DETECTION OF OIL SLICKS IN SAR IMAGES USING HIERARCHICAL MRF

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ABSTRACT

This study deals with hierarchical Markov Random Field (MRF) models and with their application for the segmentation of SAR images of oil spills, which are going to be segmented into three classes: denser oil, thinner oil and sea water. The proposed unsupervised scheme takes into account the variety of the laws in the distribution mixture of a SAR image in order to estimate MRF parameters. To obtain a more precise model of local and global characteristics of image content, a hierarchical model involving a pyramidal scheme is used. The main goal of this strongly filtered representation is to introduce a rough map which facilitates the detection in the upper high resolution level. The proposed segmentation procedure works as a sequential technique which combines communication between the different levels of the pyramid. Because of the noisy nature of the SAR images, a MRF scheme, which exploits its contextual analysis, is used.

The investigation was carried out using an ERS-2/SAR image, collected on June 9 2000 over the South Adriatic Sea (orbit: 26858 frame: 451) and showing the presence of a large oil slick. From the full SAR scene, a subset, 1000x1500 pixel size, covering large part of the slick, was extracted to become our test image. Before applying the proposed scheme, the speckle noise was removed from the image by means of an adaptive filter [1].

Using the proposed hierarchical MRF scheme, different segmentation experiments were carried out. The results of this study will be presented and discussed.

1. REFERENCES