1106-58-1265 **Sofya Chepushtanova*** (chepusht@math.colostate.edu), Department of Mathematics, 1874 Campus Delivery, Fort Collins, CO 80523-1874, and **Michael Kirby**. *Sparse Grassmannian Embeddings for Hyperspectral Image Classification.*

We propose a set-to-set pattern recognition approach for capturing the signal variability in hyperspectral imagery using the framework of the Grassmann manifold. Sets of pixels from the same data class characterize the variability of the class information, so we can organize them as abstract points on the Grassmannian, i.e. subspaces represented by orthonormal matrices. There are a variety of metrics which allow us to determine a distance matrix that is used to realize the Grassmannian as an embedding in the Euclidean space in the context of metric spaces. We use the chordal and the geodesic metrics, as well as a pseudometric of our choice. A sparse support vector machine trained in the Euclidean space gives a classification model for the embedded subspaces as well as a subset of selected dimensions of the embedding for subsequent model reduction. We analyze the behaviour of embeddings and compare classification results for different metrics. We observe that we can achieve an isometric embedding of the Grassmann manifold using the chordal metric, and nearly isometric embedding with geodesic distances. It is also observed that non-isometric embeddings generated by using the pseudometric on the Grassmannian in some cases can lead to the best classification results. (Received September 11, 2014)