

GA-based segmentation and feature selection for the classification of AHS hyperspectral data recorded over salt marshes in Schiermonnikoog, The Netherlands

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The salt marshes on the island Schiermonnikoog, The Netherlands, constitute a valuable and complex natural ecosystem. It is governed by salinity and humidity gradients, as is reflected in the occurrence and abundance of natural plant species. Hyperspectral remote sensing is used here to reveal these gradients by classifying the flora that is typically found on the island. First a naïve pixel-based reference classification is performed using conventional classifiers, and based on field data collected in summer 2006. Because pixel based classifications of very high resolution data typically results in salt-and-pepper classifications and valuable spatial dependency and texture is mostly ignored, it is natural to adopt segmentation approaches before any classification takes place. The segmentation is performed here using the well known ECognition software, and an in-house developed region merging segmentation strategy that incorporates the notion of spectral angle in the segmentation process. Because the number of spectral bands of sufficiently high quality was limited, and incorporating spectral bands of low quality in the segmentation process resulted in low-quality segmentations, a genetic algorithm (GA) was attached to the segmentation process. This GA selects the combination of spectral bands that results in the optimal segmentation result, according to an objective evaluation criterion. After segmentation, again a GA in combination with a number of image object classifiers was used to select the combination of spectral bands that yields the highest classification accuracy.