1145-VT-1695 **Enrico Au-Yeung*** (eauyeun1@depaul.edu) and **Greg Zanotti** (gregzanotti1@gmail.com).
Recovery of Low-Coherence Dictionary Atoms under Restricted Signal Assumptions.

In dictionary learning, a matrix comprised of signals Y is factorized into the product of two matrices: a matrix of prototypical "atoms" D, and a sparse matrix containing coefficients for atoms in D, called X. Dictionary learning finds applications in signal processing, image recognition, and a number of other fields. Many procedures for solving the dictionary learning problem follow the alternating minimization paradigm; that is, alternating between solving for D and X separately, until the procedure converges to a solution.

Suppose an initialization procedure is chosen carefully. Under certain assumptions, is it possible to eliminate the computationally intense task of using a subsequent alternating minimization procedure? In this work, we analyze a dictionary initialization algorithm and the assumption of a more nuanced data generating process. By decomposing and individually bounding sources of noise contributed by our model assumptions, we show that the algorithm achieves nearly complete atom recovery with overwhelmingly high probability. Our findings indicate that the costly step of alternating minimization can be avoided in certain cases, without affecting the performance of the signal recovery process. (Received September 23, 2018)