2021
Member of working group designing a course on DEI for first-year Ph.D. students	

Advising and mentoring

Ph.D. Thesis committee

Yao Ji, Purdue University, Industrial Engineering	2024 Summer (Expected)

Graduate or undergraduate project advisor

Yunlei Lu, Undergraduate student from Peking University	Jan. 2021–Feb. 2023
First placement: Master of Scientific Computing program, Courant Institute of Mathematical Sciences, NYU	

Professional affiliations

SIAM (Society for Industrial and Applied Mathematics), Member

INFORMS (Institute for Operations Research and the Management Sciences), Member

MOS (Mathematical Optimization Society), Member