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Spectral Mixture Model Applied to Cannabis Parcel Determination

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Abstract : Many research projects require accurate delineation of the different land cover type of the agricultural area. Especially it is critically important for the definition of specific plants like cannabis. However, the complexity of vegetation stands structure, abundant vegetation species, and the smooth transition between different seconder section stages make vegetation classification difficult when using traditional approaches such as the maximum likelihood classifier. Most of the time, classification distinguishes only between trees/annual or grain. It has been difficult to accurately determine the cannabis mixed with other plants. In this paper, a mixed distribution models approach is applied to classify pure and mix cannabis parcels using Worldview-2 imagery in the Lakes region of Turkey. Five different land use types (i.e. sunflower, maize, bare soil, and cannabis) were identified in the image. A constrained Gaussian mixture discriminant analysis (GMDA) was used to unmix the image. In the study, 255 reflectance ratios derived from spectral signatures of seven bands (Blue-Green-Yellow-Red-Rededge-NIR1-NIR2) were randomly arranged as 80% for training and 20% for test data. Gaussian mixed distribution model approach is proved to be an effective and convenient way to combine very high spatial resolution imagery for distinguishing cannabis vegetation. Based on the overall accuracies of the classification, the Gaussian mixed distribution model was found to be very successful to achieve image classification tasks. This approach is sensitive to capture the illegal cannabis planting areas in the large plain. This approach can also be used for monitoring and determination with spectral reflections in illegal cannabis planting areas.

Keywords : Gaussian mixture discriminant analysis, spectral mixture model, Worldview-2, land parcels
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