

Matt Menickelly

Argonne National Laboratory
Mathematics and Computer Science Division
9700 S. Cass Ave.
Lemont, IL 60439

Phone (W): (630) 252-4311
Phone (C): (610) 417-8760
Email: mmenickelly@anl.gov
Website: <http://www.mcs.anl.gov/~menickmj/>
Date Generated: October 31, 2019

Education

- 2017 Ph.D. Industrial Engineering, Lehigh University
- Thesis Title: Random Models in Nonlinear Optimization
- Advisor: Katya Scheinberg
- 2012 M.S. Mathematics, Miami University
- Thesis Title: Fictitious Play Processes in Linear Programming
- Advisor: Doug Ward
- 2010 B.S. Mathematics, Miami University
- Cum laude, with University Honors
- B.A. Music Performance, Minor in Actuarial Science

Research Experience

- Sep '19 - present **Assistant Computational Mathematician - Argonne National Laboratory**
Performing research in optimization, with a focus on derivative-free optimization and scientific machine learning.
- Jun '17 - Aug '19 **Postdoctoral Appointee - Argonne National Laboratory**
Performed research primarily in derivative-free optimization and robust optimization. Supervised by Dr. Stefan Wild.
- Aug '12 - May '17 **Research Assistant - Lehigh University**
Performed research in mathematical optimization, primarily in stochastic nonconvex optimization and derivative-free optimization. Advised by Dr. Katya Scheinberg.
- May '16 - Mar '17 **Supplemental Researcher - Math Science and Analytics - IBM T.J. Watson Research Center**
Started as Research Intern, promoted in October 2016. Performed research in optimization methods for machine learning applications that arose from client projects. Mentored by Dr. Dzung Phan, managed by Dr. Jayant Kalagnanam.
- May '14 - Aug '15 **Givens Associate - Argonne National Laboratory**
Performed research in derivative-free nonsmooth grey-box optimization. Mentored by Drs. Stefan Wild and Jeffrey Larson.

Publications

Journal Articles

- J. Larson, **M. Menickelly**, and S. Wild. Derivative-free Optimization Methods. *Acta Numerica*, 28, 287-404, 2019.
- J. Blanchet, C. Cartis, **M. Menickelly**, and K. Scheinberg. Convergence Rate Analysis of a Stochastic Trust-Region Method for Nonconvex Optimization. *INFORMS Journal on Optimization*, 1(2), 92-119, 2019.
- M. Menickelly** and S. Wild. Derivative-Free Robust Optimization by Outer Approximations. To appear in *Mathematical Programming*, 2019.

S. Leyffer, **M. Menickelly**, T. Munson, C. Vanaret, S. Wild. Nonlinear Robust Optimization. To appear in *Information Systems and Operational Research*, 2019.

R. Chen, **M. Menickelly**, and K. Scheinberg. Stochastic Optimization Using a Trust-Region Method and Random Models. *Mathematical Programming*, 169:447-487, 2018.

A. Ulvestad, **M. Menickelly**, and S. Wild. Accurate, Rapid Identification of Dislocation Lines in Coherent Diffractive Imaging via a Min-Max Optimization Formulation. *AIP Advances*, 8(1), 2018.

J. Larson, **M. Menickelly**, and S. Wild. Manifold Sampling for L1 Nonconvex Optimization. *SIAM Journal on Optimization*, 26(4), 2540-2563, 2016.

Articles in Peer-Reviewed Conference Proceedings

M. Menickelly and S. Wild. Robust Learning of Trimmed Estimators via Manifold Sampling. In proceedings of the 35th International Conference on Machine Learning Workshops (July 2018, Stockholm, Sweden).

D. Phan, T. Ide, J. Kalagnanam, **M. Menickelly**, K. Scheinberg. A Novel ℓ_0 -Constrained Gaussian Graphical Model for Anomaly Localization. In proceedings of the 17th International Conference on Data Mining Workshops (November 2017, New Orleans, USA).

Technical Reports and Papers Under Review

M. Menickelly, O. Günlük, J. Kalagnanam, and K. Scheinberg. Optimal Generalized Decision Trees via Integer Programming. Technical report. <https://arxiv.org/abs/1612.03225>

Research Presentations

Talks Presented

Formulations and Methods for Derivative-Free Optimization Under Uncertainty. ICCOPT 2019. August 6, 2019. Berlin, Germany.

Derivative-Free Robust Data-Fitting via Nonsmooth, Nonconvex Formulations. ICIAM 2019. July 15, 2019. Valencia, Spain.

(Derivative-Free) Methods for Computing Robust Statistics. SIAM Conference on Computational Science and Engineering. March 2, 2019. Spokane, WA.

Derivative-Free Robust Optimization by Outer Approximations. 23rd International Symposium on Mathematical Programming. July 2, 2018. Bordeaux, France.

Derivative-Free Robust Optimization by Outer Approximations. 15th Copper Mountain Conference on Iterative Methods. March 26, 2018. Copper Mountain, CO.

Derivative-Free Robust Optimization by Outer Approximations. INFORMS Optimization Society Conference 2018. March 23, 2018. Denver, CO.

Cardinality-Constrained Sparse Inverse Covariance Estimation: An Algorithm and an Application to Anomaly Localization. LANS Seminar. March 21, 2018. Argonne, IL.

DFO/STORM Approaches to Machine Learning Settings. SIAM Conference on Optimization 2017. May 24, 2017. Vancouver, BC, Canada.

STORM: Stochastic Optimization using Random Models. INFORMS Annual Meeting 2016. November 15, 2016. Nashville, TN.

Probabilistically Fully Linear Models in STORM. 5th International Conference on Continuous Optimization. August 10, 2016. Tokyo, Japan.

Stochastic Optimization Using Random Models. U.S.-Mexico Workshop on Optimization and its Applications. January 5, 2016. Merida, Mexico.

Stochastic Optimization Using a Trust-Region Method and Random Models. INFORMS Annual Meeting 2015. November 1, 2015. Philadelphia, PA.

Unconstrained Stochastic Optimization with Occasionally Dominating Non-i.i.d. Noise. 22nd International Symposium on Mathematical Programming. July 13, 2015. Pittsburgh, PA.

Sudoku, Shidoku, and ... Grobner Bases? An Algebraic & Computer Systems Approach to Counting Boards. AMS/MAA Joint Sessions. January 14, 2010. San Francisco, CA.

Posters Presented

Robust Learning of Trimmed Estimators via Manifold Sampling. DIMACS/TRIPODS/MOFTA. August 14, 2018. Bethlehem, PA.

Robust Derivative-Free Optimization. 2017 ASCR Applied Mathematics PI Meeting. September 11, 2017. Rockville, MD.

Manifold Sampling for L1 Nonconvex Optimization. Workshop on Nonlinear Optimization Algorithms and Industrial Applications. June 2, 2016. Toronto, Canada.

Manifold Sampling for Derivative-Free Nonsmooth Optimization. ACNW (Argonne Chicago Northwestern Wisconsin) Conference. June 1, 2015. Chicago, IL.

Fictitious Play Processes in Linear Programming. NOGLSTP Out to Innovate Conference. October 14, 2012. Columbus, OH.

Awards

- Rossin Doctoral Fellowship, 2014-2017. Lehigh University.
- Dean's Doctoral Student Assistantship, 2012. Lehigh University.

Teaching Experience

University Courses (instructor of record unless otherwise noted)

Lehigh University, Department of Industrial & Systems Engineering

- Introduction to Industrial Engineering Mathematics (Fall 2015).
- Teaching Assistant: Engineering Probability (Fall 2012), Introduction to Stochastic Models in Operations Research (Spring 2013).

Miami University, Department of Mathematics

- Calculus I (Fall 2011, Spring 2012).
- Precalculus (Fall 2010).
- Teaching Assistant: Differential Equations, Calculus II (Spring 2010).

Job-Related Mentoring and Tutoring

- **Argonne National Laboratory** - Supervisor of students:
 - Anuj Bajaj, May-August 2019. NSF-MSGI student, conducted research in variable precision optimization methods, co-supervised with Paul Hovland.
 - Caleb Bugg, May-August 2019, Givens student, conducted research in multiobjective formulations of chance-constrained optimization.
 - Liyuan Cao, May-August 2018. Givens student, conducted research in derivative-free multiobjective optimization.
- **Lehigh University** - HSE Mentor, Aug '14 - May '15. Provided tutoring assistance to HSE (Healthcare Systems Engineering) Masters students in all department quantitative courses (including optimization, statistics, and design of experiments).
- **Miami University** - Department Tutor, Jan '10 - May '10. Provided tutoring assistance to Department of Mathematics undergraduates in lower-level courses (e.g., precalculus, calculus, elementary linear algebra, and introductory differential equations).

Service

Mathematics Community

- **Journal Referee**
 - IMA Journal of Numerical Analysis
 - Journal of Optimization Theory and Applications
 - Optimization and Engineering
 - SIAM Journal on Optimization (**)
 - SIAM Journal on Scientific Computing

- Journal of Open Source Software
- Optimization Methods and Software (*)
- Each (*) indicates one referee report submitted since September 30, 2019.
- **Minisymposium Organization**
 - SIAM CS&E 2019: “Derivative-Free and Global Optimization”
- **Proposal Review**
 - Natural Sciences and Engineering Research Council (NSERC), 2019

Broader Community, Mathematics-Related

- **Afro-Academic, Cultural, Technological and Scientific Olympics (ACT-SO)** - Mentor, Sep '17-present. ACT-SO is an NAACP-sponsored program encouraging the participation of African-American and/or black high school students in STEM fields. I mentored a student's project in autonomous driving via deep neural nets, which won a bronze medal in a regional competition.
- **Valley Youth House (VYH)** - Tutor, Aug '13-May '17. VYH is a nonprofit organization in Pennsylvania that provides assistance and services to homeless and unstably housed children. I offered free tutoring in high school mathematics courses.

University/Institution Service

- **Argonne National Laboratory** - LDRD Proposal Reviewer, 2018
- **Argonne National Laboratory** - CELS Navigator. Jul '18 - present.
- **Lehigh University** - I&SE Student Council, PhD student representative. May '13 - May '14.
- **Lehigh University** - INFORMS University Chapter, Vice President. May '13 - May '14.
- **Lehigh University** - Graduate Student Senate, Senator. Aug '12 - Aug '14.
- **Miami University** - Pi Mu Epsilon, Chapter President. Aug '11 - Aug '12.

Skills

- Comfortable with Matlab and Python. Some experience with R, C/C++, Fortran, and Julia.
- Native English speaker, proficient in Spanish, limited proficiency in Mandarin Chinese.

Professional Memberships

- Institute for Operations Research and the Management Sciences (INFORMS)
- Mathematical Optimization Society (MOS)
- Society for Industrial and Applied Mathematics (SIAM)
- National Organization of Gay & Lesbian Science and Technology Professionals (NOGLSTP)