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# Hierarchical Segmentation of SAR Images with Shape Criteria

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# Hierarchical Segmentation of SAR Images with Shape Criteria

In remote sensing, a segmentation process could be used to detect land fields and to improve pixel classification. We have obtained good segmentation results for optical images (airborne, Landsat and Spot images). The segmentation of SAR (Synthetic Aperture Radar) images is greatly complicated by the presence of coherent speckle. The complex structure of the SAR images requires the utilization of a composite criterion for the segmentation. We are exploring the utilisation of spatial constraints and multi-resolution in order to improve the segmentation results.

We take advantage of a powerful hierarchical segmentation technique based upon step-wise optimization. A data driven hierarchical decomposition of the picture is produced. It can be viewed as a tree where the nodes correspond to segment and where links between nodes indicate set inclusion. At each iteration, the algorithm merges the two most similar segments by optimizing a "stepwise criterion". The algorithm could easily be adapted to complex criterion. The implementation avoids recalculation by updating the only values that are modified by a segment merger. Moreover, data structures are employed to reduce computing time.

The high noise level or texture of SAR images results in the production of micro-regions inside a homogeneous field after the first merges. These micro-regions have variable mean and variance values and irregular shapes. We should therefore impose the merging of these micro-regions inside a homogeneous field without merging parts of different fields. In order to take account of the high noise level, we should consider the utilisation of additional information. We are exploiting spatial and shape information for the segment merging criterion. Segment shape parameters, such as the contour length, the smoothness of contour and the compactness of the region, are employed.