

Estimation of the Number of Endmembers via Thresholding Ridge Ratio Criterion

Xuehu Zhu

Xi'an Jiaotong University
E-mail: zhuxuehu@xjtu.edu.cn

Abstract: Endmember is defined as the spectral signature of pure material present in hyperspectral imagery. Estimation of the number of endmembers (NOE) present in a scene is an important preprocessing step and plays a crucial role in hyperspectral image processing, since over- or under-estimation of the NOE will lead to heavily incorrect results. In this paper, we develop a thresholding ridge ratio (TRR) criterion based on eigendecomposition for NOE determination. Different from the widely used eigenvalue difference analysis methods, the TRR seeks an adaptive thresholding operation to the ridge ratio of eigenvalue differences. And ridge ratio combined with adaptive thresholding can theoretically guarantee a consistent estimate even when there are several local minima. Based on the TRR criterion, an algorithm is introduced to perform the estimation of NOE. Experimental results on both simulated and real hyperspectral data sets have demonstrated that the proposed TRRbased algorithm has comparable and even better performances to several benchmark algorithms in estimation accuracy of the NOE.