Frame Based Kernel Methods for Hyperspectral Imagery Data

Abstract: The use of hyperspectral imagery (HSI) data for a host of applications is a relatively new trend and there is still much research on the development of algorithms for processing HSI data. In the first part of this talk we will begin with an introduction to HSI data, explaining exactly what it is and giving some insight into why HSI data could be useful. One of the main potential uses of HSI data is for the purposes of material classification and target detection. The second part of the talk will be devoted to presenting an algorithm that processes HSI data for these purposes. This algorithm is based on two existing mathematical theories and combines them in a novel way. The first of these theories is kernel eigenmap methods. Given a high dimensional data set that lies on a low dimensional manifold, kernel eigenmap methods are a class of dimension reduction techniques for mapping these high dimensional coordinates to low dimensional ones while preserving their underlying geometric structure. The second is frame theory; frames are a generalization of bases and have been shown to be useful in data representation problems. After presenting the basics of the algorithm, we show some results on actual HSI data sets.