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SPOT DETECTION FROM MODIS IMAGERY USING 2P-CFAR

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ABSTRACT:

Oil spills are one of the major environmental concerns, especially in the coastal zones of the ocean. Satellite remote sensing imagery has proved to be a useful tool for monitoring oil spills in the marine environment. With its two daily acquisitions and the possibility to obtain near-real-time data free of charge, the Moderate Resolution Imaging Spectroradiometer (MODIS) shows interesting potential as such a cost-effective supplementary tool.

Traditionally, the first step of oil spill detection from MODIS imagery is spot detection. In this study, we proposed an approach to detect spots from MODIS imagery by using 2P-CFAR (two-parameter constant false alarm rate). The proposed approach includes three image processing steps: image mask and filtering, geometric correction, segmentation of bright spots. In step 1, the imagery is first stretched to 256 gray values, and then screened by the land mask and the cloud mask. In step 2, the model-based geometric rectification and map registration are performed. In step 3, to set the sizes of the object window, the protection window and the background window, and to apply the 2P-CFAR detector to derive the spots. For the situation where dark spots should be detected, the geometric-corrected MODIS imagery should be inversed before being applied to the 2P-CFAR detector for its capability of detection of bright objects.

This approach is applied to actual MODIS imageries collected over the East China Sea during 2008-2009. The synthetic aperture radar (SAR) data covering common area with MODIS imagery, which was acquired at the time near to the acquisition time of MODIS imagery, was used to validate the effectiveness of the proposed approach. The result shows that the proposed approach is effective in these spot detection case studies.

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