Ahmad Mousavi

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https://scholar.google.com/citations?user=IStw0S4AAAAJ&hl=en

Experience

- **American University** Washington, DC
  Professorial Lecturer at Department of Mathematics and Statistics 2023-now
- **University of Florida** Gainesville, FL
  Postdoctoral Associate at Informatics Institute 2021-2023
- **University of Minnesota** Minneapolis, MN
  Industrial Postdoctoral Fellow at Institute for Mathematics and its Applications 2019-2021

Education

- **University of Maryland, Baltimore County** Baltimore, MD
  Ph.D. in Applied Mathematics (GPA: 4.00/4.00) 2013-2019
  - Advisor: Prof. Jinglai Shen
  - Thesis topic: Topics in Sparse Recovery via Constrained Optimization: Least Sparsity, Solution Uniqueness, and Constrained Exact Recovery
- **University of Maryland, Baltimore County** Baltimore, MD
  M.Sc. in Applied Mathematics (GPA: 4.00/4.00) 2013-2015
- **Sharif University of Technology** Tehran, Iran
  M.Sc. in Applied Mathematics (GPA: 18.18/20) 2008-2011
- **University of Guilan** Rasht, Iran
  B.Sc. in Applied Mathematics (GPA: 16.93/20) 2004-2008

Research Interests

- General: Data Science, Machine Learning, Deep Learning, Sparse Optimization, Large Scale Optimization, Mathematical Finance, Mathematical Modeling, Quantum Computing, and Numerical Linear Algebra.
- Specific (not restricted to): Support Vector Machines, Penalty Decomposition Method, ℓ_1-Minimization, Greedy Algorithms, Semidefinite Programming, ADMM, Inexact Newton's Methods, Matrix Decomposition, Linear Programming, and so on.

Research Summary

I am an accomplished researcher specializing in sparse optimization, machine learning, data science, and mathematical finance. My work encompasses a diverse range of topics, including support vector machines with regularization, deep learning, compressive sensing, mean-reverting and mean-variance portfolios with sparsity and volatility constraints, decentralized bilevel programming, and density estimation. I have developed innovative algorithms and methods that address complex problems in these areas. My research has been published in reputable journals and has practical applications in real-world scenarios. I am also currently engaged in various data science projects that require novel optimization techniques. My work reflects my commitment to advancing data science and making significant contributions to the scientific community. For further details, please see below, my research statement, and `https://scholar.google.com/citations?user=IStw0S4AAAAJ&hl=en`.

Publications

- **Ahmad Mousavi**, Zheming Gao, Lanshan Han, and Alvin Lim. Quadratic Surface Support Vector Machine with L1 Norm Regularization, Journal of Industrial and Management Optimization 18, no. 3 (2022): 1835-1861, `https://www.aimsciences.org/article/doi/10.3934/jimo.2021046`.

- Hossein Moosaei, **Ahmad Mousavi**, Milan Hladík, and Zheming Gao. Sparse universum quadratic surface support vector machine models for binary classification. Soft Computing (2023). `https://doi.org/10.1007/s00500-023-07860-3`.

- **Ahmad Mousavi** and Jinglai Shen. Solution Uniqueness of Convex Piecewise Affine Functions Based Optimization with Applications to Constrained ℓ_1 Minimization, ESAIM: Control, Optimisation, and Calculus of Variations, Volume 25, p. 56, 2019, `https://www.esaim-cocv.org/articles/cocv/abs/2019/01/cocv180023/cocv180023.html`.

- **Ahmad Mousavi** and Jinglai Shen. A Penalty Decomposition Algorithm with Greedy Improvement for Mean-reverting Portfolios with Sparsity and Volatility Constraints. International Transactions in Operational Research, 2022 Feb 7, `https://onlinelibrary.wiley.com/doi/abs/10.1111/itor.13123`.

- **Ahmad Mousavi** and George Michailidis. Cardinality Constrained Mean-Variance Portfolios: A Penalty Decomposition Algorithm, arXiv, 2023, `https://arxiv.org/abs/2309.16004`.

- **Ahmad Mousavi** and George Michailidis. Mean-Reverting Portfolios with Sparsity and Volatility Constraints, arXiv, 2023, `https://arxiv.org/abs/2305.00203`.

- Parvin Nazari, **Ahmad Mousavi**, Davoud Ataee Tarzanagh, and George Michailidis. A Penalty Based Method for Communication-Efficient Decentralized Bilevel Programming, arXiv, 2022, `https://arxiv.org/abs/2211.04088`.

- Jinglai Shen and **Ahmad Mousavi**. Least Sparsity of p-norm based Optimization Problems with $p > 1$, SIAM Journal on Optimization, Volume 28(3), pp. 2721-2751, 2018, `https://epubs.siam.org/doi/10.1137/17M1140066`.

- **Ahmad Mousavi**, Mohammad Mehdi Rezaee Taghiabadi, and Ramin Ayanzadeh. A Survey on Compressive Sensing: Classical Results and Recent Advancements, Journal of Mathematical Modeling, Vol. 8, No. 3, 2020, pp. 309–344. https://jmm.guilan.ac.ir/article_4155.html.
- Sai Popuri, Nagaraj Neerchal, Amita Mehta, and **Ahmad Mousavi**. Density Estimation using Entropy Maximization for Semi-continuous Data, Digital Signal Processing 116 (2021): 103107, https://www.sciencedirect.com/science/article/abs/pii/S1051200421001469.
- Jinglai Shen and **Ahmad Mousavi**. Exact Support and Vector Recovery of Constrained Sparse Vectors via Constrained Matching Pursuit, arXiv, 2019, https://arxiv.org/abs/1903.07236.
- Ramin Ayanzadeh, **Ahmad Mousavi**, Milton Halem, and Tim Finin. Quantum Annealing Based Binary Compressive Sensing with Matrix Uncertainty, arXiv, 2019, https://arxiv.org/abs/1901.00088.
- Hassan Rezapour, Ramin Nasiri, and **Ahmad Mousavi**. The Hyper-Zagreb Index of Trees and Unicyclic Graphs. Iranian Journal of Mathematical Sciences and Informatics. 2023 Apr 10;18(1):41-54, https://ijmsi.ir/browse.php?a_id=1356&slc_lang=en&sid=1&printcase=1&hbnr=1&hmb=1.
- Hassan Rezapour and **Ahmad Mousavi**. Probability and Statistics (A Comprehensive Book for M.S. Nationwide Examination in Economics and Management Fields, Sobhan-e Mehr Publication, 2013, In Farsi).

Ongoing Projects

- **Ahmad Mousavi**, Hui Zou, Ju Sun, and Yash Travadi. A Low-rank Second-order Minimization Method for Deep Learning.
- **Ahmad Mousavi** and George Michailidis A Two-stage Algorithm for Mean-Reverting Portfolios with Sparsity and Volatility Constraints.
- **Ahmad Mousavi** and Shuzhong Zhang. Sparse and Low-rank Semidefinite Optimization Models.
- **Ahmad Mousavi**, Laura Balzano, and Jon Lee. Sparse Moore-Penrose Pseudoinverse of Low-rank Matrices via ADMM.
- Ramin Ayanzadeh, **Ahmad Mousavi**, Narges Alavisamani, and Moinuddin Qureshi Enigma: Secure and Privacy-Preserving QAOA Execution on Untrusted Quantum Computers.
- Saeed Damadi, **Ahmad Mousavi** and Jinglai Shen. A Sparse Backpropagation Algorithm for Deep Learning.
- Hossein Moosaei, Milan Hladík, **Ahmad Mousavi**, Zheming Gao, and George Michilidis. Quadratic Surface Twin Support Vector Machine for Imbalanced Data.

Honors and Awards

- Associate Postdoctoral Fellowship, Informatics Institute, University of Florida.
- Industrial Postdoctoral Fellowship, Institute for Mathematics and its Applications (IMA), University of Minnesota.

- Outstanding Graduate Research Award in Mathematics, College of Natural and Mathematical Sciences, UMBC, 2019.
- Lodging Support to Attend Foundation of Data Science Summer School, Georgia Institute of Technology, 2019.
- Full Graduate Assistantship from Department of Mathematics and Statistics, University of Maryland, Baltimore County, 2013-2019.
- ICERM Travel and Lodging Support to Attend Optimization Methods in Computer Vision and Image Processing Workshop, Providence, Rhode Island, USA, 2019.
- ICERM Lodging Support to Attend Computational Imaging Workshop, Providence, Rhode Island, USA, 2019.
- SIAM Student Travel Award to Attend SIAM Annual Meeting, Portland, Oregon, USA, 2018.
- UMBC Graduate School Professional Development Grant to Attend SIAM Annual Meeting, 2018, Portland, Oregon, USA.
- UMBC Graduate School Professional Development Grant to Attend Optimization Methods in Computer Vision and Image Processing Workshop, Providence, Rhode Island, USA, 2019.
- Ranked 13th in Nationwide Entrance Examination for Ph.D. Program in Mathematics, Iran, April 2011.
- Ranked 16th among 10763 Participants in the Nationwide Entrance Examination for M.S. Program in Mathematics, Iran, February 2008.
- Ranked 4th among Fellow M.S. Students in Applied Mathematics, Department of Mathematical Sciences, Sharif University of Technology.
- Ranked 1st among Fellow B.S. Students, Faculty of Mathematical Sciences, The University of Guilan.
- Accepted with Full Reimbursement for Autumn School Algorithmic Optimization, Trier University, 2016 (However, I could not attend).

Work Experience

- Research and Development Intern, Precima, R&D division, Chicago, IL, Summer 2019.

Conference/Workshops Presentation and Attendance

- (Presentation) Some Topics in Sparse Optimization, `http://www.norbertwiener.umd.edu/seminars/`, The Norbert Wiener Center, University of Maryland, College Park, MD, 2018.
- (Presentation) Solution Uniqueness of Convex Piecewise Affine Functions Based Optimization with Applications to Constrained ℓ_1 Minimization, `http://meetings.siam.org/sess/dsp_programsess.cfm?SESSIONCODE=65264`, SIAM Annual Meeting, Portland, OR, 2018.
- (Poster Presentation) Solution Uniqueness of Convex Piecewise Affine Functions Based Optimization with Applications to Constrained ℓ_1 Minimization. Princeton Day of Optimization, 2018, ICERM Computational Imaging Workshop, 2019, and ICERM Optimization Methods in Computer Vision and Image Processing Workshop, 2019.

- (Presentation) A Mathematical Introduction to Compressive Sensing, University of Maryland, Baltimore County, Optimization Seminar, Baltimore, MD, 2016.
- (Attendance) Workshop on Intersections between Control, Learning, and Optimization, UCLA, Los Angles, CA., 2019.
- (Attendance) SIAM Annual Meeting, Pittsburgh, PA, 2017.
- (Attendance) American Mathematical Society Spring Eastern Sectional Meeting, Baltimore, MD, 2014.
- Attendance: 3rd and 4th International Conference of Iranian Operations Research Society, Tehran and Rasht, Iran, May 2010 and 2011.
- (Attendance) 3rd and 4th Workshop on Optimization and its Applications, Tehran, Iran, 2011 and 2012.
- (Attendance) 40th Annual Iranian Mathematics Conference, Tehran, Iran, 2009.

Teaching Experience

- Professorial Lecturer at American University.
  - DATA 412/612: Statistical Programming in R, Fall 2023.
  - MATH 170: Precalculus Mathematics, Fall 2023.
- Instructor at University of Maryland, Baltimore County.
  - MATH 225: Introduction to Differential Equations, Summer and Winter 2018, and Winter 2019.
- Instructor at Islamic Azad University.
  - Numerical Computations: Spring 2016.
- Teaching Assistant at University of Maryland, Baltimore County.
  - MATH 152: Calculus and Analytic Geometry II, Fall 2014, Spring 2015, Fall 2015, Fall 2016, Spring 2017, Summer 2017.
  - MATH 151: Calculus and Analytic Geometry I, Summer 2015, Fall 2017, Fall 2018.
  - MATH 155: Applied Calculus, Spring 2014.
- Teaching Assistant at Sharif University of Technology.
  - Introduction to Differential Equations, Spring 2008, Fall 2009.

Other Scientific Activities

- Reviewed for many scientific journals such as IEEE Signal Processing, Journal of Optimization Theory and Applications, Mathematical Methods of Operations Research, Optimization Methods and Software, Digital Signal Processing, Physica A: Statistical Mechanics and its Applications, Mathematical Problems in Engineering, and so on.

Service

- Vice President of Mathematics and Statistics Graduate Student Association (MSGSA) at the University of Maryland, Baltimore County, 2015.
- Orientation Advisor at UMBC in Summer 2017.

Miscellaneous

- **Computer Skills**: R, Python, MATLAB, LaTeX, Microsoft Office.
- **Memberships**: Society for Industrial and Applied Mathematics (SIAM), Iranian Operations Research Society.

References

- George Michailidis: Professor at the University of Florida, Department of Statistics, gmichail@ufl.edu.
- Hui Zou: Professor at the University of Minnesota, School of Statistics, zouxx019@umn.edu
- Shuzhong Zhang: Professor at the University of Minnesota, Industrial and Systems Engineering, zhangs@umn.edu.
- Jinglai Shen: Professor at the University of Maryland, Baltimore County, Department of Mathematics and Statistics, shenj@umbc.edu.
- Florian Potra: Professor at the University of Maryland, Baltimore County, Department of Mathematics and Statistics, potra@umbc.edu.
- Muddappa Seetharama Gowda: Professor at the University of Maryland, Baltimore County, Department of Mathematics and Statistics, gowda@umbc.edu.
- Muruhan Rathinam: Professor at the University of Maryland, Baltimore County, Department of Mathematics and Statistics, muruhan@umbc.edu.
- Maziar Salahi: Professor at the University of Guilan, Faculty of Mathematical Sciences, salahim@guilan.ac.ir.