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, data science, 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

HONORS & AWARDS

- Finalist (top 10%), INFORMS Junior Faculty Interest Group (JFIG) Paper Competition, 2023
  for the paper "Compact extended formulations for low-rank functions with indicator variables", joint work with Andrés Gómez

JOURNAL PAPERS

1. Han, S., Gómez, A., and Atamtürk, A. (2023b). 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*, 22:1–43

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*
   • JFIG Paper Competition Finalist, INFORMS 2023.
3. Han, S., Zhang, X., and Pang, J.-S. (2023c). On the number of pivots of Dantzig's simplex methods for linear and convex quadratic programs. *Minor revision under review at Operations Research Letters*
4. Han, S., Cui, Y., and Pang, J.-S. (2023a). Analysis of a class of minimization problems lacking lower semicontinuity. *Submitted*

5. Han, S., Gómez, A., and Pang, J.-S. (2022b). On polynomial-time solvability of combinatorial Markov random fields. *Submitted*
6. Han, S. and Gómez, A. (2021b). Single-neuron convexifications for binarized neural networks. *Technical Report*

TEACHING EXPERIENCE

Instructor

- *ISE 530* (MS)
  Optimization Methods for Data Analytics, University of Southern California, Fall 2023

Teaching Assistant

- *ISE 599* (PhD)
  Mixed-Integer Programming, University of Southern California, Spring 2021
- *ISE 530* (MS)
  Optimization Methods for Analytics, University of Southern California, Fall 2019
- *ENGR 0020* (BS)
  Prob & Stat for Engineers, University of Pittsburgh, Spring & Fall 2018 / Spring 2019
- *IE 2086* (MS)
  Decision Models, 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

SERVICE & PROFESSIONAL ACTIVITIES

Journal/Conference Reviewer

- Mathematical Programming
- SIAM Journal on Optimization
- Operations Research
- Mathematics of Operations Research
- Journal of Global Optimization
- Optimization Letters
- Conference on Integer Programming and Combinatorial Optimization (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
- INFORMS Junior Faculty Interest Group (JFIG) 2023 – Present
- INFORMS Computing Society (ICS) 2023 – 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.