

# Stanford

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## Madeleine Udell

Assistant Professor of Management Science and Engineering and, by courtesy, of Electrical Engineering

### Bio

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#### ACADEMIC APPOINTMENTS

- Assistant Professor, Management Science and Engineering
- Assistant Professor (By courtesy), Electrical Engineering
- Member, Bio-X
- Member, Institute for Computational and Mathematical Engineering (ICME)

### Teaching

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#### COURSES

##### 2022-23

- Introduction to Applied Statistics: MS&E 125 (Spr)
- Optimization: CME 307, MS&E 311 (Spr)

#### STANFORD ADVISEES

##### Doctoral Dissertation Advisor (AC)

Pratik Rathore

##### Doctoral (Program)

Zachary Frangella, Ali Teshnizi, Mike Van Ness

### Publications

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#### PUBLICATIONS

- **Sparse Data Reconstruction, Missing Value and Multiple Imputation through Matrix Factorization** *SOCIOLOGICAL METHODOLOGY*  
Sengupta, N., Udell, M., Srebro, N., Evans, J.  
2023; 53 (1): 72-114
- **A strict complementarity approach to error bound and sensitivity of solution of conic programs** *OPTIMIZATION LETTERS*  
Ding, L., Udell, M.  
2022
- **NysADMM: faster composite convex optimization via low-rank approximation**  
Zhao, S., Frangella, Z., Udell, M., Chaudhuri, K., Jegelka, S., Song, L., Szepesvari, C., Niu, G., Sabato, S.  
JMLR-JOURNAL MACHINE LEARNING RESEARCH.2022

- **Online Missing Value Imputation and Change Point Detection with the Gaussian Copula**  
Zhao, Y., Landgrebe, E., Shekhtman, E., Udell, M., Assoc Advancement Artificial Intelligence  
ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2022: 9199-9207
- **CONTROLBURN: Feature Selection by Sparse Forests**  
Liu, B., Xie, M., Udell, M., ASSOC COMP MACHINERY  
ASSOC COMPUTING MACHINERY.2021: 1045-1054
- **Scalable Semidefinite Programming** *SIAM JOURNAL ON MATHEMATICS OF DATA SCIENCE*  
Yurtsever, A., Tropp, J. A., Fercoq, O., Udell, M., Cevher, V.  
2021; 3 (1): 171-200
- **Robust Non-Linear Matrix Factorization for Dictionary Learning, Denoising, and Clustering** *IEEE TRANSACTIONS ON SIGNAL PROCESSING*  
Fan, J., Yang, C., Udell, M.  
2021; 69: 1755-1770
- **RANDOMIZED SKETCHING ALGORITHMS FOR LOW-MEMORY DYNAMIC OPTIMIZATION** *SIAM JOURNAL ON OPTIMIZATION*  
Muthukumar, R., Kouri, D. P., Udell, M.  
2021; 31 (2): 1242-1275
- **TenIPS: Inverse Propensity Sampling for Tensor Completion**  
Yang, C., Ding, L., Wu, Z., Udell, M., Banerjee, A., Fukumizu, K.  
MICROTOME PUBLISHING.2021
- **ON THE SIMPLICITY AND CONDITIONING OF LOW RANK SEMIDEFINITE PROGRAMS** *SIAM JOURNAL ON OPTIMIZATION*  
Ding, L., Udell, M.  
2021; 31 (4): 2614-2637
- **An Optimal-Storage Approach to Semidefinite Programming Using Approximate Complementarity** *SIAM JOURNAL ON OPTIMIZATION*  
Ding, L., Yurtsever, A., Cevher, V., Tropp, J. A., Udell, M.  
2021; 31 (4): 2695-2725
- **Dynamic Assortment Personalization in High Dimensions** *OPERATIONS RESEARCH*  
Kallus, N., Udell, M.  
2020; 68 (4): 1020-1037
- **Low-Rank Tucker Approximation of a Tensor from Streaming Data** *SIAM JOURNAL ON MATHEMATICS OF DATA SCIENCE*  
Sun, Y., Guo, Y., Luo, C., Tropp, J., Udell, M.  
2020; 2 (4): 1123-1150
- **AutoML Pipeline Selection: Efficiently Navigating the Combinatorial Space**  
Yang, C., Fan, J., Wu, Z., Udell, M., ASSOC COMP MACHINERY  
ASSOC COMPUTING MACHINERY.2020: 1446-1456
- **Missing Value Imputation for Mixed Data via Gaussian Copula**  
Zhao, Y., Udell, M., ASSOC COMP MACHINERY  
ASSOC COMPUTING MACHINERY.2020: 636-646
- **Polynomial Matrix Completion for Missing Data Imputation and Transductive Learning**  
Fan, J., Zhang, Y., Udell, M., Assoc Advancement Artificial Intelligence  
ASSOC ADVANCEMENT ARTIFICIAL INTELLIGENCE.2020: 3842-3849
- **Optimal Design of Efficient Rooftop Photovoltaic Arrays** *INFORMS JOURNAL ON APPLIED ANALYTICS*  
Udell, M., Toole, O.  
2019; 49 (4): 281-294
- **Optimal Design of Efficient Rooftop Photovoltaic Arrays** *INFORMS JOURNAL ON APPLIED ANALYTICS*  
Udell, M., Toole, O.  
2019; 49 (4): 293-294

- **Factor Group-Sparse Regularization for Efficient Low-Rank Matrix Recovery**  
Fan, J., Ding, L., Chen, Y., Udell, M., Wallach, H., Larochelle, H., Beygelzimer, A., d'Alche-Buc, F., Fox, E., Garnett, R.  
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2019
- **Why Are Big Data Matrices Approximately Low Rank?** *SIAM JOURNAL ON MATHEMATICS OF DATA SCIENCE*  
Udell, M., Townsend, A.  
2019; 1 (1): 144-160
- **Fairness Under Unawareness: Assessing Disparity When Protected Class Is Unobserved**  
Chen, J., Kallus, N., Mao, X., Svacha, G., Udell, M., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 339-348
- **STREAMING LOW-RANK MATRIX APPROXIMATION WITH AN APPLICATION TO SCIENTIFIC SIMULATION** *SIAM JOURNAL ON SCIENTIFIC COMPUTING*  
Tropp, J. A., Yurtsever, A., Udell, M., Cevher, V.  
2019; 41 (4): A2430-A2463
- **OBOE: Collaborative Filtering for AutoML Model Selection**  
Yang, C., Akimoto, Y., Kim, D., Udell, M., Assoc Comp Machinery  
ASSOC COMPUTING MACHINERY.2019: 1173-1183
- **Online high rank matrix completion**  
Fan, J., Udell, M., IEEE Comp Soc  
IEEE.2019: 8682-8690
- **Causal Inference with Noisy and Missing Covariates via Matrix Factorization**  
Kallus, N., Mao, X., Udell, M., Bengio, S., Wallach, H., Larochelle, H., Grauman, K., CesaBianchi, N., Garnett, R.  
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2018
- **Frank-Wolfe Style Algorithms for Large Scale Optimization** *LARGE-SCALE AND DISTRIBUTED OPTIMIZATION*  
Ding, L., Udell, M., Giselsson, P., Rantzer, A.  
2018; 2227: 215-245
- **Limited memory Kelley's Method Converges for Composite Convex and Submodular Objectives**  
Zhou, S., Gupta, S., Udell, M., Bengio, S., Wallach, H., Larochelle, H., Grauman, K., CesaBianchi, N., Garnett, R.  
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2018
- **Disciplined Multi-Convex Programming**  
Shen, X., Diamond, S., Udell, M., Gu, Y., Boyd, S., IEEE  
IEEE.2017: 895-900
- **Graph-Regularized Generalized Low-Rank Models**  
Paradkar, M., Udell, M., IEEE  
IEEE.2017: 1921-1926
- **PRACTICAL SKETCHING ALGORITHMS FOR LOW-RANK MATRIX APPROXIMATION** *SIAM JOURNAL ON MATRIX ANALYSIS AND APPLICATIONS*  
Tropp, J. A., Yurtsever, A., Udell, M., Cevher, V.  
2017; 38 (4): 1454-1485
- **Sketchy Decisions: Convex Low-Rank Matrix Optimization with Optimal Storage**  
Yurtsever, A., Udell, M., Tropp, J. A., Cevher, V., Singh, A., Zhu, J.  
MICROTOME PUBLISHING.2017: 1188-1196
- **Fixed-Rank Approximation of a Positive-Semidefinite Matrix from Streaming Data**  
Tropp, J. A., Yurtsever, A., Udell, M., Cevher, V., Guyon, Luxburg, U. V., Bengio, S., Wallach, H., Fergus, R., Vishwanathan, S., Garnett, R.  
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2017
- **Bounding duality gap for separable problems with linear constraints** *COMPUTATIONAL OPTIMIZATION AND APPLICATIONS*  
Udell, M., Boyd, S.

2016; 64 (2): 355-378

- **DISCOVERING PATIENT PHENOTYPES USING GENERALIZED LOW RANK MODELS.** *Pacific Symposium on Biocomputing. Pacific Symposium on Biocomputing*  
Schuler, A., Liu, V., Wan, J., Callahan, A., Udell, M., Stark, D. E., Shah, N. H.  
2016; 21: 144-155
- **Revealed Preference at Scale: Learning Personalized Preferences from Assortment Choices**  
Kallus, N., Udell, M., ACM  
ASSOC COMPUTING MACHINERY.2016: 821-837
- **The Sound of APALM Clapping: Faster Nonsmooth Nonconvex Optimization with Stochastic Asynchronous PALM**  
Davis, D., Udell, M., Edmunds, B., Lee, D. D., Sugiyama, M., Luxburg, U. V., Guyon, Garnett, R.  
NEURAL INFORMATION PROCESSING SYSTEMS (NIPS).2016
- **Introduction** *FOUNDATIONS AND TRENDS IN MACHINE LEARNING*  
Udell, M., Horn, C., Zadeh, R., Boyd, S.  
2016; 9 (1): 2-+
- **FACTORIZATION FOR ANALOG-TO-DIGITAL MATRIX MULTIPLICATION**  
Lee, E. H., Udell, M., Wong, S., IEEE  
IEEE.2015: 1061-65
- **Revenue Maximization for Broadband Service Providers Using Revenue Capacity**  
Mehmood, H., Udell, M., Cioffi, J., IEEE  
IEEE.2015
- **Incorporation of flexible objectives and time-linked simulation with flux balance analysis.** *Journal of theoretical biology*  
Birch, E. W., Udell, M., Covert, M. W.  
2014; 345: 12-21
- **Analyzing patterns of drug use in clinical notes for patient safety.** *AMIA Summits on Translational Science proceedings AMIA Summit on Translational Science*  
LePendu, P., Liu, Y., Iyer, S., Udell, M. R., Shah, N. H.  
2012; 2012: 63-70