Heuristic Spatial-Spectral Hyperspectral Image Segmentation Using Bands Quartile Box Plot Profiles

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Abstract : This paper presents a new hyperspectral image segmentation scheme with respect to both spatial and spectral contexts. The scheme uses the 8-pixels spatial pattern to build a weight structure that holds the number of outlier bands for each pixel among its neighborhood windows in different directions. The number of outlier bands for a pixel is obtained using bands quartile box plots profile among spatial 8-pixels pattern windows. The quartile box plot weight structure represents the spatial-spectral context in the image. Instead of starting segmentation process by single pixels, the proposed methodology starts by pixels groups that proved to share the same spectral features with respect to their spatial context. As a result, the segmentation scheme starts with Jigsaw pieces that build a mosaic image. The following step builds a model for each Jigsaw piece in the mosaic image. Each Jigsaw piece will be merged with another Jigsaw piece using KNN applied to their bands' quartile box plots profiles. The scheme iterates till required number of segments reached. Experiments use two data sets obtained from Earth Observer 1 (EO-1) sensor for Egypt and France. Initial results qualitative analysis showed encouraging results compared with ground truth. Quantitative analysis for the results will be included in the final paper.

Keywords : hyperspectral image segmentation, image processing, remote sensing, box plot

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