

Madeleine Udell

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- Academic Employment** **Cornell University** Ithaca, NY
Assistant Professor, Richard and Sybil Smith Sesquicentennial Fellow July 2016 –
Department of Operations Research and Information Engineering Graduate field member
in Operations Research, Computer Science, Applied Mathematics
- California Institute of Technology** Pasadena, CA
Postdoctoral Fellow, Center for the Mathematics of Information June 2015 – June 2016
- Education** **Stanford University** Stanford, CA
Ph.D. in Computational and Mathematical Engineering June 2015
GPA: 4.0.
Thesis: *Generalized Low Rank Models*. Advisor: Stephen Boyd.
- Yale University** New Haven, CT
B.S. in Mathematics and Physics June 2009
Summa cum Laude, with honors in mathematics and honors in physics.
GPA: 3.95.
Thesis: *Local Parametrizations via Laplacian Eigenfunctions*. Advisor: Peter W. Jones.
- Papers**
- J. A. Tropp, A. Yurtsever, M. Udell, and V. Cevher. Fixed-rank approximation of a positive-semidefinite matrix from streaming data. *arXiv preprint arXiv:1706.05736*, 2017.
- M. Udell and A. Townsend. Nice latent variable models have log-rank. *arXiv preprint arXiv:1705.07474*, 2017.
- M. Paradkar and M. Udell. Graph-regularized generalized low rank models. In *CVPR Workshop on Tensor Methods in Computer Vision*, 2017.
- 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)*, 2017.
- X. Shen, S. Diamond, M. Udell, Y. Gu, and S. Boyd. Disciplined multi-convex programming. In *Chinese Control and Decision Conference (CCDC)*, 2017.
- N. Kallus and M. Udell. Dynamic assortment personalization in high dimensions. *arXiv preprint arXiv:1610.05604*, 2016.
- J. A. Tropp, A. Yurtsever, M. Udell, and V. Cevher. Randomized single-view algorithms for low-rank matrix approximation. *arXiv preprint arXiv:1609.00048*, 2016.
- 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.
- A. Schuler, V. Liu, J. Wan, A. Callahan, M. Udell, D. Stark, and N. Shah. Discovering patient phenotypes using generalized low rank models. *Pacific Symposium on Biocomputing (PSB)*, 2016.

- 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.
- N. Kallus and M. Udell. Learning preferences from assortment choices in a heterogeneous population. In *ICML Workshop on Computational Frameworks for Personalization*, 2016.
- M. Udell. Generalized low rank models, 2015.
- H. Mehmood, M. Udell, and J. Cioffi. Revenue maximization for broadband service providers using revenue capacity. *IEEE Global Communications Conference*, 2015.
- M. Udell and S. Boyd. PCA on a data frame, 2015.
- M. Udell and S. Boyd. Beyond principal component analysis (PCA). *Biomedical Computation Review*, 2014.
- M. Udell, K. Mohan, D. Zeng, J. Hong, S. Diamond, and S. Boyd. Convex optimization in Julia. *SC14 Workshop on High Performance Technical Computing in Dynamic Languages*, 2014.
- E. Lee, M. Udell, and S. Wong. Factorization for analog-to-digital matrix multiplication. *ICASSP*, 2015.
- M. Udell, C. Horn, R. Zadeh, and S. Boyd. Generalized low rank models. *Foundations and Trends in Machine Learning*, 9(1), 2016.
- M. Udell, C. Horn, R. Zadeh, and S. Boyd. Generalized low rank models. *NIPS Workshop on Distributed Machine Learning and Matrix Computations*, 2014.
- M. Udell and S. Boyd. Maximizing a sum of sigmoids, 2013.
- M. Udell and S. Boyd. Bounding duality gap for separable problems with linear constraints. *Computational Optimization and Applications*, 64(2):355–378, 2016.
- 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.
- M. Udell and R. Takapoui. Linear bandits, matrix completion, and recommendation systems. *NIPS Workshop on Large Scale Matrix Analysis and Inference*, 2013.
- 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.

Software	LowRankModels.jl	2014
	<i>Software for generalized low rank models in Julia</i>	
	www.github.com/madeleineudell/LowRankModels.jl	
	Convex.jl	2014
	<i>Software for convex optimization in Julia.</i>	
	www.github.com/cvxgrp/Convex.jl	
	SigmoidalProgramming.jl	2014
	<i>Software for sigmoidal programming in Julia.</i>	
	www.github.com/madeleineudell/SigmoidalProgramming.jl	
	ParallelSparseMatMul.jl	2014
	<i>Software for shared-memory parallel sparse matrix multiplication in Julia.</i>	
	www.github.com/madeleineudell/ParallelSparseMatMul.jl	

SigOpt

2012

Software for sigmoidal programming in Python.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 Advisor**

Palo Alto, CA

*Aurora Solar**Fall 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.

Senior Research Scientist

San Francisco, CA

*Qadium**Fall 2012 – Spring 2015*

Won grants exceeding \$6.5M from DARPA for research in data analytics and cybersecurity.

Lead Data Scientist

Arlington, VA

*DARPA (via Data Tactics)**Summer 2012 – Spring 2013*

Wrote 3 white papers to define mission for \$100M DARPA cybersecurity program.

Data Scientist

Chicago, IL

*Obama for America**Fall 2011*

Analyzed graph of 70M Facebook users to identify potential donors and target voter registration campaign.

Research Scientist

San Mateo, CA

*Apixio**Summer 2011*

Developed a tool to extract structured information about diseases from the unstructured text of doctors notes.

Sales and Trading Strategist

New York, NY

*Goldman Sachs**Summer 2009*

Corrected model of commodities derivatives risk using multiple parameter estimation.

Market Risk Management Analyst

New York, NY

*Goldman Sachs**Summer 2008*

Designed and automated a system to evaluate and graph mutual fund risk.

Teaching**ORIE6326: Convex Optimization**

Cornell University

*Instructor**Spring 2017***ORIE4741: Learning with Big Messy Data**

Cornell University

*Instructor**Fall 2016***EE364b: Convex Optimization II**

Stanford University

*Teaching assistant**Spring 2014***CVX101: Convex Optimization**

EdX Stanford

*Head teaching assistant**Winter 2014*

Taught 10,000 students worldwide.

EE364a: Convex Optimization I

Stanford University

*Instructor**Summer 2013***EE364a: Convex Optimization I**

Stanford University

*Teaching Assistant**Winter 2012***CME Refresher Course: Discrete Math and Algorithms**

Stanford University

Instructor *September 2011, September 2012*

CME 305: Discrete Mathematics and Algorithms Stanford University
Teaching Assistant *Winter 2011*

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

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.

C² 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*

Grants **Cornell: Digital Agriculture** *2017*

Won grant for \$214K over three years as co-PI

DARPA: Composable Robust Structured Data Inference *2017*

Won grant for \$1.4M over four years as single PI

Cornell: Cornell Tech Faculty Exchange Grant *2016*

Won grant for \$3K over one year as co-PI

Awards **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
<i>Awarded for the best senior thesis research paper in the sciences.</i>	
Howard L. Schultz Prize , Yale University	2009
<i>Awarded for excellence, inventiveness and good taste in experimental physics.</i>	
Deforest Senior Mathematical Prize , Yale University	2009
<i>Awarded for proficiency in pure and applied mathematics.</i>	
Marshall Scholarship Finalist , Yale University	2009
Churchill Scholarship Finalist , Yale University	2009
US Physics Olympics Team Member	2005

Talks and posters

JuliaCon , Berkeley	2017
LCDD workshop on Distributed Optimization (Invited) , Lund	2017
UW Optimization Seminar , Seattle	2017
SIOPT , Vancouver	2017
DARPA D3M Kickoff , Arlington	2017
Optimization Under Uncertainty Workshop (Invited) , Duke	2017
Yale Alumni in Science and Engineering Talk , New York	2017
NYU Numerical Analysis Seminar , New York	2017
Goldman Sachs Tech Talk , New York	2017
CS Brown-Bag Colloquium , Cornell	2017
MIIS (Tutorial and Invited Talk) , Chinese University of Hong Kong, Shenzhen	2016
NIPS , Barcelona	2016
INFORMS , Nashville	2016
SCAN Seminar , Cornell	2016
CAM Colloquium , Cornell	2016
ICCOPT , Tokyo	2016
SIAM Annual Meeting , Boston	2016
JPL Seminar , Pasadena	2016
DARPA ISAT Workshop on the Future of Storage , New York	2016
Kaiser Permanente , Oakland	2016
TDA 2016 , Leuven	2016
CMI Seminar (I) , California Institute of Technology	2015
CMI Seminar (II) , California Institute of Technology	2015
DARPA SIMPLEX program meeting , Stanford University	2015
H2O World , Santa Clara	2015
Uber Tech Talk , San Francisco	2015
INFORMS , Philadelphia	2015
Applied Math Seminar , UCLA	2015
Sandia National Lab Seminar , Livermore	2015
ISMP , Pittsburgh	2015
Optimization in Julia , JuliaCon, Cambridge	2015
Google Tech Talk , Mountain View	2015
Biomedical Informatics Seminar , Stanford University	2015
Palantir Tech Talk , Palo Alto	2015
Twitter Tech Talk , San Francisco	2015
ICME PhD Oral Examination , Stanford University	2015
H2O Tech Talk , Santa Clara	2015
Civis Analytics Tech Talk , Chicago	2015
TTIC Seminar , Toyota Technical Institute of Chicago	2015
IBM T. J. Watson Research Seminar , Yorktown Heights	2015
Hutchin Hill Capital Seminar , New York	2015

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

Languages **Scripting:** Python, Julia, R, Matlab, Bash, Javascript
Text: L^AT_EX, IPython 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.