Supervised Classification of Very High Resolution Optical Images Using Wavelet-Based Textural Features

In this paper, we explore the potentialities of using wavelet-based multivariate models for the classification of very high resolution optical images. A strategy is proposed to apply these models in a supervised classification framework. This strategy includes a content-based image retrieval analysis applied on a texture database prior to the classification in order to identify which multivariate model performs the best in the context of application. Once identified, the best models are further applied in a supervised classification procedure by extracting texture features from a learning database and from regions obtained by a presegmentation of the image to classify. The classification is then operated according to the decision rules of the chosen classifier. The use of the proposed strategy is illustrated in two real case applications using Pléiades panchromatic images: the detection of vineyards and the detection of cultivated oyster fields. In both cases, at least one of the tested multivariate models displays higher classification accuracies than gray-level cooccurrence matrix descriptors. Its high adaptability and the low number of parameters to be set are other advantages of the proposed approach.