

Information-theoretic learned linear projections for dimensionality reduction

Lawrence Carin, Duke University

There has been significant recent interest in dimensionality reduction based on random projections. In this talk we demonstrate that by using information-theoretic metrics, such as mutual information, one can significantly reduce the number of required projections, as compared with random projections. We give theoretical justification for the mutual information metric, and we consider this from the perspective of real-valued and count-valued matrices (the latter may be of interest when modeling the number of words in a corpus). We consider multiple goals, such as matrix recovery, classification based on the compressed representation, or a convex combination of the two (the last corresponding to the information bottleneck). Several example results are presented for real data and applications.