1116-65-1417 **Wei Zhu**, **Victoria Chayes**, **Alexandre Tiard**, **Stephanie Sanchez**, **Devin Dahlberg** and **Da Kuang*** (dakuang@math.ucla.edu), 520 Portola Plaza, Room 7354, Department of Mathematics, UCLA, Los Angeles, CA 90095, and **Andrea Bertozzi**, **Stanley Osher** and **Dominique Zosso**. *Nonlocal Total Variation with Primal-Dual Algorithm for Unsupervised Hyperspectral Imagery Analysis.* Preliminary report.

We propose an efficient nonlocal total variational method for unsupervised classification of hyperspectral imagery. We minimize the energy directly using a primal-dual algorithm, which is adapted for the nonlocal gradient and weighted centroid recalculation. By squaring the labeling function in the fidelity term and re-clustering the data points on the simplex, we can develop an unsupervised clustering method with random initialization of the centroids. To better differentiate clusters, we use a linear combination of the cosine and Euclidean distance between spectral signatures instead of the traditional cosine distance. Finally, we speed up the calculation using an approximate nearest neighbor search algorithm for constructing the pairwise weight matrix for the hyperspectral pixel signatures. We demonstrate substantially improved results on six data sets, compared to traditional clustering methods like k-means, non-negative matrix factorization, and the graph-based MBO scheme. (Received September 19, 2015)