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Cartographic Information as a Structuring Principle for Image Segmentation

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Abstract: Image segmentation is a relatively new image processing procedure which breaks an image into a set of contiguous regions characterized by some criteria of homogeneity and/or continuity. Segmentation is carried out before classification, and hence allows for classification which is based on the average spectral characteristics of the component entities. Furthermore, such classification can also benefit from shape and context information. These advantages make image segmentation a powerful tool for automated image interpretation. However, when segmentation algorithms are applied to remotely sensed images they often yield image partitions which do not correspond well to meaningful structures in the scene. This paper presents a scenario for introducing auxiliary cartographic information into image segmentation. In particular, we have found that the introduction of partially complete cartographic information, based on the more stable elements of a scene, serves as a “structuring principle” for the segmentation algorithm. The resulting partitions contain structures which correspond better with meaningful entities in the image, even in regions for which no cartographic information was introduced, and hence greatly facilitate the task of automated image interpretation. This technique is shown to be particularly useful when crop covers are small compared to the pixel size. Examples are presented where cadastral information has been used as such a structuring principle with SPOT multispectral imagery and with airborne SAR imagery of agricultural scenes

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