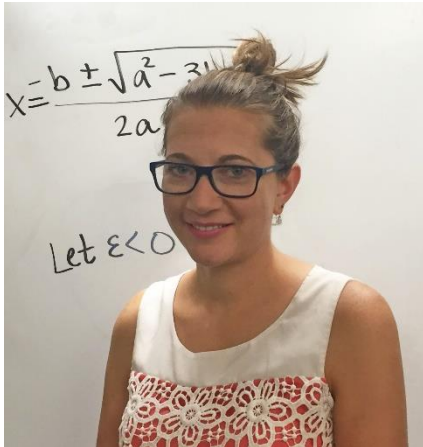




Online Nonnegative Matrix Factorization and Applications



Online Matrix Factorization (OMF) is a fundamental tool for dictionary learning problems, giving an approximate representation of complex data sets in terms of a reduced number of extracted features. Convergence guarantees for most of the OMF algorithms in the literature assume independence between data matrices, and the case of dependent data streams remains largely unexplored. In this talk, the speaker presents results showing that a non-convex generalization of the well-known OMF algorithm for i.i.d. data converges almost surely to the set of critical points of the expected loss function, even when the data matrices are functions of some underlying Markov chain satisfying a mild mixing condition. As the main application, by combining online non-negative matrix factorization and a recent MCMC algorithm for sampling motifs from networks, the speaker proposes a novel framework of Network Dictionary Learning that extracts “network dictionary patches” from a given network in an online manner that

encodes main features of the network. The speaker demonstrates this technique on real-world data and discusses recent extensions and variations.

Deanna Needell, Ph.D.

Professor, Mathematics, UCLA
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Research & Education
Dunn Family Endowed Chair in Data Theory

Date: Monday, April 18, 2022

Time: 1:50 – 2:40 p.m. US Central Time

Zoom Meeting ID: 998 4499 3279

Passcode: 724615

Faculty host: Simon Foucart, MATH

Biography

Dr. Deanna Needell earned her PhD from UC Davis before working as a postdoctoral fellow at Stanford University. She is currently a full professor of mathematics at UCLA, the Dunn Family Endowed Chair in Data Theory, and the Executive Director for UCLA's Institute for Digital Research and Education. She has earned many awards including the Alfred P. Sloan fellowship, an NSF CAREER and other awards, the IMA prize in Applied Mathematics, and is a 2022 AMS Fellow. She has been a research professor fellow at several top research institutes including the Mathematical Sciences Research Institute and Simons Institute in Berkeley. She also serves as associate editor for IEEE Signal Processing Letters, Linear Algebra and its Applications, the SIAM Journal on Imaging Sciences, and Transactions in Mathematics and its Applications as well as on the organizing committee for SIAM sessions and the Association for Women in Mathematics.

You can also click this link to join the seminar <https://tamu.zoom.us/j/99844993279?pwd=TkJodWFVRURyMmkwakl4SWZGeVJTQT09>

