Andrés Gómez

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RESEARCH INTERESTS

Mixed-integer optimization, Nonlinear optimization, Conic optimization,
Optimization models in statistics, machine learning, finance and revenue management

ACADEMIC EMPLOYMENT

University of Southern California, Los Angeles, CA Fall 2019 -Present
Department of Industrial & Systems Engineering
Assistant Professor

University of Pittsburgh, Pittsburgh, PA Fall 2017 -Summer 2019
Department of Industrial Engineering
Assistant Professor

EDUCATION

University of California, Berkeley, CA 2013-2017
Ph.D., Industrial Engineering and Operations Research
M.S., Industrial Engineering and Operations Research

Universidad de los Andes, Bogotá, Colombia 2006-2012
B.S., Mathematics
B.S., Computer Science

SUBMITTED PAPERS

1. Gómez A. Strong formulations for conic quadratic optimization with indicator variables. *Submitted. JFIG Paper Competition Finalist, INFORMS 2018.*

2. Gómez A and Prokopyev O. A mixed-integer fractional optimization approach to best subset selection. *Submitted.*

3. Atamtürk A, Gómez A and Han S. Sparse and smooth signal estimation: Convexification of L0 formulations. *Submitted.*

4. Gómez A. Submodularity and valid inequalities in nonlinear optimization with indicator variables. *Submitted.*

5. Atamtürk A and Gómez A. Rank one convexifications for sparse regression. *Submitted.*

6. Han S, Gómez A and Prokopyev O. Assortment optimization and submodularity. *Submitted.*

7. Mehmanchi E, Gómez A and Prokopyev O. Solving a class of feature selection problems via fractional 0-1 programming. *Submitted.*

8. Gómez A. Outlier detection in time series via mixed-integer conic quadratic optimization. *Submitted.*

JOURNAL PAPERS

1. Mehmanchi E, Gómez A and Prokopyev O (2019) Fractional 0–1 programs: Links between mixed-integer linear and conic quadratic formulations. *Journal of Global Optimization, 75:273-339.*

2. Mehmanchi E, Gillen C, Gómez A and Prokopyev O (2019) On robust fractional 0-1 programming. *Forthcoming in INFORMS Journal on Optimization.*

3. Atamtürk A and Gómez A (2019+) Submodularity in conic quadratic mixed 0-1 optimization. *Forthcoming in Operations Research.*

4. Atamtürk A and Gómez A (2019) Simplex QP-based methods for minimization of a conic quadratic function over polyhedra. *Mathematical Programming Computation, 11:311-340.*

5. Atamtürk A and Gómez A (2018) Strong formulations for quadratic optimization with M-matrices and indicator variables. *Mathematical Programming, 170:141-176.*

6. Atamtürk A and Gómez A (2017) Maximizing a class of utility functions over the vertices of a polytope. *Operations Research, 65:433-445.*

7. Atamtürk A, Gómez A and Küçükyavuz S (2016) Three-partition inequalities for constant capacity fixed-charge network flow problems. *Networks, 67:299-315.*

8. Gómez A, Mariño R, Akhavan-Tabatabaei R, Medaglia A and Mendoza J (2016) On modeling stochastic travel and service times in vehicle routing. *Transportation Science, 50:627-641.*

CONFERENCE PROCEEDINGS

1. Wei L, Gómez A and Küçükyavuz S (2020) On the convexification of constrained quadratic optimization problems with indicator variables. *Forthcoming in Conference on Integer Programming and Combinatorial Optimization (IPCO) XXI.*

GRANTS

• EAGER: Transforming Additive Nanomanufacturing with Machine Learning. National Science Foundation Grant No. 1930582 (2019-2021). Total award amount: $284,121. Role: co-PI (with PI Paul Leu).

• Transforming Optical Nanomanuacturing Research with Artificial Intelligence. University of Pittsburgh Center for Advanced Manufacturing (2019). Total award amount: $25,000. Role: co-PI (with PI Paul Leu and co-PI Oleg Prokopyev).

• Advancing Fractional Combinatorial Optimization: Computation and Applications. National Science Foundation Grant No. 1818700 (2018-2021). Total award amount: $150,000. Role: PI (with co-PI Oleg Prokopyev).

• Strong formulations for Sparse Optimization in Machine Learning. Central Research Development Fund, University of Pittsburgh (2018-2020). Total award amount: $15,000. Role: PI.

HONORS & AWARDS

JFIG Paper Competition Finalist, INFORMS, 2018
Katta Murty Best Paper Prize, University of California Berkeley, 2017
IEOR First Year Faculty Fellowship, University of California Berkeley, 2014
Colfuturo Fellowship, Colfuturo and Colciencias, 2013
Best Paper Award, IADIS Multi-conference, 2011

TALKS

Submodularity and lifting in nonlinear optimization with indicators
- INFORMS Annual Meeting, Seattle, WA, October 2019

Inference with sparsity: Closing the gap between ℓ_1 and ℓ_0 formulations
- INFORMS International Conference, Cancún, Mexico, June 2019
- University of Southern California, CA, March 2019

Strong formulations for conic quadratic optimization with indicator variables
- INFORMS Annual Meeting, Phoenix, AZ, November 2018

On mixed-integer fractional and conic quadratic optimization
- MIP Workshop, Greenville, SC, June 2018

Strong formulations for quadratic optimization with M-matrices and indicators
- ISMP, Bordeaux, France, July 2018
- Carnegie Mellon University, Pittsburgh, PA, January 2018

On exploiting submodularity in mixed-binary conic quadratic optimization
- INFORMS Annual Meeting, Houston, TX, October 2017

Discrete conic quadratic optimization: formulations, relaxations and algorithms
- Universidad de los Andes, Bogotá, Colombia, February 2017
- Cornell University, Ithaca, NY, January 2017
- University of Pittsburgh, Pittsburgh, PA, January 2017

Polymatroid inequalities for p-order conic mixed 0-1 optimization
- INFORMS Annual Meeting, Nashville, TN, November 2016

Maximizing a class of utility functions over the vertices of a polytope
- INFORMS Annual Meeting, Philadelphia, PA, November 2015

Three-partition inequalities for constant capacity fixed-charge network flow problems
- ISMP, Pittsburgh, PA, July 2015
- INFORMS Annual Meeting, San Francisco, CA, November 2014
- Mixed-integer Programming Workshop (poster), Columbus, OH, July 2014

Motion learning problem in robotics using bayes networks
- IADIS Multi-conference on Computer Science and Information Systems, Rome, Italy, July 2011

TEACHING

UNIVERSITY OF SOUTHERN CALIFORNIA

ISE 530 (MS)
Optimization for Analytics — Fall 2019

UNIVERSITY OF PITTSBURGH

IE 3080 (PhD)
Advanced Topics in Operations Research — Spring 2019

ENGR 0020 (BS)
Probability and Statistics for Engineers — Spring 2018

IE 3087 (PhD)
Network-based optimization — Fall 2017

UNIVERSITY OF CALIFORNIA BERKELEY

IEOR 160 (BS)
Teaching assistant
Nonlinear and Discrete Optimization — Spring 2017

UNIVERSIDAD DE LOS ANDES

IIND 4107 (MS)
Teaching assistant
Procesos Estocásticos — Spring 2012

IIND 2106 (BS)
Teaching assistant
Modelos Probabilísticos — Spring 2012

MATE 1214 (BS)
Teaching assistant
Cálculo Integral y Ecuaciones Diferenciales — Spring - Fall 2011

VOLUNTEER EXPERIENCE

Social work with Universidad de los Andes, Bogotá, Colombia Spring 2008
Taught weekly computer training courses to school students from low-income families

Social work with Universidad de los Andes, Bogotá, Colombia Spring 2009
Taught weekly science courses to school students from low-income families

GRADUATE STUDENTS

Current Ph.D. students

- Shaoning Han, Ph.D. expected August 2022

PROFESSIONAL ACTIVITIES

Member

- INFORMS — 2014 - Present
- INFORMS Optimization Society — 2015 - Present
- INFORMS Computing Society — 2018 - Present
- INFORMS Women in ORMS — 2018 - Present
- IISE — 2017 - Present

Session chair

- INFORMS Annual Meeting 2019, *(i)* Recent advances in non-convex optimization, *(ii)* Recent advances in mixed-integer optimization
- INFORMS Annual Meeting 2018, Recent advances in non-convex optimization
- INFORMS Annual Meeting 2016, Recent advances in integer programming

Reviewer

- Computers & Operations Research
- Discrete Optimization
- IEEE Transactions on Sustainable Energy
- European Journal of Operations Research
- IISE Transactions
- INFORMS Journal on Optimization
- Journal of Global Optimization
- Mathematical Programming
- Mathematical Programming Computation
- Mathematics of Operations Research
- Naval Research Logistics
- Networks
- RAIRO - Operations Research
- Operations Research
- Operation Research Letters
- Optimization Letters

- SIAM Journal on Optimization

Co-founder of YOI, Bogotá, Colombia 2013-2016
Built a Revenue Management Software for hotels, including forecasting, overbooking and bid price modules.

Revenue manager, Blue Doors Hotels, Bogotá, Colombia 2012-2013