RESEARCH ON OIL SPILL IDENTIFICATION BASED ON TEXTURE FEATURES

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Abstract

Oil pollution at sea is an issue of great interest owing to its environmental and economic impact. Potential damages and the difficulty to restore the polluted habitats and biological natural resources stimulated a public awareness to protect the marine ecological environment. The capability to detect an oil spill is fundamental to effectively plan countermeasures and minimize the effect of pollution. In order to enhance oil spill observation, remote sensing measurements can be exploited. Techniques for monitoring oil spills includes optical, microwave, and radar approaches using aircraft or satellites. However, Satellites have wide coverage and low price. Recent years, with more advanced sensor launching, correctness and real time of oil spills monitoring using satellites are improved.

It is believed that the most suitable sensor is the synthetic aperture radar (SAR). It is an active microwave remote sensing sensor, which is capable to provide wide-area surveillance and day and night measurements, (almost) independently from atmospheric conditions. So SAR is very advisable for monitoring such a kind of pollution. However, they also present some drawbacks which prevent oil spill extraction correctly.

Oil spills appear as dark areas in the SAR images because oil dampens the capillary waves of the sea surface. A major part of the oil spill detection problem is to distinguish oil spills from other natural phenomena (look-alikes) that also dampen the short waves and create dark patches on the surface. It is known that SAR data is acquired by single band, which provides few features about oil slick, and induces many look-alikes. With regard to this problem, texture features are suggested to improve accuracy of oil spill identification. Texture

features, extracted from GLCM, are analyzed, and the parameters used for texture extraction are also tested and evaluated. Research indicates that mean, contrast, variance, entropy, and dissimilarity are effective for oil identification. With regard to oil slick feature distribution, nonparametric classifier, parallelepiped, is suggested, and acquires good results. Research indicates that texture features extends information of interested objects, and help to improve oil spill monitoring.

Key words: SAR, texture, oil spill

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