1015-62-173 **Evgenia Rubinshtein*** (rubin@stat.fsu.edu), Department of Statistics, Florida State University, Tallahassee, FL 32306, and **Anuj Srivastava** (anuj@stat.fsu.edu), Department of Statistics, Florida State University, Tallahassee, FL 32306. *Optimal Representation of Natural and Face Images Under Diverse Criteria.* Preliminary report.

Images are high-dimensional objects and image analysis requires dimension reduction before statistical analysis, in order to apply any sophisticated procedures. Motivated by past observations of non-Gaussianity, sparse structure of images and good recognition rate exposed by principal component analysis, we are interested in those low-dimensional representations that exhibit maximum of kurtosis, variance, sparseness and their combinations. Using linear projection for dimension reduction, we formulate this problem as that of optimization on Grassmann or Stiefel manifolds. It can be solved by deterministic gradient methods which are not guaranteed to converge to a global maximum. We use stochastic gradient methods, that lead to the global solutions. The gradient process is constructed as a piecewise geodesic curve, and the gradient vector can be represented as the orthogonal projector onto the tangent space of the manifold. This optimization problem is solved numerically. We present experiments conducted with natural and face images in order to get representation with the best recognition rate. (Received February 06, 2006)