

# A Review On: Oil Spill Detection In MATLAB Software Using SAR Images

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**Abstract-** *The main objective of this research is to detect oil spills and to determine the oil spill frequency. SAR(Synthetic Aperture Radar) imagery is a common medium for detecting oil spills. Object detection is a frequent and important field of study in Image processing and in Earth Observation. It has emerged into an important application for the society. Environmental safety is presently an essential subject of increasing public concern and as a outcome, peculiar attention is being compensated to the environmental damage caused by the formation of spills of hydrocarbon compounds over the sea surface generated as a result of oil-tanker accidents or wrongful cleaning of tankers. A successful handling operation to a marine oil spill depends on the accelerated response from the time the oil spill is recognized. In this paper, an oil spill detection method is proposed. The method consists of three stages, namely: 1) GLCM Analysis; 2) Image Filtering 3) Image Thresholding; and 4) Object recognition of the segmented objects as oil spills. This approach is implemented and results are verified in MATLAB software.*

**Keywords-** Image processing, Oil Spill Detection

## I. INTRODUCTION

Oil spills can destroy marine life as well as damage habitat for land animals and humans. The majority of marine oilspills result from ships emptying their bilge tanks before or after entering port. Large area oil spills result from tanker ruptures or collisions with reefs, rocky shoals, or other ships. These ships are usually spectacular in the extent of their environmental damage and generate wide spread media coverage.

Mineral oil spills floating on the sea surface are detectable by imaging radars because they damp the short surface waves that are responsible for the radar backscattering. Oil spills appear as dark areas on radar images. Oil spills are seriously affecting the marine ecosystem and cause political and scientific concern since they seriously effect fragile marine and coastal ecosystem. The amount of pollutant discharges and associated effects on the marine environment

are important parameters in evaluating sea water quality. When an oil slick from a large oil spill reaches the beach, the oil coats and clings to every rock and grain of sand. If the oil washes into coastal marshes, mangrove forests or other wetlands, fibrous plants and grasses absorb the oil, which can damage the plants and make the whole area unsuitable as wildlife habitat. Hence to provide protection to the marine species and applying proper methods to reduce oil slicks it is necessary to find the location of the oil spill in the sea.

SAR sensors have an advantage over optical sensors in that they can provide data under poor weather conditions and during darkness. Users of remotely sensed data for oil spill applications include the Coast Guard, national environmental protection agencies and departments, oil companies, shipping industry, insurance industry, fishing industry, national departments of fisheries and oceans, and departments of defence.

## II. MATERIALS AND METHODOLOGY:

**STUDY AREA:** In the early morning of January 28, 2017, a liquefied petroleum gas tanker, the BW Maple, while coming out of the Kamarajar port, Ennore, collided with another tanker, the MT Dawn Kanchipuram, laden with 32,813 tonnes of petroleum lubricant. As per the real-time data of Port's Vessel Traffic Management System (VTMS), the Maple crashed into the side of the Dawn Kanchipuram at about 3.45 AM,leaking dark waxy bunker oil of the latter into the sea at about 2 nautical miles from the coast.

When the municipal pumps failed, authorities fell back on thousands of poorly equipped workers armed with little more than plastic buckets. Two weeks into the operation, the oil slick's most visible traces have largely disappeared, but environmentalists fear that the damage has just begun.



Fig:- Ennore oil spill

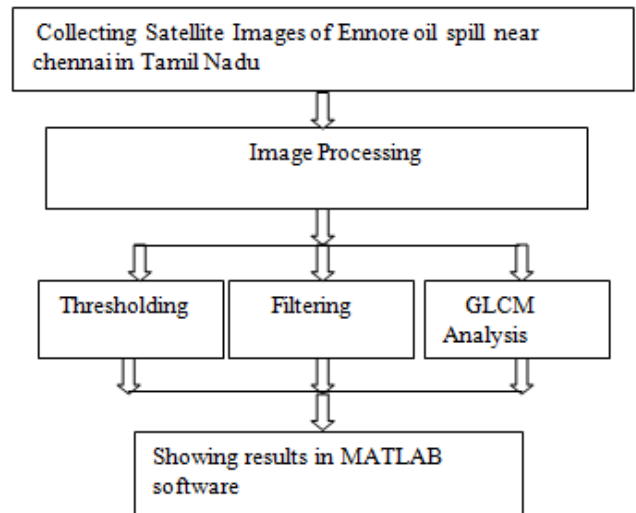


Fig.2: Flow chart of methodology for oil spill detection

Importance and necessity of digital image processing stems from two principal application areas: the first being the Improvement of pictorial information for human interpretation and the second being the Processing of a scene data. Digital image processing has a broad range of applications such as remote sensing, image and data storage for transmission in business applications, medical imaging, acoustic imaging.

**GLCM Analysis:** Gray scale is simply reducing complexity: from a 3D pixel value (R,G,B) to a 1D value. GLCM is a square matrix which has the same number of rows and columns as the quantization level of the image and symmetrical around the diagonal.

**Filtering:** Filtering is a technique for modifying or enhancing an image. For example, we can filter an image to emphasize certain features or remove other features. Image processing operations implemented with filtering include smoothing, sharpening and edge enhancement.

**Thresholding:** Image thresholding is a simple, yet effective, way of partitioning an image into a foreground and background

MATLAB is a high-performance language for technical computing. It integrates computation, visualization, and programming in an easy-to-use environment where problems and solutions are expressed in familiar mathematical notation.

### III. DISCUSSION

As the quantity of the SAR data increases rapidly there is a big need for semi or fully automatic methodologies to detect and identify dark formations as oil spills, fast and accurate. In this research methods of image processing is studied which is implemented in MATLAB software for oil spill detection using SAR(Synthetic Aperture Radar) images SAR image of Ennore oil spill will be collected and imported in MATLAB.

Image processing will be then applied on the image which is three step process. First GLCM analysis will be implemented on the image followed by Filtering and Thresholding. And then final image will be the output where oil spill will be detected and all these results is showed in MATLAB software

### IV. CONCLUSION

The main objective of this paper is to detect oil spills on the ocean using SAR images. In order to save the ocean properties, this research play an important part. Three methods have been used like GLCM analysis, Filtering and Thresholding for oil spill detection. Also this method can be approached because it can be able to do oil spill detection for any SAR image and can be implemented in MATLAB software.

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