

SHAONING HAN

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RESEARCH INTERESTS

- **Methodologies:** mixed-integer programming, nonconvex and nonsmooth optimization, submodular optimization, variational inequality, (parametric) pivoting methods for LP/QP/LCP
- **Applications:** inference problems with combinatorial structures in statistics and machine learning, portfolio optimization and risk, signal denoising, revenue management

ACADEMIC EMPLOYMENT

Postdoctoral researcher, University of Southern California, Aug 2022 -Present
• Advisor: Jong-Shi Pang

EDUCATION

Ph.D in Industrial Engineering, University of Southern California, August 2022
• Advisor: Andrés Gómez
B.S. in Mathematics, University of Science and Technology of China, June 2017

JOURNAL PAPERS

1. Han, S., Gómez, A., and Atamtürk, A. (2023a). 2×2 -convexifications for convex quadratic optimization with indicator variables. *Mathematical Programming*
2. He, Z., Han, S., Gómez, A., Cui, Y., and Pang, J.-S. (2023). Comparing solution paths of sparse quadratic minimization with a Stieltjes matrix. *Mathematical Programming*
3. Pang, J.-S. and Han, S. (2023). Some strongly polynomially solvable convex quadratic programs with bounded variables. *SIAM Journal on Optimization*, 33(2):899–920
4. Han, S., Gómez, A., and Atamtürk, A. (2022a). The equivalence of optimal perspective formulation and Shor’s SDP for quadratic programs with indicator variables. *Operations Research Letters*, 50(2):195–198
5. Han, S., Gómez, A., and Prokopyev, O. A. (2022c). Fractional 0-1 programming and submodularity. *Journal of Global Optimization*, 84:77–93
6. Atamtürk, A., Gómez, A., and Han, S. (2021). Sparse and smooth signal estimation: Convexification of ℓ_0 -formulations. *Journal of Machine Learning Research*, 22(52):1–43

PREPRINTS

1. Han, S. and Pang, J.-S. (2022). Continuous selections of solutions to parametric variational inequalities. *Minor revision under review at SIAM Journal on Optimization*
2. Han, S. and Gómez, A. (2021a). Compact extended formulations for low-rank functions with indicator variables. *Major revision under review at Mathematics of Operations Research*
3. Han, S., Zhang, X., and Pang, J.-S. (2023b). On the number of pivots of Dantzig’s simplex methods for linear and convex quadratic programs. *Major revision under review at Operations Research Letters*
4. Han, S., Gómez, A., and Pang, J.-S. (2022b). On polynomial-time solvability of combinatorial Markov random fields. *Submitted*
5. Han, S. and Gómez, A. (2021b). Single-neuron convexifications for binarized neural networks. *Technical Report*

**TEACHING
EXPERIENCE**

- ISE 530 (MS) Optimization Methods for Analytics
Instructor, University of Southern California, Fall 2023
- ISE 599 (PhD) Mixed-Integer Programming
Teaching Assistant, University of Southern California, Spring 2021
- ISE 530 (MS) Optimization Methods for Analytics
Teaching Assistant, University of Southern California, Fall 2019
- ENGR 0020 (BS) Probability and Statistics for Engineers
Teaching Assistant, University of Pittsburgh, Spring&Fall 2018 / Spring 2019
- IE 2086 (MS) Decision Models
Teaching Assistant, University of Pittsburgh, Fall 2017

**INVITED
TALKS**

- *On the convex hull of mixed-integer nonlinear submodular minimization.* INFORMS Annual Meeting, Phoenix, AZ, October 2023
- *Mixed-binary convex quadratic optimization and its applications in inference with sparsity.* The Academy of Mathematics and Systems Science (AMSS) of the Chinese Academy of Sciences, March 2023
- *On polynomial-time solvability of combinatorial Markov random fields.* INFORMS Annual Meeting, Indianapolis, IN, October 2022
- *Convexification for low-rank functions with indicator variables.* International Conference on Continuous Optimization, Bethlehem, PA, July 2022
- *Strongly polynomial algorithm for box-constrained quadratic programs with H_0 -matrix.* INFORMS Optimization Society Conference, Greenville, SC, March 2022
- *Fractional 0-1 programming and submodularity.* INFORMS Annual Meeting, Anaheim, CA, October 2021
- *On SDP formulations for quadratic optimization with indicator variables.* INFORMS Annual Meeting, virtual, November 2020

**PROFESSIONAL Journal/Conference Reviewer
ACTIVITIES**

- Mathematical Programming
- SIAM Journal on Optimization
- Mathematics of Operations Research
- Journal of Global Optimization
- Optimization Letters
- IPCO

Invited Session Chair

- Recent advances in nonsmooth optimization, 2023 INFORMS Annual Meeting, Phoenix, AZ, October 2023
- Recent advances in mixed-integer nonlinear programming, 2023 INFORMS Annual Meeting, Phoenix, AZ, October 2023
- Algorithms for discrete optimization problems, 2022 INFORMS Optimization Society Conference, Greenville, SC, March 2022

Member

- INFORMS 2018 - Present
- INFORMS Optimization Society 2018 - Present

**VOLUNTEER
EXPERIENCE**

Virtual volunteer at INFORMS Annual Meeting, Anaheim, CA, October 2021.
Responsible for five rooms during one shift day to ensure the smooth progress of meetings.

SKILLS

Python, Matlab, Julia, PyTorch, Gurobi, Mosek