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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, and Electrical and Computer Engineering

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

M. Udell and O. Toole. Optimal design of efficient rooftop photovoltaic arrays. *Submitted*, 2017.

J. A. Tropp, A. Yurtsever, M. Udell, and V. Cevher. Fixed-rank approximation of a positive-semidefinite matrix from streaming data. In *Advances in Neural Information Processing Systems*, 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. LePendu, 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*
Software for generalized low rank models in Julia
`www.github.com/madeleineudell/LowRankModels.jl`

Convex.jl *2014*
Software for convex optimization in Julia.
`www.github.com/cvxgrp/Convex.jl`

SigmoidalProgramming.jl *2014*

Software for sigmoidal programming in Julia.
`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`

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 Santa Monica, CA
Retina AI *Fall 2017 –*
Advised on technical solutions for problems in e-commerce, including retention analysis, sales force optimization, and customer segmentation.

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.

C^2 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

NSF Transdisciplinary Research in Principles of Data Science (TRIPODS) institute *2017*
Won grant as co-PI to establish TRIPODS institute at Cornell University

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

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

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*

Talks and posters

Cornell Engineering College Council, New York, *2017*

INFORMS, Houston *2017*

SIMONS Institute, Berkeley *2017*

MIT ORC Seminar, Cambridge, MA *2017*

Capital One Tech Talk, New York *2017*

Schonfeld Quantitative Conference, New York *2017*

STRATA, New York *2017*

Two Sigma Tech Talk, New York *2017*

JuliaCon, Berkeley *2017*

LCCC 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: LaTeX, IPython notebooks, Google docs, Microsoft Office
Parallel computing: Python, Julia, Spark, Hadoop
Workflow: Git, GitHub, BitBucket
Human: English, French, Spanish, Italian

Numbers

Erdös number: 3

Bacon number: 3
Erdös-Bacon number: 6

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