SEGMENTATION OF HYPERSPECTRAL IMAGES

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Abstract

In this paper we consider the problem of joint segmentation of hyperspectral images in the Bayesian framework. The proposed approach is based on a Hidden Markov Modeling (HMM) of the images with common segmentation, or equivalently with common hidden classification label variables which is modeled by a Potts Markov Random Field. Appropriate Markov Chain Monte Carlo (MCMC) algorithms are used to implement the method. This approach has previously been considered by [1,2]. In those works, the pixels of the same region are assumed independent and identically distributed. The identical assumption is a valid hypothesis for regions with constant mean and variance values. However in many hyperspectral images this hypothesis may not be valid. In this work, first we give some extensions to that work by considering a multiple linear regression model for the means of pixels in each region. This extension will give more flexibility to model regions whose mean values are not constant but linearly trended. Second, we include appropriate model parameters estimation for the regression parameters inside the MCMC algorithm. Finally we compare the segmentation results of this method with the case that pixel values in each segment are assumed identical and the case that pixel values in each channel are identical but are not independent, [3].

Key Words: Data fusion, Segmentation of hyperspectral images, HMM, MCMC, Gibbs Algorithm

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