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Arnesh Sujanani

Research Interests

First-Order Optimization Algorithms for Machine Learning, Semidefinite Programming, Numerical Linear Algebra, Continuous Optimization, Nonconvex Optimization, Numerical Analysis, Scientific Computing.

Research Positions

2024-2026 **Postdoctoral Fellow**, *University of Waterloo*, Department of Combinatorics and Optimization, Faculty of Mathematics, Advisors: Henry Wolkowicz (24-26), Saeed Ghadimi (24-26), Walaa Moursi (24-26), and Stephen Vavasis (24-25).

Education

2024 **Ph.D. Operations Research**, *Georgia Institute of Technology*, Advisor: Renato D.C. Monteiro, **GPA: 3.92/4.0**.

2024 **M.S. Mathematics**, *Georgia Institute of Technology*, **GPA: 4.0/4.0**.

2019 **B.S. Applied and Computational Mathematics**, *University of Southern California*, **GPA: 3.93/4.0**.

Industry Research Experience

Summer 2023 **Graduate R&D Intern**, *Sandia National Laboratories*, Advisor: Christopher Eldred, Discrete exterior calculus for continuum mechanics and numerically solving PDEs.

Published and Submitted Papers

1. S. Ghadimi, W. Jung, **A. Sujanani**, D. Torregrosa-Belén, H. Wolkowicz **(alphabetical order)**. New Insights and Algorithms for Optimal Diagonal Preconditioning. Available on arXiv at `https://arxiv.org/abs/2509.23439`. **Submitted to SIAM Journal on Matrix Analysis (2025).**
2. P. Kananian, **A. Sujanani**, S.M. Zahedi. Asymptotically Fair and Truthful Allocation of Public Goods. Available on arXiv at `https://arxiv.org/abs/2404.15996`. **Accepted in Journal of Artificial Intelligence Research (2025).**
3. **A. Sujanani**, R.D.C. Monteiro. Efficient Parameter-Free Restarted Accelerated Gradient Methods for Convex and Strongly Convex Optimization. **Journal of Optimization Theory and Applications 206** (52), 34 **(2025)**. `https://doi.org/10.1007/s10957-025-02713-5`
4. J. Aguirre, D. Cifuentes, V. Guigues, R.D.C. Monteiro, V.H. Nascimento, **A. Sujanani (alphabetical order).** cuHALLaR: A GPU Accelerated Low-Rank Augmented Lagrangian Method for Large-Scale Semidefinite Programming. Available on arXiv at `https://arxiv.org/abs/2505.13719`. **Submitted to Mathematical Programming Computation (2025).**

5. R.D.C. Monteiro, **A. Sujanani**, D. Cifuentes. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. Available on arXiv at `https://arxiv.org/abs/2401.12490` **(2024)**. **Major Revision in Mathematical Programming.**
6. **A. Sujanani**, R.D.C. Monteiro. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. ***Journal of Scientific Computing*** **97** (2), 34 **(2023)**. `https://doi.org/10.1007/s10915-023-02350-y`

Working Papers

7. S. Ghadimi, **A. Sujanani**, H. Wolkowicz **(alphabetical order)**. Fast Projection and Optimization Over the Simplex using Semismooth Newton, Hadamard Liftings, and Riemannian Optimization. **Working Paper (2025).**

Software

1. J. Aguirre, D. Cifuentes, V. Guigues, R.D.C. Monteiro, V.H. Nascimento, **A. Sujanani (alphabetical order).** A User Manual for cuHALLaR: A GPU Accelerated Low-Rank Semidefinite Programming Solver. Available on arXiv at `https://arxiv.org/abs/2508.15951`. Software can be downloaded at `https://github.com/OPTHALLaR/cuHALLaR`

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Mentorship of Junior Researchers

2025-present Woosuk Jung (PhD student at University of Waterloo). Project: New Insights and Algorithms for Optimal Diagonal Preconditioning.

2025-Present Yongjie Zhao (undergraduate student at University of Waterloo). Project: A Gauss-Newton interior-point method for the maximum stable set problem.

2024-Present Jacob Aguirre (PhD student at Georgia Tech). Project: cuHALLaR: A GPU Accelerated Low-Rank Augmented Lagrangian Method for Large-Scale Semidefinite Programming.

2024-Present Victor Hugo Nascimento (PhD student at FGV University in Brazil). Project: cuHALLaR: A GPU Accelerated Low-Rank Augmented Lagrangian Method for Large-Scale Semidefinite Programming.

Teaching Experience

Fall 2025 Guest Lecturer (2 lectures) - CO 666: Continuous Optimization (PhD Level), University of Waterloo. Instructor: Professor Henry Wolkowicz.

Fall 2023 Guest Lecturer (3 lectures) - ISyE 6669: Deterministic Optimization (Masters Level), Georgia Institute of Technology. Instructor: Professor Renato D.C. Monteiro.

Spring 2023 Graduate Teaching Assistant - ISyE 6661: Linear Optimization (PhD Level), Georgia Institute of Technology. Instructor: Professor Arkadi Nemirovski.

Fall 2022 Guest Lecturer - ISyE 6669: Deterministic Optimization (Masters Level), Georgia Institute of Technology. Instructor: Professor Renato D.C. Monteiro.

Summer 2022 Graduate Teaching Assistant - ISyE 6739: Statistical Methods (Masters Level), Georgia Institute of Technology. Instructor: Professor Dave Goldsman.

Fall 2021 Graduate Teaching Assistant - ISyE 6669: Deterministic Optimization (Masters Level), Georgia Institute of Technology. Instructor: Professor Andy Sun.

Fall 2019 Graduate Teaching Assistant - ISyE 2027: Probability with Applications (Undergraduate Level), Georgia Institute of Technology. Instructor: Professor Sigrun Andradottir.

Spring 2018 Undergraduate Teaching Assistant - ITP 168: Introduction to MATLAB (Undergraduate Level), University of Southern California. Instructor: Professor Ashley Williams.

Service

2023-25 Served as a session organizer of the following sessions:
- *Methods for Large-Scale Nonlinear Optimization and Semidefinite Programming* at INFORMS Computing Society (ICS) Conference
- *First-Order Methods for Semidefinite Programming and Linearly-Constrained Nonconvex Optimization* at INFORMS Optimization Society (IOS) Conference

2022-Present Reviewer for *Operations Research*, *Mathematical Programming Computation*, *SIAM Journal on Optimization*, *Computational Optimization and Applications* (2 papers), *Journal of Scientific Computing*, *INFORMS Journal on Optimization*.

Talks and Poster Presentations

1. **A. Sujanani (talk)**. cuHALLaR: A GPU Accelerated Low-Rank Augmented Lagrangian Method for Large-Scale Semidefinite Programming. *2025 INFORMS Annual Meeting*, Atlanta, GA, October 2025.
2. **A. Sujanani (talk)**. HALLaR: A New Solver for Solving Huge SDPs. *ICCOPT Conference hosted by University of Southern California*, Los Angeles, California, July 2025.
3. **A. Sujanani (talk)**. The Inexact Augmented Lagrangian Method: Optimal Complexity Bounds and Applications to Solving Huge SDPs. *Tutte Colloquium*, Waterloo, Ontario, March 2025.
4. **A. Sujanani (talk)**. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. *ICS Conference hosted by University of Toronto*, Toronto, Ontario, January 2025.
5. **A. Sujanani (talk)**. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. *Harvard University*, December 2024.
6. **A. Sujanani (poster)**. HALLaR: A New Solver for Solving Huge SDPs. *26th Midwest Optimization Meeting & Workshop on Large Scale Optimization and Applications*, University of Waterloo, November 2024.
7. **A. Sujanani (talk)**. Efficiency of a restarted parameter-free FISTA method for strongly convex/convex optimization with provable complexity guarantees. *2024 INFORMS Annual Meeting*, Seattle, WA, October 2024.
8. **A. Sujanani (talk)**. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. *MOPTA Conference hosted by Lehigh University*, Bethlehem, Pennsylvania, August 2024.
9. **A. Sujanani (talk)**. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. *25th International Symposium on Mathematical Programming*, Montréal, Canada, July 2024.
10. **A. Sujanani (poster)**. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. *Princeton Workshop on Optimization, Learning, and Control*, Princeton University, June 2024.

11. **A. Sujanani (talk)**. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. *IOS Conference hosted by Rice University*, Houston, Texas, March 2024.
12. **A. Sujanani (talk)**. A low-rank augmented Lagrangian method for large-scale semidefinite programming based on a hybrid convex-nonconvex approach. *ISyE Student Seminar*, Georgia Institute of Technology, February 2024.
13. **A. Sujanani (talk)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *UMDSS Seminar*, Umeå University, November 2023.
14. **A. Sujanani (talk)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *Massachusetts Institute of Technology (MIT)*, November 2023.
15. **A. Sujanani (talk)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *2023 INFORMS Annual Meeting*, Phoenix, AZ, October 2023.
16. **A. Sujanani (poster)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *Acceleration and Extrapolation Methods*, Institute for Computational and Experimental Research in Mathematics (ICERM), Brown University, July 2023.
17. **A. Sujanani (poster)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *Foundations of Computational Mathematics 2023*, Sorbonne Université, June 2023.
18. **A. Sujanani (talk)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *SIAM Conference on Optimization*, Seattle, WA, May 2023.
19. **A. Sujanani (talk)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *2022 INFORMS Annual Meeting*, Indianapolis, IN, October 2022.
20. **A. Sujanani (talk)**. An adaptive superfast inexact proximal augmented Lagrangian method for smooth nonconvex composite optimization problems. *ISyE Student Seminar*, Georgia Institute of Technology, October 2022.

Awards and Scholarships

2019-2020 William S. Green Fellowship, Georgia Institute of Technology. A fellowship awarded to incoming first-year PhD students.

2017-2019 Rose Hills Scholarship, University of Southern California. A merit-based scholarship awarded to exceptional University of Southern California students majoring in science and engineering.