IMPACT OF CLIMATE CHANGE ON LAND-USE AND LAND-COVER OF YEWA SOUTH LOCAL GOVERNMENT AREA, NIGERIA

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OCTOBER, 2021

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A THESIS SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF DOCTOR OF PHILOSOPHY (Ph.D) IN CIVIL ENGINEERING (SURVEYING AND GEOINFORMATICS) IN THE DEPARTMENT OF CIVIL ENGINEERING, COLLEGE OF ENGINEERING, COVENANT UNIVERSITY, OTA, OGUN STATE NIGERIA.

OCTOBER, 2021

ACCEPTANCE

This is to attest that this report is accepted in partial fulfillment of the requirements for the award of Degree of Doctor of Philosophy **(Ph.D)** in Civil Engineering (Surveying and Geoinformatics) in the Department of Civil Engineering, College of Engineering, Covenant University, Ota, Ogun State, Nigeria.

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DECLARATION

I, OJO ADEREMI SAMUEL (CU/PC060300), declare that this research was carried out by me under the supervision of Prof. Joseph O. Olusina of Department of Surveying & Geoinformatics, University of Lagos, and Dr. Ben U. Ngene of Department of Civil Engineering, Michael Okpara University of Agriculture, Umudike, Abia State. I attest that the thesis has not been presented either wholly or partially for the award of any degree elsewhere. All sources of data and scholarly information used in this thesis are duly acknowledged.

OJO, ADEREMI SAMUEL ……

Signature & Date

CERTIFICATION

We certify that this work titled **"Impact of Climate Change on Land - Use and Land - Cover of Yewa South Local Government Area,"** is original research carried out by **OJO, ADEREMI. SAMUEL (CU/PC060300),** in the Department of Civil Engineering, College of Engineering, Covenant University, Ota, Ogun State, Nigeria, under the supervision of Prof. Joseph O. Olusina and Dr. Ben U. Ngene. We have examined and found the work acceptable for the award of the degree of Doctor of Philosophy in Civil Engineering.

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DEDICATION

This research is dedicated to the memory of my late mother, Mrs. Racheal Idowu, Ojo.

ACKNOWLEDGEMENTS

This work was completed due to the support I received from different sources. First of all, I like to give glory to my heavenly father for his mercy and sufficient grace that enabled me to cope with challenges of academic life. I sincerely acknowledge my dear father, the Chancellor, Chairman of the Board of Regents, Covenant University, Dr. David O. Oyedepo, whose vision and values provided a blossoming platform for me to fulfil my career. I also sincerely acknowledge the Covenant University management team led by our amiable Vice-Chancellor, Professor. Abiodun H. Adebayo for his drives toward the actualization of the 1-of-10-in-10 mandate and for putting policies and strategies in place which birth this research. I equally express my profound gratitude to the Registrar, Dr. Oluwasegun P. Omidiora for his support and contribution to the drive of the University's **CORE VALUES** and the vision 10-2022 mandate. I truly appreciate the Dean, School of Postgraduate Studies (SPS), Prof. Akan B. Williams, for his unalloyed support and contribution at various levels of this research. I will also appreciate the Sub-Dean (SPS), Dr. Emmanuel O. Amoo for his support and contribution at various levels of this research. Your effort toward the structuring and quality required to ensure that this research was a success is commendable.

I would like to express my profound gratitude to the Dean of College of Engineering, Professor David O. Omole for his advice and input in the course of this study and the head of Department of Civil Engineering, Professor Ede, N. Anthony, for his contributions to the success of this program. I would also express my sincere appreciation to the members of the Postgraduate Committee in the Civil Engineering Department for their timely response and action at various stages of this research. A debt of gratitude goes to the immediate past Head of Department of Civil Engineering, and currently, the Director of Covenant University Centre for Instrument and Research Facilities (CUCIRF), Professor David O. Olukanni, for his enormous contributions and advice toward completing this work. I pray that the amazing grace of God that made Jabez more honourable than his brethren shall distinguish him among men. I cannot forget to thank Postgraduate Coordinator, Civil Engineering Department, Dr. Gideon O. Bamigboye and all other Faculty and Staff in the Department of Civil Engineering with whom I share deep times of thought and who have patiently extended all manner of assistance.

My most reflective appreciation goes to my supervisor, Professor Joseph O. Olusina (University of Lagos), and my co-supervisor, Dr. Ben U. Ngene, Civil Engineering Department, Michael Okpara University of Agriculture, Umudike Abia State, for his encouraging comments, suggestions, and patience to guide me through the course of the research. I also appreciate them for their invaluable ideas and knowledge that proved indispensable in executing this research's execution. I am also grateful to Professor James B. Olaleye Surveying Department, University of Lagos for his support toward the completion of this program. I will like to thank Professor. Kenneth O. Adekalu, Obafemi Awolowo University, Ile Ife, for his advice, inspiring guidance, contribution in a most pleasant manner, and his valuable suggestions toward the completion of this work. My appreciation also goes to Professor Oluseyi O. Ajayi, and Professor Francis E. Idachaba. I sincerely appreciate your effort toward the structuring and quality required to ensure that this research was a success. Thank you all for your encouragement and support.

I am also grateful to my colleagues at the University of Lagos, Dr. Mahmound Solomon, who always assists on complex scientific challenges. My gratitude also goes to Tosin Julius, Jimoh Olalekan Abeeb, Shittu Ibrahim Opeyemi, Olagoke E. Daramola, and Chukwuma J. Okolie for their support and cogent criticisms, often rendered in a most pleasant manner. Through their support, I was able to appreciate the rudiment of Remote Sensing and GIS. Thank you all for your precious time you share with me. I sincerely thank my loving and caring wife, Mrs. Victoria Adenike Ojo, and our loving children, Adelayo Ojo, Ayomide Ojo, Oluwatosin Ojo, and Victor- John Adebola, Ojo. Without you, this program would not have been possible. I say thank you for paying the sacrifices, especially your moral and prayerful assistance toward the completion of this work. I also appreciate the grace of God in your life to always stay alone at home while I was away in Ota, Ogun State. This success is compensation for your patience. Finally, to all the people that have contributed to the success of this work, I would say a big thank you for your support, and blessings of God will not cease from you all.

CONTENT **TABLE OF CONTENTS** **Page**

COVER PAGE **i**

TITLE PAGE **ii**

ACCEPTANCE **iii**

DECLARATION **iv**

CERTIFICATION **v**

DEDICATION **vi**

ACKNOWLEDGEMENTS **vii**

LIST OF FIGURE **xiv**

LIST OF TABLES **xvi**

LIST OF ABBREVIATIONS **xviii**

ABSTRACT **xix**

CHAPTER ONE **1**

INTRODUCTION **1**

1.1 Background to the Study 1

1.2 Statement of the Problem 3

1.3 Aim of the Study 5

1.4 Objectives of the Study 5

1.5 Research Questions 5

1.6 Significance of the Study 5

1.7 Scope of the Study 6

1.8 The Study Area 7

CHAPTER TWO **9**

LITERATURE REVIEW **9**

2.1 Definitions and Rational of Land Use /Land Cover 9

2.2 Concept of Climate Change and Land use/Land Cover 12

2.3 Gap identified 17

2.4 Causes of Land-Use Change 19

2.5 Remote Sensing Technology 19

2.6 Digital Image Processing 20

2.6.1 Image Pre-processing/Image Restoration 20

2.6.2 Image Enhancement 21

2.6.3 Image Conversion 22
2.6.4 Image Classification 22
2.6.4.1 Supervised Classification 23
2.6.4.2 Unsupervised Classification 24
2.6.4.3 Object-Based Classification 24
2.7 Accuracy Assessment 24
2.8 Change Detection Methods 25
2.9 Model on Climate and Land use/Land Cover Change 25
2.9.1 Linear Regression Model 26
2.9.2 Logistic Regression Model 26
2.9.3 Stepwise Regression Model 27
2.9.4 Ridge Regression Model 27
2.9.5 Simple Linear Regression Model 27
2.9.6 Multivariate Linear Regression Model 28
2.10 Applications of Graph Theory Modelling 28
2.11 Exponential Smoothing Time Series Models for Forecasting Climatic Variables 29
2.12 Checking for Model Assumptions 30
2.12.1 Correlation Analysis 31
2.12.2 Root Mean Square Error (RMSE) 32
2.13 Climate Change 32
2.13.1 Causes of Climate Change on Land use/Land Cover 33
2.14 Effects of Climate Change on Land use/Land Cover 34
2.15 Sustainable Development Goals (SDG) and its Goals 36
2.15.1 The Impact of Climate Change on Sustainable Development Goals 38
CHAPTER THREE 39
METHODOLOGY 39
3.1 preamble 39
3.2 Data Collection 40
3.2.1 Primary Data (Ground Truth Information) 40
3.2.2 Secondary Data 40
3.3 Acquisition of Satellite Images for LULC Analysis. 40
3.4 The Nigerian Administrative Map 46

3.5 Climatic Data 46
3.6 Systems Selection 53
3.6.1 Hardware 53
3.6.2 Software 53
3.7 Methods 53
3.7.1 Change Detection Processes and Land Use/Land Cover Maps 54
3.7.2 Digital Image Processing and Land Use/Land Cover Classification 54
3.7.3 Image Interpretation and Feature Detection 54
3.7.3.1 Creation of Colour Composite 54
3.7.3.2 Feature Detection 56
3.7.4 Image Enhancement 57
3.7.5 Image Classification 58
3.7.5.1 Spatial Subset Creation from the Landsat Scenes 60
3.7.5.2 Creation of Training Sites and Supervised Classification 61
3.7.6 Editing of Classification Outputs 65
3.7.7 Ground Truthing 66
3.7.8 Land use/Land Cover Change Detection Analysis 67
3.7.9 Accuracy Assessment of land use/land cover Classification 68
3.7.10 Land use /land Cover Change 72
3.7.11 Linear Interpolation 72
3.8 Forecasting Climate Change 75
3.9 Multivariate Linear Regression 76
3.9.1 Working Variables 77
3.9.2 Creation of Multivariate Model using Graph Theory 78
3.9.3 Estimation of the Least Square Estimates **($\boldsymbol{\beta}$)** 80
3.9.4 Estimation of the Error Estimate 81
3.9.5 Model Assumptions 82
3.9.6 Development of Multivariate Regression Model 82
3.9.7 Model Validation 83
3.9.7.2 Correlation Analysis 84
3.9.7.3 Root Mean Square Error (RMSE) 84

CHAPTER FOUR **85**
RESULTS **85**
4.1 Introduction 85
4.2 Trend analysis of Climatic Variables in the study area 85
4.3 Land Use/ Land Cover Maps 92
4.4 Land use/Land Cover Statistics between 2000 and 2019 99
4.5 Results of Accuracy Assessment 103
4.6. Model Evaluation Results 105
4.6.1 Results for Model Validation 106
4.6.2 Correlation Result on Land use/Land Cover 109
4.6.3 Result of Root Mean Square Error (RMSE). 111
4.7 Output of Data Model 112
4.8 Relationship between Predicted Data (Modelling) Output and Classification Output 113
4.9 Forecasting Climate Change 119
4.10 Forecasting Land use/Land Cover classes 129
CHAPTER FIVE **131**
DISCUSSION **131**
5.1 Preamble 131
5.2 Analyses of Climate Variables 131
5.3 Analyses of Forecasting Climatic Variables 133
5.4 Area of Change and rates of Change in Land use/Land Cover types LULCC between the year 2000 and 2019 134
5.5 Predicting the Trend of LULCC between the year 2020 and 2040 136
5.6 Statistical Analysis of Climate Change and Land Use/Land Cover Change. 137
5.7 Performance of Regression Model 138
5.8 Checking of Assumptions 139
CHAPTER SIX **140**
CONCLUSION AND RECOMMENDATIONS **140**
6.1 Summary 140
6.2 Conclusion 141
6.3 Challenges and Limitations 142
6.4 Contributions to Knowledge 142

6.5 Recommendations 142
REFERENCES 145
APPENDIX A 162
APPENDIX B 172

LIST OF FIGURE

Figure	Title of Figures	Pages
Figure 1.1	The casual loop diagram of modelling of LULC	4
Figure 1.2	Yewa South Local Government Area, Ogun State	8
Figure 2.1	Image Processing in Remote Sensing	21
Figure 2.2	Proper vertex coloring with Chromatic number	29
Figure 3.1	Flow chart for Change Detection Analysis and Multivariate Modelling	39
Figure 3.2	Landsat 7ETM+ Epoch 2000 of the study area.	42
Figure 3.3	Landsat 7ETM+ Epoch 2002 of the study area.	43
Figure 3.4	Landsat 7ETM+ Epoch 2006 of the study area.	43
Figure 3.5	Landsat 7ETM+ 2011 of the study area	44
Figure 3.6	Landsat 8 OLI/TIRS Epoch 2013 of the study area	44
Figure 3.7	Landsat 8 OLI/TIRS Epoch 2015 of the study area	45
Figure 3.8	Landsat 8 OLI/TIRS Epoch 2019 of the study area	45
Figure 3.9	Trend of Climatic variables in the study area	52
Figure 3.10	Colour composite (Bands 5, 4 and 3) for epoch 2000	55
Figure 3.11	Colour composite (Bands 6, 5 and 4) for epoch 2013	55
Figure 3.12	Layer stacking process	56
Figure 3.13	Image sharpening using the Gram-Schmidt technique	58
Figure 3.14	Reclassification of scene	59
Figure 3.15	Colour coding the unsupervised classification	60
Figure 3.16	Selection of Yewa-South LGA boundary	60
Figure 3.17	Clipping of the Yewa-South LGA boundary	61
Figure 3.18	Region of Interest (ROI) tool	62
Figure 3.19	ROI for Waterbody class (2000)	63
Figure 3.20	Waterbody classification output (2000)	64
Figure 3.21	Built-up classification output (2000)	64
Figure 3.22	Conversion of Classification outputs to polygon (Vectorisation)	65
Figure 3.23	Advanced editing toolbar (Explode, cut polygon, Edit vertices)	66
Figure 3.24	Erase window during editing of classes	66
Figure 3.25	Edited classification for 2019	67
Figure 3.26	Calculate Geometry and Statistics for Area computation	68
Figure 3.27	Creating Random Points window	69
Figure 3.28	Exporting layer to KML	70
Figure 3.29	Assigning ground-truth class values to points	71
Figure 3.30	Extracting class values to points	71
Figure 3.31	Interpolation	73
Figure 3.32	Graph Theory of Multivariate Linear Regression	79
Figure 4.1	Trend of Average Annual Temperature (0C) of the study area	86
Figure 4.2	Trend of Average Annual Rainfall (mm) of the study area	87
Figure 4.3	Trend of Average Evaporation (ml) of the study area	89
Figure 4.4	Trend of Average Relative Humidity (ml) of the study area	90
Figure 4.5	Trend of Average Soil Temperature (0C) of the study area	91
Figure 4.6	Land use/land cover map showing spatial pattern and dynamic of the study area for year 2000	93

Figure 4.7 Land use/land cover map showing spatial pattern and dynamic of the study area for year 2002 94
Figure 4.8 Land use/land cover map showing the spatial pattern and dynamic of the study area for the year 2006 95
Figure 4.9 Land use/land cover map showing the spatial pattern and dynamic of the study area for the year 2011 96
Figure 4.10 Land use/land cover map showing the spatial pattern and dynamic of the study area for the year 2013 97
Figure 4.11 Land use/land cover map showing the spatial pattern and dynamic of the study area for the year 2015 98
Figure 4.12 Land use/land cover map showing the spatial pattern and dynamic of the study area for the year 2019 99
Figure 4.13 Chart for the area and percentage of change in different land use/land cover categories in Yewa South Local Government Area between the year 2000 and 2019 102
Figure 4.14 Chart indicates a comparison of the change in land use/land cover change in (km^2) and % between years 2000-2019 in Yewa South Local Government Area 102
Figure 4.15 Annual rate of change in LULC (km^2/year) of the study area 103
Figure 4.16 Residual plot for wetland 107
Figure 4.17 Residual plot for water body 108
Figure 4.18 Residual plot for Vegetation 108
Figure 4.19 Residual plot for Agric land 109
Figure 4.20 Residual plot for Built-up 109
Figure 4. 21 Correlation Analysis chart between land use classes 110
Figure 4.22 The Root Mean Square Error 112
Figure 4.23 Relationship between Wetland (Predicted) and Wetland (classification output) 117
Figure 4.24 Relationship between Waterbody (Predicted) and Waterbody (classification output) 117
Figure 4.25 Relationship between Vegetation (Predicted) and Vegetation (classification output) 118
Figure 4.26: Relationship between Built-up (Predicted) and Built-up (classification output) 118
Figure 4.27; Relationship between Agriculture (Predicted) and Agriculture (classification output) 119
Figure4.28; Time series model for Annual rainfall for the year (2000–2019) and predicted rainfall for years (2020 - 2040) 127
Figure 4.29; Time series model for Annual temperature for the year (2000–2019) and Predicted temperature for the year (2020 - 2040) 127
Figure 4.30; Time series model for Annual evaporation for (2000–2019) and predicted for the year (2020 - 2040) 128
Figure 4.31; Time series model for annual relative humidity for the year (2000–2019) and the predicted value for the year (2020 - 2040) 128
Figure 4.32; Time series model for soil temperature for the year (2000–2019) and the predicted value for the year (2020 – 2040) 129

LIST OF TABLES

Table	Title of Table	Page
Table 2.1	Human causes of land use/land cover change	19
Table 3.1	Attribute of the Landsat data set (Source; USSG)	41
Table 3.2	Landsat 7 ETM+ parameters: (USGS, 2019)	41
Table 3.3	Landsat 8 OLI/TIRS parameters. (USGS, 2019)	42
Table 3.4	Statistical summary of Average Rainfall in the study area	46
Table 3.5	Statistical summary of Average Temperature in the study area	47
Table 3.6	Statistical summary of Evaporation in the study area	48
Table 3.7	Statistical summary of relative humidity of the study area	49
Table 3.8	Statistical summary of Soil Temperature in the study area	50
Table 3.9	Statistical summary of climate data	51
Table 3.10	Land use/Land cover classification scheme	63
Table 3.11	Area of change per km^2 in different land use/ land cover change in the Yewa South Local Govt. Area between years 2000 and 2019	74
Table 3.12	Definition of Working Variables	78
Table 3.13	Data Usage	83
Table 4.1	Average annual temperature (0C) and Percentage change (%) between 2000 - 2019	85
Table 4.2	Trend of Average Annual Rainfall (mm) and Percentage change (%) between 2000 -2019	86
Table 4.3	Average Annual Evaporation (ml) and Percentage change (%) between 2000 - 2019	88
Table 4.4	Average Relative Humidity (ml) and Percentage change (%)	89
Table 4.5	Average Soil Temperature (0C) and Percentage change (%)	90
Table 4.6	The Area and Percentage of the different land use/land cover categories in the study area between years 2000 – 2019	100
Table 4.7	Comparison of changes in land use/land cover classes between 2000-2019 in (km^2) and % changed	100
Table 4.8	Annual rate of change in LULC (km^2/year) of the study area	101
Table 4.9	Accuracy Assessment for the year 2000	104
Table 4.10	Accuracy Assessment for the year 2002	104
Table 4.11	Accuracy Assessment for the year 2006	104
Table 4.12	Accuracy Assessment for the year 2011	104
Table 4.13	Accuracy Assessment for the year 2013	105
Table 4.14	Accuracy Assessment for the year 2015	105
Table 4.15	Accuracy Assessment for the year 2019	105
Table 4.16	Result of Model validation (Output)	106
Table 4.17	Classification data or Sample output	106
Table 4.18	Error estimate	106
Table 4.19	Correlation analysis between land use classes	109
Table 4.20	Land use/land cover correlation analysis	110
Table 4.21	Predicted value (Modelling output)	114
Table 4.22	Classified data (Sample output)	115
Table 4.23	Residual ($\boldsymbol{\epsilon = Y - Y}$)	115
Table 4.24	Forecast rainfall for years 2020 – 2040	119

Table 4.25 Forecast temperature for years 2020 – 2040 120
Table 4.26 Forecast evaporation for years 2020 – 2040 121
Table 4.27 Forecast relative humidity for years 2020 – 2040 122
Table 4.28 Forecast average soil temperature for years 2020 – 2040 123
Table 4.29 Forecasting of the climatic parameter between 2020 and 2040 in Yewa South Local Government 124
Table 4.30 Annual percentage change of forecasting climatic change between 2020 and 2040 in Yewa South Local Government 125
Table 4.31 The Area of the Forecast (Predicted) land use/land cover categories in the study area between years 2020 – 2040 130
Table 4.32 Percentage of the Forecast (predicted) land use/land cover change in the study area between years 2020 – 2040 130

LIST OF ABBREVIATIONS

C	Carbon
CC	Climate Change
CFC	Chloro-Floro-Carbons
CH_4	Methane
CO_2	Carbon Dioxide
ENVI	Environment for Visualizing Images
ETS	Exponential Smoothing Techniques
ETM+	Enhanced Thematic Mapper Plus
GCM	Global Climate Models
GHG	Greenhouse Gases
HIS	Hue, Saturation and Intensity
JARS	Japan Association of Remote Sensing
LR	Logistic Regression
LULC	Land Use/Land Cover
M. O. F. A	Ministry of food & Agriculture
MSS	Multispectral Scanner System
N	Nitrogen
NASA	National Aeronautics and Space Administration
NO_2	Nitrous Oxide,
N_20	Nitrous Oxide
NOAA	National Oceanic and Atmospheric Administration
OLI	Operational Land Imager
PCA	Principal Components Analyses
RBV	Resolution Visible Sensor
RGB	Red, Green, Blue
RMSE	Root Means Squared Error
ROI	Region of Interest
SDG	Sustainable Development Goals
TM	Thematic Mapper
TIRS	Thermal Infrared Sensor
USGS	United State Geological Survey
VI	Vegetation Indices

ABSTRACT

Agricultural products, which include farming and forestry, and raising livestock, are the main occupation of Yewa South Local Government of Ogun State in Nigeria which is the case in this study area. Climate change has been a significant threat to the study area. The burning of bush has given rise to an increase in greenhouse gas pollution in the atmosphere. The intensive use of land through dynamic human activities and climate changes has also affected the study area's agricultural product. It is necessary to understand the dynamic and climatic changes of the study area. It is on this basis, that this study was carried out to determining the effect of climate change on land use/land cover of the study area. The specific objective is to model the impact of the relationship between climate change and land use/land cover change (LULC) and predict for future planning of land use/land cover change of the study area. This study used multi-temporal data sets between 2000 and 2019 from LANDSAT-7 ETM+ and LANDSAT-8 OLI/TIRS, and climatic variables obtained from Ogun-Osun River Basin Development Authority. The general design and methods used in the study include image acquisition, image classification, and preparation of the thematic map. A supervised Parallelepiped classification scheme was used to classify the images into five different classes of LULC types. The classes are vegetation, wetland, waterbody, agricultural land and built-up. The study developed a multivariate regression model that established the relationship between climate data and (LULCC) that helped predict future planning of LULC of the study area. The LULC classification results revealed that the agricultural land use type was extensively used in the study area, with the percentage ranging from 33.82% (222.17km^2) in 2000 to 66 56% (436.84km2) in 2011. The high value of yearly rainfall throughout the study period led to an increase in water resources' agricultural consumption. The growth rate of the built-up area between 2000 and 2019 snowballed, rising from 3.85% in 2000 to 10.33%, with actual areal expansion increasing from 25.28 km2. to 67.83 km^2. The rapid increase in the population during the year of study also attributed to the expansion of farmland, where many farmers obtained land for large-scale agriculture, suggesting that farmland is the most predominant LULC category in the study area. The technique to predict LULC distribution for 2040 was successful, and the results were compared with the LULC from 2000 to 2019. The study also established that there are distinct changes in climate variability between the years 2000 and 2019, leading to changes in the land use/land cover of the study area. The statistical analysis result indicated that the climatic parameters have an accuracy of 84.12 % Prediction for land use/land cover classification. The projected LULC for 2040 revealed potential expansion in agriculture and growth in population. It is envisaged that the study will help improve the social-economic activities without further disintegrating the environment for planning, administration, and exploitation of lands in the Yewa South Local Government area of Ogun State, Nigeria.

KEYWORDS: Land use, Land cover, Multivariate, Climate, Change detection.