1162-49-95 **Benjamin Cowen***, 6 MetroTech Center, Brooklyn, NY 11201, and **Anna Choromanska** and **Apoorva Nandini Saridena**. *LSALSA: Accelerated Source Separation via Learned Sparse Coding.*

We propose an algorithm for generalized sparse coding (SC) inference. SC inference is the problem of sparsely encoding a data point with respect to the columns of a given dictionary, or in the generalized setting as given in morphological component analysis (MCA), across multiple dictionaries. In MCA, each dictionary provides a distinct sparse representation corresponding to a component of the data, forming an additive mixture model for the original data point. Both settings have been cast as ℓ_1-regularized least-squares optimization problems; these convex formulations and their solvers such as the Split Augmented Lagrangian and Shrinkage Algorithm (SALSA) are trusted by practitioners but can be computationally extensive. We propose a deep learning solution called Learned SALSA (LSALSA), and demonstrate vast acceleration on image vision tasks, in addition to increasing the quality of estimated sparse codes and visual clarity on both classic SC and MCA problems in computation-starved settings. Finally, we present a theoretical framework for analyzing LSALSA, concluding that it exactly implements a truncated instance of the alternating direction method of multipliers (ADMM) applied to a new, learned cost function with curvature modified by one of the learned matrices. (Received August 26, 2020)