



TABLE OF CONTENTS

DECLARATION	v
ACKNOWLEDGMENT	vii
ABSTRAK.....	viii
ABSTRACT.....	ix
TABLE OF CONTENTS	x
LIST OF FIGURES.....	xii
LIST OF TABLES	xv
CHAPTER I. INTRODUCTION	1
I.1 Background.....	1
I.2 Problem Statement.....	4
I.3 Research Objectives.....	5
I.4 Research Questions.....	6
I.5 Research Scope	6
I.6 Research Benefits	7
I.7 Literature Review	8
CHAPTER II. THEORITICAL BACKGROUND.....	11
II.1 Principle of Radar	11
II.1.1 Introduction.....	11
II.1.2 Radar Frequencies and Polarisations	12
II.1.3 Principle of Imaging Radar.....	14
II.1.4 Radar Geometry	16
II.1.5 Distortions in Radar Imagery.....	18
II.2 Ocean Surface Scattering on SAR.....	19
II.2.1 Surface Scattering	19
II.2.2 Bragg Scattering	21
II.3 SAR Wind Field Retrieval.....	22
II.4 Marine Oil Spill on SAR	24
II.4.1 Oil Spill.....	24
II.4.2 Look-alike	25
II.5 Ocean Remote Sensing.....	28
II.5.1 MODIS.....	28



II.5.2 Sentinel-1 SAR Mission	29
II.6 Image Texture Analysis.....	30
II.7 Support Vector Machine (SVM) Classification	32
CHAPTER III. RESEARCH METHODS.....	34
III.1 Study Area.....	34
III.2 Datasets and Processing Tools.....	36
III.2.1 Data.....	36
III.2.2 Processing Tools.....	38
III.3 Methods.....	38
III.3.1 Manual Inspection for Dark Formations	39
III.3.2 Dark Formation Analysis	41
III.3.3 SAR Pre-processing.....	44
III.3.4 Image Texture Analysis.....	46
III.3.5 SVM Classification	48
III.3.6 Oil Spill Spread Analysis	49
CHAPTER IV. RESULT AND DISCUSSION	51
IV.1 Manual Inspection.....	51
IV.1.1 Oil spill.....	51
IV.1.2 Look-alike	55
IV.2 Texture Analysis	60
IV.3 Oil Spill Spread Analysis.....	63
CHAPTER V. CONCLUSION AND RECOMMENDATION.....	66
V.1 Conclusions	66
V.2 Recommendations	67
BIBLIOGRAPHY	68
APPENDICES	74
Appendix A. Brief explanation about auxiliary data	74
Appendix B. Auxiliary data	76
Appendix C. Oil spill analysis using wind speed.....	78
Appendix D. Texture combinations	85