

**Madeleine Udell**  
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<b>Academic Employment</b>	<b>Cornell University</b> <span style="float: right;">Ithaca, NY</span>
	Assistant Professor, Richard and Sybil Smith Sesquicentennial Fellow <span style="float: right;"><i>July 2016</i> –</span> Department of Operations Research and Information Engineering Graduate field member in Operations Research, Computer Science, Applied Mathematics, Data Science, Statistics, and Electrical and Computer Engineering
	<b>California Institute of Technology</b> <span style="float: right;">Pasadena, CA</span>
	Postdoctoral Fellow, Center for the Mathematics of Information <span style="float: right;"><i>June 2015</i> – <i>June 2016</i></span>
<b>Education</b>	<b>Stanford University</b> <span style="float: right;">Stanford, CA</span>
	Ph.D. in Computational and Mathematical Engineering <span style="float: right;"><i>June 2015</i></span> GPA: 4.0. Thesis: <i>Generalized Low Rank Models</i> . Advisor: Stephen Boyd.
	<b>Yale University</b> <span style="float: right;">New Haven, CT</span>
	B.S. in Mathematics and Physics <span style="float: right;"><i>June 2009</i></span> <i>Summa cum laude</i> , with honors in mathematics and honors in physics. GPA: 3.95. Thesis: <i>Local Parametrizations via Laplacian Eigenfunctions</i> . Advisor: Peter W. Jones.

## Papers

## References

- [1] Yuxuan Zhao, Eric Landgrebe, Eliot Shekhtman, and Madeleine Udell. Online missing value imputation and correlation change detection for mixed-type data via gaussian copula. *Submitted*, 2020.
- [2] William Stephenson, Madeleine Udell, and Tamara Broderick. Approximate cross-validation with low-rank data in high dimensions. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.
- [3] Eric Landgrebe, Yuxuan Zhao, and Madeleine Udell. Online mixed missing value imputation using gaussian copula. In *ICML Workshop on the Art of Learning with Missing Values (Artemiss)*, 2020.
- [4] Lijun Ding, Jicong Fan, and Madeleine Udell. *k*FW: A Frank-Wolfe style algorithm with stronger subproblem oracles. *Submitted*, 2020.
- [5] Yuxuan Zhao and Madeleine Udell. Matrix completion with quantified uncertainty through low rank gaussian copula. In *Advances in Neural Information Processing Systems (NeurIPS)*, 2020.
- [6] Iddo Drori, Anant Kharkar, William R. Sickinger, Brandon Kates, Qiang Ma, Suwen Ge, Eden Dolev, Brenda Dietrich, David P. Williamson, and Madeleine Udell. Learning to solve combinatorial optimization problems on real-world graphs in linear time. In *IEEE International Conference on Machine Learning and Applications (IEEE ICMLA)*, 2020.

- [7] Chengrun Yang, Jicong Fan, Ziyang Wu, and Madeleine Udell. Efficient AutoML pipeline search with matrix and tensor factorization, 2020.
- [8] Iddo Drori, Lu Liu, Qiang Ma, Jonah Deykin, Brandon Kates, and Madeleine Udell. Real-time AutoML. *Submitted*, 2020.
- [9] Jicong Fan, Chengrun Yang, and Madeleine Udell. Robust non-linear matrix factorization for dictionary learning, denoising, and clustering. *Major Revision at IEEE Trans. Signal Processing (TSP)*, 2020.
- [10] Elizabeth A. Ricci, Madeleine Udell, and Ross A. Knepper. An information-theoretic approach to persistent environment monitoring through low rank model based planning and prediction, 2020.
- [11] Chengrun Yang, Ziyang Wu, Jicong Fan, and Madeleine Udell. AutoML pipeline selection: Efficiently navigating the combinatorial space. In *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2020.
- [12] Lijun Ding and Madeleine Udell. On the regularity and conditioning of low rank semidefinite programs. *Submitted to SIOPT*, 2020.
- [13] Jicong Fan, Yuqian Zhang, and Madeleine Udell. Polynomial matrix completion for missing data imputation and transductive learning. In *Thirty-Fourth AAAI Conference on Artificial Intelligence*, pages 3842–3849, 2020.
- [14] Alp Yurtsever, Joel A. Tropp, Olivier Fercoq, Madeleine Udell, and Volkan Cevher. Scalable semidefinite programming. *Submitted to SIAM Journal on Mathematics of Data Science (SIMODS)*, 2019.
- [15] Alexander Ratner, Dan Alistarh, Gustavo Alonso, David G. Andersen, Peter Bailis, Sarah Bird, Nicholas Carlini, Bryan Catanzaro, Eric Chung, Bill Dally, Jeff Dean, Inderjit S. Dhillon, Alexandros G. Dimakis, Pradeep Dubey, Charles Elkan, Grigori Fursin, Gregory R. Ganger, Lise Getoor, Phillip B. Gibbons, Garth A. Gibson, Joseph E. Gonzalez, Justin Gottschlich, Song Han, Kim M. Hazelwood, Furong Huang, Martin Jaggi, Kevin G. Jamieson, Michael I. Jordan, Gauri Joshi, Rania Khalaf, Jason Knight, Jakub Konečný, Tim Kraska, Arun Kumar, Anastasios Kyrillidis, Jing Li, Samuel Madden, H. Brendan McMahan, Erik Meijer, Ioannis Mitliagkas, Rajat Monga, Derek Gordon Murray, Dimitris S. Papailiopoulos, Gennady Pekhimenko, Theodoros Rekatsinas, Afshin Rostamizadeh, Christopher Ré, Christopher De Sa, Hanie Sedghi, Siddhartha Sen, Virginia Smith, Alex Smola, Dawn Song, Evan R. Sparks, Ion Stoica, Vivienne Sze, Madeleine Udell, Joaquin Vanschoren, Shivaram Venkataraman, Rashmi Vinayak, Markus Weimer, Andrew Gordon Wilson, Eric P. Xing, Matei Zaharia, Ce Zhang, and Ameet Talwalkar. SysML: The new frontier of machine learning systems. *CoRR*, abs/1904.03257, 2019.
- [16] Jicong Fan, Lijun Ding, Yudong Chen, and Madeleine Udell. Factor group-sparse regularization for efficient low-rank matrix recovery. In *Advances in Neural Information Processing Systems (NeurIPS)*, volume 32, pages 5105–5115, 2019.
- [17] Ramchandran Muthukumar, Drew Kouri, and Madeleine Udell. Randomized sketching algorithms for low memory dynamic optimization. *Under revision at SIOPT*, 2019.
- [18] Yuxuan Zhao and Madeleine Udell. Missing value imputation for mixed data through gaussian copula. In *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2020.

- [19] Iddo Drori, Lu Liu, Sharath Koorathota, Nian Yi, Jie Li, Antonio Moretti, Juliana Freire, and Madeleine Udell. AutoML using metadata language embeddings. In *NeurIPS Workshop on Meta-Learning*, 2019.
- [20] Chengrun Yang, Yuji Akimoto, Dae Won Kim, and Madeleine Udell. OBOE: Collaborative filtering for AutoML model selection. In *ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, volume 25, pages 1173–1183. ACM, 2019.
- [21] Yujia Zhang, Kuangyan Song, Yiming Sun, Sarah Tan, and Madeleine Udell. “Why should you trust my explanation?” understanding uncertainty in LIME explanations. In *ICML Workshop AI for Social Good*, 2019.
- [22] Yiming Sun, Yang Guo, Charlene Luo, Joel A Tropp, and Madeleine Udell. Low-rank Tucker approximation of a tensor from streaming data. *Accepted at SIAM Journal on Mathematics of Data Science (SIMODS)*, 2020.
- [23] Joel A Tropp, Alp Yurtsever, Madeleine Udell, and Volkan Cevher. Streaming low-rank matrix approximation with an application to scientific simulation. *SIAM Scientific Computing (SISC)*, 41(4):A2430–A2463, 2019.
- [24] Lijun Ding, Alp Yurtsever, Volkan Cevher, Joel A Tropp, and Madeleine Udell. An optimal-storage approach to semidefinite programming using approximate complementarity. *Major Revision at SIOPT*, 2019.
- [25] Madeleine Udell. Big data is low rank. *SIAG/OPT Views and News*, 2019.
- [26] Jicong Fan and Madeleine Udell. Online high-rank matrix completion. In *Computer Vision and Pattern Recognition (CVPR)*, pages 8690–8698, 2019.
- [27] Madeleine Udell and Oliver Toole. Optimal design of efficient rooftop photovoltaic arrays. *INFORMS Journal on Applied Analytics (Interfaces)*, 49(4):281–294, 2019.
- [28] Jiahao Chen, Nathan Kallus, Xiaojie Mao, Geoffrey Svacha, and Madeleine Udell. Fairness under unawareness: Assessing disparity when protected class is unobserved. In *FAT\*: Conference on Fairness, Accountability, and Transparency*, pages 339–348, 2019.
- [29] Yiming Sun, Yang Guo, Joel A Tropp, and Madeleine Udell. Tensor random projection for low memory dimension reduction. In *NeurIPS Workshop on Relational Representation Learning*, 2018.
- [30] Joel A Tropp, Alp Yurtsever, Madeleine Udell, and Volkan Cevher. More practical sketching algorithms for low-rank matrix approximation. Technical Report 2018-01, California Institute of Technology, Pasadena, California, 2018.
- [31] Chengrun Yang, Yuji Akimoto, Dae Won Kim, and Madeleine Udell. OBOE: Collaborative filtering for AutoML initialization (workshop version). *NeurIPS Workshop on Automated Machine Learning*, 2018.
- [32] Sam Zhou, Swati Gupta, and Madeleine Udell. Limited memory Kelley’s method converges for composite convex and submodular objectives. In *Advances in Neural Information Processing Systems*, 2018.
- [33] Nathan Kallus, Xiaojie Mao, and Madeleine Udell. Causal inference with noisy and missing covariates via matrix factorization. In *Advances in Neural Information Processing Systems*, 2018.

- [34] Sengupta, Nandana, Madeleine Udell, Nathan Srebro, and James Evans. Matrix factorization for missing value imputation and sparse data reconstruction. *Submitted*, 2017.
- [35] Lijun Ding and Madeleine Udell. Frank-Wolfe style algorithms for large scale optimization. In *Large-Scale and Distributed Optimization*. Springer, 2018.
- [36] Joel A. Tropp, Alp Yurtsever, Madeleine Udell, and Volkan Cevher. Fixed-rank approximation of a positive-semidefinite matrix from streaming data. In *Advances in Neural Information Processing Systems*, 2017.
- [37] Madeleine Udell and Alex Townsend. Why are big data matrices approximately low rank? *SIAM Journal on Mathematics of Data Science (SIMODS)*, 1(1):144–160, 2019.
- [38] Mihir Paragkar and Madeleine Udell. Graph-regularized generalized low rank models. In *CVPR Workshop on Tensor Methods in Computer Vision*, 2017.
- [39] A. Yurtsever, M. Udell, J. A. Tropp, and V. Cevher. Sketchy decisions: Convex low-rank matrix optimization with optimal storage. In *International Conference on Artificial Intelligence and Statistics (AISTATS)*, pages 1188–1196, 2017.
- [40] X. Shen, S. Diamond, M. Udell, Y. Gu, and S. Boyd. Disciplined multi-convex programming. In *Chinese Control and Decision Conference (CCDC)*, 2017.
- [41] Nathan Kallus and Madeleine Udell. Dynamic assortment personalization in high dimensions. *Operations Research*, 2019.
- [42] J. A. Tropp, A. Yurtsever, M. Udell, and V. Cevher. Practical sketching algorithms for low-rank matrix approximation. *SIAM Journal of Matrix Analysis and Applications (SIMAX)*, 38(4):1454–1485, 2017.
- [43] D. Davis, B. Edmunds, and M. Udell. The sound of APALM clapping: Faster nonsmooth nonconvex optimization with stochastic asynchronous PALM. In *Advances in Neural Information Processing Systems*, 2016.
- [44] A. Schuler, V. Liu, J. Wan, A. Callahan, M. Udell, D. Stark, and N. Shah. Discovering patient phenotypes using generalized low rank models. In *Pacific Symposium on Biocomputing (PSB)*, 2016.
- [45] N. Kallus and M. Udell. Revealed preference at scale: Learning personalized preferences from assortment choices. In *The 2016 ACM Conference on Economics and Computation*, New York, NY, USA, 2016. ACM.
- [46] N. Kallus and M. Udell. Learning preferences from assortment choices in a heterogeneous population. In *ICML Workshop on Computational Frameworks for Personalization*, 2016.
- [47] M. Udell. *Generalized Low Rank Models*. PhD thesis, Stanford University, 2015.
- [48] H. Mehmood, M. Udell, and J. Cioffi. Revenue maximization for broadband service providers using revenue capacity. In *IEEE Global Communications Conference*, 2015.
- [49] M. Udell and S. Boyd. PCA on a data frame, 2015.
- [50] M. Udell and S. Boyd. Beyond principal component analysis (PCA). *Biomedical Computation Review*, 2014.
- [51] M. Udell, K. Mohan, D. Zeng, J. Hong, S. Diamond, and S. Boyd. Convex optimization in Julia. In *SC14 Workshop on High Performance Technical Computing in Dynamic Languages*, 2014.

- [52] E. Lee, M. Udell, and S. Wong. Factorization for analog-to-digital matrix multiplication. In *International Conference on Acoustics, Speech, and Signal Processing (ICASSP)*, 2015.
- [53] M. Udell, C. Horn, R. Zadeh, and S. Boyd. Generalized low rank models. *Foundations and Trends in Machine Learning*, 9(1), 2016.
- [54] M. Udell, C. Horn, R. Zadeh, and S. Boyd. Generalized low rank models. *NeurIPS Workshop on Distributed Machine Learning and Matrix Computations*, 2014.
- [55] M. Udell and S. Boyd. Maximizing a sum of sigmoids, 2013.
- [56] M. Udell and S. Boyd. Bounding duality gap for separable problems with linear constraints. *Computational Optimization and Applications*, 64(2):355–378, 2016.
- [57] P. LePendou, Y. Liu, S. Iyer, M. Udell, and N. Shah. Analyzing patterns of drug use in clinical notes for patient safety. *Proceedings of the AMIA Summits on Translational Science*, 2012:63, 2012.
- [58] M. Udell and R. Takapoui. Linear bandits, matrix completion, and recommendation systems. *NeurIPS Workshop on Large Scale Matrix Analysis and Inference*, 2013.
- [59] E. Birch, M. Udell, and M. Covert. Incorporation of flexible objectives and time-linked simulation with flux balance analysis. *Journal of Theoretical Biology*, 345:12–21, 2014.

## Grants

### Current

**ONR (PI):** *Young Investigator Award: DREAMI: Dimension Reduction for Efficient Automated Machine Intelligence*, \$528,890, December 1, 2019 to November 30, 2022.

**NSF (PI):** *CAREER: Accelerating Machine Learning with Low Dimensional Structure*, \$550,000, October 1, 2020 to September 30, 2025. “ **Canadian Institutes of Health**

**Research (Senior Personnel):** *Using data to guide population health management: A comprehensive evaluation of analytic approaches for population segmentation*. PI: Laura Rosella. \$291,082, March 2020 to March 2023. (Provides some student funding.)

**NSF CCF-1740822 (Senior Personnel):** *TRIPODS: Data Science for Improved Decision-Making: Learning in the Context of Uncertainty, Causality, Privacy, and Network Structures*, \$1,496,655, October 1, 2017 to September 30, 2020. (.09 calendar [ie, nominal level] effort.) This grant establishes a major data science center at Cornell.

**Cornell: Digital Agriculture (co-PI):** *Development of a High-Resolution Weather Forecast Database for Digital Agricultural Research and Outreach Applications*. Co-PI: Art Degaetano. \$214,000, 2017–2020.

### Pending

**NSF proposal (Senior Personnel):** *AI Institute: Accelerating Innovation in Functional Sequence-defined Biomolecules*. PI: Peter Frazier.

**NSF proposal (PI):** *III: Small: Learning Algorithms*, \$500,000, October 1, 2020 to September 30, 2023.

**AFOSR MURI proposal (Co-PI):** *Mechanistic Understanding Through System Informed Machine Learning (MUSI-ML)*. PI: Chris Earles. \$7,316,816, October 1, 2020 to September 30, 2025.

### Past

**DARPA FA8750-17-2-0101 (PI):** *Composable Robust Structured Data Inference*, \$1,411,602, March 27, 2017 to February 24, 2020. (2 summer months, 1 academic month effort.) The

goal of this project is to develop robust tools for imputing missing data in large scale, heterogeneous data tables by using side information about which rows or columns are similar.

**Capital One (co-PI).** Co-PI: Nathan Kallus. \$60,000, August 1 2018.

**Cornell Tech Faculty Exchange Grant (co-PI).** Co-PI: Nathan Kallus. \$3,000, 2016–2017.

## Awards

**INFORMS Optimization Society Student Research Prize, INFORMS** 2019

*First place for student Lijun Ding's paper on Storage-Optimal Semidefinite Programming*

**INFORMS Undergraduate Operations Research Prize, INFORMS** 2018

*Honorable mention for student Song Zhou's paper on Limited Memory Kelley's Method*

**Douglas Whitney '61 Engineering Teaching Excellence Award, Cornell University** 2018

**Doing Good with Good OR Student Paper Competition, INFORMS** 2017

*Second place, for Optimal design of efficient rooftop photovoltaic arrays.*

**Center for the Mathematics of Information Postdoctoral Fellowship** 2015

California Institute of Technology

**Gerald J. Lieberman Fellowship, Stanford University** 2014

*Awarded to doctoral students demonstrating the potential to become academic leaders.*

*(12 Lieberman Fellows are selected among all doctoral candidates at Stanford each year.)*

**Best Force Multiplier, DARPA PlanX** 2013

**Graduate Research Fellowship, National Science Foundation** 2010

**Gabilan Graduate Fellowship, Stanford University** 2009

**Phi Beta Kappa, Yale University** 2009

**Henry Edwards Ellsworth Prize, Yale University** 2009

*Awarded for the best senior thesis research paper in the sciences.*

**Howard L. Schultz Prize, Yale University** 2009

*Awarded for excellence, inventiveness and good taste in experimental physics.*

**Deforest Senior Mathematical Prize, Yale University** 2009

*Awarded for proficiency in pure and applied mathematics.*

**Marshall Scholarship Finalist, Yale University** 2009

**Churchill Scholarship Finalist, Yale University** 2009

**US Physics Olympics Team Member** 2005

**PhD advising Zachary Frangella (chair)** *expected graduation May 2024*

**Miaolan Xie (rotation)** *expected graduation May 2024*

**Shipu Zhao (chair)** *expected graduation May 2023*

**Yuxuan Zhao (chair)** *expected graduation May 2022*

**Xiaojie Mao (co-chair)** *expected graduation May 2021*

**Chengrun Yang (chair)** *expected graduation May 2021*

**Lijun Ding (co-chair)** *expected graduation May 2021*

**Yiming Sun (co-chair)** *graduated October 2019*

*High Dimensional Data Analysis with Dependency and Under Limited Memory.*

<b>Teaching</b>	<b>Research advising</b>	Cornell University
	As of March 2020, 7 PhD advisees and one alumnus; 5 undergraduate advisees and 10 alumni; 8 Master's advisees and 17 alumni. See my webpage for details.	
	<b>ORIE 3120: Practical Tools for Operations Research, Data Science, and Machine Learning</b>	Cornell University
	<i>Instructor</i>	<i>Spring 2020</i>
	<b>ORIE 4741: Learning with Big Messy Data</b>	Cornell University
	<i>Instructor</i>	<i>Fall 2016, 2017, 2019</i>
	<b>ORIE 7191: Optimization for Machine Learning</b>	Cornell University
	<i>Instructor</i>	<i>Spring 2019</i>
	<b>CS+ORIE+STSCI 1380: Data Science for All</b>	Cornell University
	<i>Co-instructor</i>	<i>Spring 2018</i>
<b>ORIE 6326: Convex Optimization</b>	Cornell University	
<i>Instructor</i>	<i>Spring 2017</i>	
<b>EE 364b: Convex Optimization II</b>	Stanford University	
<i>Teaching assistant</i>	<i>Spring 2014</i>	
<b>CVX 101: Convex Optimization</b>	EdX Stanford	
<i>Head teaching assistant</i>	<i>Winter 2014</i>	
Taught 10,000 students worldwide.		
<b>EE 364a: Convex Optimization I</b>	Stanford University	
<i>Instructor</i>	<i>Summer 2013</i>	
<b>EE 364a: Convex Optimization I</b>	Stanford University	
<i>Teaching Assistant</i>	<i>Winter 2012</i>	
<b>CME Refresher Course: Discrete Math and Algorithms</b>	Stanford University	
<i>Instructor</i>	<i>September 2011, September 2012</i>	
<b>CME 305: Discrete Mathematics and Algorithms</b>	Stanford University	
<i>Teaching Assistant</i>	<i>Winter 2011</i>	
<b>Service</b>	<b>SciML Scientific Machine Learning Advisory Committee</b>	NumFocus
	<i>Committee Member</i>	<i>2020–</i>
	<b>ORIE Curriculum Committee</b>	Cornell University
	<i>Committee Member</i>	<i>2020–2021</i>
	<b>INFORMS AI Strategy Advisory Committee</b>	INFORMS
	<i>Committee Member</i>	<i>2019</i>
<i>Advise the INFORMS board to develop synergies and opportunities in artificial intelligence</i>		
<b>INFORMS Session: Large Scale Semidefinite Programming</b>	Seattle	
<i>Co-organizer (with Lijun Ding)</i>	<i>2019</i>	
<b>CAM Colloquium Committee</b>	Cornell University	
<i>Committee Member</i>	<i>2018–2019</i>	
<b>CAM PhD Admissions Committee</b>	Cornell University	

*Committee Member* 2018

**BoydFest: Stephen Boyd's 60th Birthday Conference** Stanford University  
*Co-organizer (with Maryam Fazel and Mung Chiang)* 2018

**ORIE Curriculum Review Committee** Cornell University  
*Committee Member* 2017–2018

**ICDM Workshop: Data Driven Discovery of Models** New Orleans  
*Co-organizer (with Christophe Giraud-Carrier and Ishanu Chattopadhyay)* 2017

**ORIE PhD Admissions Committee** Cornell University  
*Committee Member* 2016, 2017

**SIAM Annual: mini-symposium on Robust Low-Rank Models and Applications**  
 New Orleans  
*Co-organizer (with Tamara Kolda)* 2016

**MOPTA: session on Large-scale Distributed Convex Optimization** Lehigh  
*Organizer* 2015

**Committee on the Future of the School of Engineering** Stanford University  
*Committee Member* Fall 2014 – Spring 2015  
 Represented all engineering doctoral students on faculty committee.  
 Collaborated on proposal addressing faculty hiring and development, research themes and centers, space and facilities, education and outreach, and interdisciplinary research.

**JuliaOpt** Github  
*Co-owner* Fall 2014 –  
 The JuliaOpt organization curates high quality optimization software in the Julia language.

**C<sup>2</sup> Computational Consulting** Stanford University  
*Consultant* Fall 2011 – Spring 2015  
 Helped researchers across the university (in physics, computer science, neuroscience, law, immunology, ...) formulate and solve numerical problems.

**EE Faculty Search Committee** Stanford University  
*Committee Member* Fall 2014 – Spring 2015  
 Student member on Electrical Engineering broad area search committee.

**Information Systems Laboratory Colloquium** Stanford University  
*Coordinator* Winter 2012 – Spring 2013  
 Invited and hosted academic speakers for weekly seminar series.

**Committee on Graduate Studies** Stanford University  
*Committee Member* Fall 2011 – Spring 2013  
 Debated and decided policies for all graduate students at Stanford.  
 Approved and reauthorized interdisciplinary graduate programs.

**Graduate Student Housing** Stanford University  
*Community Associate* Winter 2011 – Spring 2013  
 Planned and led events for 800 graduate students.

**Judicial Affairs** Stanford University  
*Juror* Fall 2009 – Spring 2010



**Editorial**      **2019:** Journal of the American Statistical Society (JASA); Annals of Applied Statistics (AOAS); SIAM Journal on the Mathematics of Data Science (SIMODS) (2); Journal of Statistical Software (JSS); Optimization Letters (OPTL); SIAM Journal on Matrix Analysis and Applications (SIMAX) (2); SIAM Journal on Optimization (SIOPT). Conferences: Learning for Dynamics and Control (5); ICML (3); NeurIPS (6); AAAI (3). Grants: NSF RI.

**2018:** SIAM Review; SIAM Journal on Scientific Computing; Linear Algebra and Applications; Stochastic Systems; NeurIPS (6); AAAI meta-reviewer (23); SysML (now MLSys).

**2017:** Mathematical Programming; NIPS (6); SIAM Journal on Matrix Analysis; AAAI metareviewer (26); ICDM Workshop on Data Driven Discovery of Models (2); Journal of Statistical Software; Automatica; Springer book chapters (2);

**Software**      **LowRankModels.jl** 2014  
*Software for generalized low rank models in Julia*  
[www.github.com/madeleineudell/LowRankModels.jl](http://www.github.com/madeleineudell/LowRankModels.jl)

**Convex.jl** 2014  
*Software for convex optimization in Julia.*  
[www.github.com/cvxgrp/Convex.jl](http://www.github.com/cvxgrp/Convex.jl)

**SigmoidalProgramming.jl** 2014  
*Software for sigmoidal programming in Julia.*  
[www.github.com/madeleineudell/SigmoidalProgramming.jl](http://www.github.com/madeleineudell/SigmoidalProgramming.jl)

**ParallelSparseMatMul.jl** 2014  
*Software for shared-memory parallel sparse matrix multiplication in Julia.*  
[www.github.com/madeleineudell/ParallelSparseMatMul.jl](http://www.github.com/madeleineudell/ParallelSparseMatMul.jl)

**SigOpt** 2012  
*Software for sigmoidal programming in Python.*  
[www.github.com/cvxgrp/sigopt](http://www.github.com/cvxgrp/sigopt)

**Patents**      **M. Udell and O. Toole. Optimal Design of Residential Photovoltaic Arrays.**  
*Application No. 62/400,542, filed on September 27, 2016.*

**Industry Experience**

**Technical Consultant** *BMD Analytics* 2018 –  
 Provide technical expertise on modeling, learning, and optimization, via structured presentations or hands-on consulting, to firms including BlackRock, Goldman Sachs, Schonfeld Quantitative, Two Sigma, and H2O.ai.

**Technical Advisor** Santa Monica, CA  
*Retina AI* 2017 –  
 Advised on technical solutions for problems in e-commerce, including rapid assessment of long term value, retention analysis, and customer segmentation.

**Technical Advisor** Palo Alto, CA  
*Aurora Solar* 2014 –  
 Designed optimization algorithms tailored for problems in the solar industry, including design of efficient rooftop photovoltaic array configurations. Compared to designs produced by solar installation experts, the resulting optimized designs deliver the same energy output at lower cost for more than 70% of homes.

	<b>Senior Research Scientist</b> <i>Qadium</i> Won grants exceeding \$6.5M from DARPA for research in data analytics and cybersecurity.	San Francisco, CA 2012 – 2015
	<b>Lead Data Scientist</b> <i>DARPA (via Data Tactics)</i> Wrote 3 white papers to define mission for \$100M DARPA cybersecurity program.	Arlington, VA 2012 – 2013
	<b>Data Scientist</b> <i>Obama for America</i> Analyzed graph of 70M Facebook users to identify potential donors and target voter registration campaign.	Chicago, IL Fall 2011
	<b>Research Scientist</b> <i>Apixio</i> Developed a tool to extract structured information about diseases from the unstructured text of doctors' notes.	San Mateo, CA Summer 2011
	<b>Sales and Trading Strategist</b> <i>Goldman Sachs</i> Corrected model of commodities derivatives risk using multiple parameter estimation.	New York, NY Summer 2009
	<b>Market Risk Management Analyst</b> <i>Goldman Sachs</i> Designed and automated a system to evaluate and graph mutual fund risk.	New York, NY Summer 2008
<b>Talks and posters</b>	<b>Ezra Systems Seminar</b> , Cornell (online) 2020	
	<b>OPTML++ Seminar</b> , MIT (online) <i>Big Data is Low Rank</i> 2020	
	<b>Scientific Computing Seminar</b> , Emory (online) <i>Imputing Missing Data with the Gaussian Copula</i> 2020	
	<b>QMnet Seminar</b> , Melbourne (online) <i>Missing Data Imputation with Low Rank Models</i> 2020	
	<b>The Art of Learning with Missing Values (ARTEMISS) Workshop</b> , ICML (online) 2020 <i>Imputing Missing Data with the Gaussian Copula</i>	
	<b>SIAM Mathematics of Data Science</b> , (online) <i>Imputing Missing Data with the Gaussian Copula</i> 2020	
	<b>Mathematics of Data Science Math Seminar</b> , Tufts (online) <i>Big Data is Low Rank</i> 2020	
	<b>Applied Math Seminar</b> , Princeton <i>Scalable Semidefinite Programming</i> 2020	
	<b>Science on Tap</b> , Ithaca, NY <i>Filling in Missing Data: Elections, _____, Healthcare.</i> 2019	
	<b>Low-rank models winter school</b> , Villars-Sur-Ollon, Switzerland <i>Low Rank Models for Missing Data and Optimization</i> 2020	
	<b>Statistics and Computation</b> , Alan Turing Institute, London <i>Big Data is Low Rank</i> 2020	
	<b>Reunion Conference on Foundations of Data Science</b> , Simons Institute 2020	

<i>Missing Value Imputation for Mixed Data Through Gaussian Copula</i>	
<b>NeurIPS</b> , Vancouver	2020
<i>Factor Group-Sparse Regularization for Efficient Low-Rank Matrix Recovery</i>	
<b>INFORMS</b> , Seattle	2020
<i>Low Rank Tucker Approximation of a Tensor from Streaming Data</i>	
<b>Knowledge Discovery and Data Mining (KDD)</b> , Anchorage	2019
<i>Oboe: Collaborative Filtering for AutoML Initialization</i>	
<b>JuliaCon</b> , Baltimore	2019
<i>Keynote: Big Data is Low Rank using LowRankModels</i>	
<b>Applied Math Seminar</b> , UC Boulder	2019
<i>Optimal-Storage Semidefinite Programming using Approximate Complementarity</i>	
<b>Learning for Dynamics and Control (L4DC)</b> , MIT	2019
<i>Oboe: Collaborative Filtering for AutoML Initialization (poster)</i>	
<b>Machine Learning for Health (ML4H)</b> , Vector Institute, Toronto	2019
<i>Representation Learning, Patient Similarity, and Subtyping</i>	
<b>Low Rank Optimization Workshop</b> , Leipzig MPI for Mathematics in the Sciences	2019
<i>Low Rank Tucker Approximation of a Tensor from Streaming Data</i>	
<b>Optimization and Statistical Learning</b> , Les Houches	2019
<i>Optimal-Storage Semidefinite Programming using Approximate Complementarity</i>	
<b>Women and Mathematics (WAM) Ambassador Program</b> , Cornell University	2019
<i>Filling in Missing Data: Elections, _____, Healthcare.</i>	
<b>CME 300</b> , Stanford	2019
<i>Big Data is Low Rank</i>	
<b>Women in Data Science</b> , Stanford	2019
<i>Plenary: Big Data is Low Rank</i>	
100,000 conference attendees worldwide!	
<b>Johns Hopkins AMS seminar</b> , Baltimore	2019
<i>Big Data is Low Rank</i>	
<b>CAM Colloquium</b> , Cornell University	2019
<i>Low Memory Convex Optimization</i>	
<b>NeurIPS workshop on AI in financial services</b> , Montreal	2018
<i>Moderated Industry Panel</i>	
<b>NeurIPS workshop on AI in financial services</b> , Montreal	2018
<i>Fairness under Unawareness</i>	
<b>NeurIPS spotlight talk</b> , Montreal	2018
<i>Limited Memory Kelley's Method Converges for Composite Convex and Submodular Optimization</i>	
<b>Rutgers Optimization Seminar</b> , New Brunswick	2018
<i>Low Memory Convex Optimization</i>	
<b>Princeton Optimization Seminar</b> , Princeton	2018
<i>Low Memory Convex Optimization</i>	
<b>UC Davis Mathematics of Data and Decisions Seminar</b> , Davis	2018
<i>Big Data is Low Rank</i>	
<b>Georgia Tech OR Colloquium</b> , Atlanta	2018

<i>Big Data is Low Rank</i>	
<b>Stanford Linear Algebra and Optimization Seminar</b> , Stanford	2018
<i>Low Memory Convex Optimization</i>	
<b>ISMP</b> , Bordeaux	2018
<i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	
<b>Ecole Polytechnique: Statistics Special Seminar</b> , Paris	2018
<i>Big Data is Low Rank</i>	
<b>DARPA D3M Workshop</b> , Arlington	2018
<i>Composable Robust Structured Data Inference: AutoML, Causal Inference, Big Data is Low Rank</i>	
<b>AI in advancement</b> , Cornell	2018
<i>Panel Discussion</i>	
<b>Penn State OR Colloquium</b> , State College, PA	2018
<i>Big Data is Low Rank</i>	
<b>Cornell Engineering College Council</b> , New York,	2017
<i>The New Educational Paradigm: Data Science</i>	
<b>INFORMS</b> , Houston	2017
<i>Optimal Design of Rooftop Photovoltaic Arrays</i>	
<b>SIMONS Institute</b> , Berkeley	2017
<i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	
<b>MIT ORC Seminar</b> , Cambridge, MA	2017
<i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	
<b>Capital One Tech Talk</b> , New York	2017
<i>Low Rank Models for Automatic Machine Learning and Interpretability</i>	
<b>Schonfeld Quantitative Conference</b> , New York	2017
<i>Convex Optimization Modeling</i>	
<b>STRATA</b> , New York	2017
<i>Generalized Low Rank Models</i>	
<b>Two Sigma Tech Talk</b> , New York	2017
<i>Generalized Low Rank Models</i>	
<b>CATALYST Academy Field Session: Operations Research</b> , Cornell	2017
<i>Outreach session to introduce URM high school students to the discipline of OR</i>	
<b>CURIE Academy Field Session: Operations Research</b> , Cornell	2017
<i>Outreach session to introduce female high school students to the discipline of OR</i>	
<b>JuliaCon</b> , Berkeley	2017
<i>Julia: the Type of Language for Mathematical Programming</i>	
<b>LCDD workshop on Distributed Optimization (Invited)</b> , Lund	2017
<i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	
<b>UW Optimization Seminar</b> , Seattle	2017
<i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	
<b>SIOPT</b> , Vancouver	2017
<i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	
<b>DARPA D3M Kickoff</b> , Arlington	2017
<i>Composable Robust Structured Data Inference</i>	

<b>Optimization Under Uncertainty Workshop</b> , Duke <i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	2017
<b>Yale Alumni in Science and Engineering Talk</b> , New York <i>Filling in Missing Data: Elections, ———, Healthcare.</i>	2017
<b>NYU Numerical Analysis Seminar</b> , New York <i>Sketchy Decisions: Convex Optimization with Optimal Storage</i>	2017
<b>Goldman Sachs Tech Talk</b> , New York	2017
<b>CS Brown-Bag Colloquium</b> , Cornell	2017
<b>MIIS (Tutorial and Invited Talk)</b> , Chinese University of Hong Kong, Shenzhen	2016
<b>NIPS</b> , Barcelona	2016
<b>INFORMS</b> , Nashville	2016
<b>SCAN Seminar</b> , Cornell	2016
<b>CAM Colloquium</b> , Cornell	2016
<b>ICCOPT</b> , Tokyo	2016
<b>SIAM Annual Meeting</b> , Boston	2016
<b>JPL Seminar</b> , Pasadena	2016
<b>DARPA ISAT Workshop on the Future of Storage</b> , New York	2016
<b>Kaiser Permanente</b> , Oakland	2016
<b>TDA 2016</b> , Leuven	2016
<b>CMI Seminar (I)</b> , California Institute of Technology	2015
<b>CMI Seminar (II)</b> , California Institute of Technology	2015
<b>DARPA SIMPLEX program meeting</b> , Stanford University	2015
<b>H2O World</b> , Santa Clara	2015
<b>Uber Tech Talk</b> , San Francisco	2015
<b>INFORMS</b> , Philadelphia	2015
<b>Applied Math Seminar</b> , UCLA	2015
<b>Sandia National Lab Seminar</b> , Livermore	2015
<b>ISMP</b> , Pittsburgh	2015
<b>Optimization in Julia</b> , JuliaCon, Cambridge	2015
<b>Google Tech Talk</b> , Mountain View	2015
<b>Biomedical Informatics Seminar</b> , Stanford University	2015
<b>Palantir Tech Talk</b> , Palo Alto	2015
<b>Twitter Tech Talk</b> , San Francisco	2015
<b>ICME PhD Oral Examination</b> , Stanford University	2015
<b>H2O Tech Talk</b> , Santa Clara	2015
<b>Civis Analytics Tech Talk</b> , Chicago	2015
<b>TTIC Seminar</b> , Toyota Technical Institute of Chicago	2015
<b>IBM T. J. Watson Research Seminar</b> , Yorktown Heights	2015
<b>Hutchin Hill Capital Seminar</b> , New York	2015

<b>ORIE Seminar</b> , Cornell University	2015
<b>IEOR Seminar</b> , UC Berkeley	2015
<b>CMS Seminar</b> , California Institute of Technology	2015
<b>Heinz College Seminar</b> , Carnegie Mellon University	2015
<b>Mobilize Seminar</b> , Stanford University	2014
<b>Distributed Machine Learning Workshop</b> , NIPS, Montreal	2014
<b>HPTCDL Workshop</b> , SC14, New Orleans	2014
<b>INFORMS</b> , San Francisco	2014
<b>ICME Seminar</b> , Stanford University	2014
<b>Bay Area Julia Users Meetup</b> , San Francisco	2014
<b>BlackRock SAE Tech Talk</b> , Stanford University	2014
<b>Modern Massive Data Sets (MMDS)</b> , UC Berkeley	2014
<b>JuliaCon</b> , Chicago	2014
<b>Verizon Labs Tech Talk</b> , Palo Alto	2014
<b>IPAM Workshop on Mathematics of Politics</b> , UCLA	2013
<b>Workshop on Large Matrices</b> , NIPS, Lake Tahoe	2013
<b>IPAM Workshop on Optimization</b> , UCLA	2013
<b>ICME Seminar</b> , Stanford University	2013
<b>Marin Software Tech Talk</b> , San Francisco	2013
<b>Political Psychology Research Seminar</b> , Stanford University	2013
<b>ICME Student Seminar</b> , Stanford University	2010

**Languages**

**Scripting:** Python, Julia, R, Matlab, Bash, Javascript

**Text:** L<sup>A</sup>T<sub>E</sub>X, Jupyter notebooks, Google docs, Microsoft Office

**Parallel computing:** Python, Julia, Spark, Hadoop

**Workflow:** Git, GitHub, BitBucket

**Human:** English, French, Spanish, Italian

**Numbers**

**Erdős number:** 3

**Bacon number:** 3

**Erdős-Bacon number:** 6

**Hobbies** Harp, backpacking, barefoot running, foraging, ergonomics, carbon sequestration.