COMPARISON BETWEEN DIFFERENT TEXTURE ALGORITHMS FOR OIL SPILL DETECTION FROM SAR IMAGE

NURUL AMALINA BINTI OTHMAN @ HUSSIN

FACULTY OF SCIENCE AND TECHNOLOGY
UNIVERSITI COLLEGE OF SCIENCE AND TECHNOLOGY MALAYSIA
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COMPARISON BETWEEN DIFFERENT TEXTURE ALGORITHMS FOR OIL SPILL DETECTION FROM SAR IMAGE

By

Nurulaini Binti Othman @ Hussin

Research Report submitted in partial fulfillment of the requirements for the degree of Bachelor of Science (Marine Science)

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KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA
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DEDICATED TO:

BELOVED MOM, DAD, BROTHERS AND SISTER;

YOU ARE MY SUNSHINE.

SPECIAL THANK FOR ALL THE KINDNESS,

SUPPORTS AND EVERYTHING.

KOLEJ UNIVERSITI SAINS DAN TEKNOLOGI MALAYSIA [KUSTEM]
Mengabang Telipot
21030 Kuala Terengganu

(Marine Science Department)

APPROVAL AND CERTIFICATION FORM
RESEARCH PROJECT I AND II

I certify that the research report entitled: Comparison between Different Texture Algorithms for Oil Spill Detection from SAR Image by Nurulaini Binti Othman @ Hussin, Matric no.: UK 7114 have been read and all corrections recommended by the examiners have been done. This research report is submitted to the Department of Marine Science in partial fulfilment of the requirements for the degree of Bachelor of Science in Marine Science, Faculty of Science and Technology, Kolej Universiti Sains dan Teknologi Malaysia.

Approved by:

Supervisor.

Name: DR. MAGED MOHMOUD MARGHANY
Penyelia
Jabatan Perikanan dan Sains Samudera
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
21030 Mengabang Telipot
Kuala Terengganu

Date:

Stamp:

Head of Department.

Name: DR. AHMAD SHAMSUDDIN B. AHMAD
Ketua
Jabatan Sains Samudera
Fakulti Sains dan Teknologi
Kolej Universiti Sains dan Teknologi Malaysia
21030 Kuala Terengganu

Date:

Stamp:

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LIST OF ABBREVIATIONS

CHH	Band C, horizontal-horizontal polarization
cm	centimetre or centimetres
Dept.	Department
DN	digital number
E	East
e.g.	for example
et. al.	(Latin) *et alii*; meaning 'and others'
etc.	(Latin) et cetera; meaning 'and so on'
GCP	Ground Control Point
GHz	gigahertz / 10^9 Hz
GL	grey level
GLCM	Grey Level Co-occurrence Matrices
HH	horizontal-horizontal
i.e.	that is
km	kilometre or kilometres
m	metre or metres
MACRES	Malaysian Centre for Remote Sensing
MMS	Malaysia Meteorological Service
MST	Malaysian Standard Time
PACE	Picture Analysis, Correction and Enhancement
p.m.	(Latin) post meridian; meaning 'after midday'

RADAR	Radio Detection and Ranging
RSO	Rectified Skew Orthomorphic
SAR	Synthetic Aperture Radar
ST	Station Time

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LIST OF SYMBOLS

SYMBOL	MEANING
%	Percent (per 100)
'	Minute
"	Second
<	less than
>	more than
m/s	metre per second
°	degree
μ	micro / 10^{-6}

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ABSTRACT

One of the major environmental issues today is the oil pollution near coastal area. Under these circumstances, the need for effective tools for oil spill detection is very important. This report presents study done in selecting and utilizing appropriate texture measures for oil spill detection. The main objective of this study is to compare different texture algorithms and opt for the best algorithm for oil spill detection from SAR image. Eight texture algorithms such as homogeneity, contrast, dissimilarity, mean, standard deviation, entropy, angular second moment and correlation were studied to discriminate oil spills from the surrounding seawater. This qualitative-based study used visual evaluations in selecting the best algorithm. This study shows that texture analysis such as Mean, Standard deviation and Entropy can be a very good combination for rapid detection of oil spill from SAR image. The detectability of oil spills in SAR image was discuss in terms of wind conditions and look-alikes caused by various phenomenon other than oil spills.

ABSTRAK

Salah satu daripada isu alam sekitar dewasa ini ialah masalah tumpahan minyak berdekatan kawasan pantai. Dalam keadaan ini, program pengesanan awal dan kaedah pengesanan terbaik untuk mengesan tumpahan minyak amat diperlukan. Laporan ini membentangkan kajian yang telah dijalankan dalam memilih dan mengaplikasi analisis tekstur yang sesuai untuk mengesan tumpahan minyak. Objektif utama kajian ini adalah untuk membandingkan beberapa algoritma tekstur dan memilih algoritma yang paling sesuai dan berkesan untuk mengesan tumpahan minyak daripada imej SAR. Lapan algoritma tekstur telah di analisis untuk membezakan kawasan tumpahan minyak daripada kawasan sekitarnya. Kajian kualitatif ini menggunakan perbandingan visual untuk memilih algoritma yang paling sesuai. Hasil kajian menunjukkan bahawa gabungan algoritma tekstur seperti Min, Sisihan Piawai dan Entropi boleh digunakan untuk pengesanan pantas tumpahan minyak daripada imej SAR. Kebolehan imej SAR mengesan tumpahan minyak dibincangkan dari segi keadaan angin dan kemiripan atau kepalsuan yang disebabkan oleh fenomena lain selain daripada tumpahan minyak.