UNIVERSITI TEKNOLOGI MARA

URBAN LANDCOVER FEATURES IDENTIFICATION UTILIZING MULTIBAND COMBINATIONS AND MULTI-LEVEL IMAGE SEGMENTATION FOR OBJECT-BASED CLASSIFICATION

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Thesis submitted in fulfillment
of the requirements for the degree of
Master of Science
(Built Environment)

Faculty of Architecture, Planning and Surveying

May 2018

AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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Date	:	May 2018

ACKNOWLEDGEMENT

In the name of Allah, the most beneficial and most merciful.

First and foremost, thank you Allah for giving me the opportunity, strength and courage to complete this study. Second, I would like to express my deepest gratitude to my supervisor Assoc. Prof. Dr. Juazer Rizal Bin Abdul Hamid for the patient, suggestions and invaluable suggestions to this thesis throughout my master journey. I would also like to acknowledge Malaysian Centre for Geospatial Data Infrastructure (MaCGDI) for providing some of the data for this research. Special thanks to Universiti Teknologi MARA and Ministry of Higher Education Malaysia for the sponsorship of this study. Many thanks to my postgraduate friends especially Hezri, Atiqah, Ibtisam and Shfikah whom always been there to be able to work together, provide knowledge, discuss and sharing the ideas to each other during our master journey. Alhamdulillah after all the hardships, we manage to complete what we had started. Also special thanks to my close friends since my undergraduate studies for never ending support and helped. May Allah grant all of you a life filled with blessed and happiness in this world and the hereafter.

My deepest appreciation goes to my mother Siti Selamah Binti Ismail. Without your daily prayer, unconditional love and endless support, none of this would have been possible. I would also like to thank my sisters, brothers and my fiancé Khairul Haswad for the constant encouragement and helped me whenever I needed most. A very special thank you also goes to my late father Hashim bin Shaibon. You are such a great inspiration to me which I will carry on forever eventhough you are no longer here with me in this world. May Allah grant you the highest level of jannah, InsyaAllah.

ABSTRACT

Urban area refers to cities which have highly heterogeneous objects with complex landscape. Variation land-cover features, which include natural and man-made objects, lead to the advent of features that are spectrally very similar. For example, trees and grass as well as building roofs and roads often have similar spectral response that always had been misclassified yet difficult to distinguish. The complexness of urban features require high spatial as well as high spectral resolution image especially when trying to extract the land-cover objects. Advanced in remote sensing technology has tremendously strengthens the spatial and spectral techniques, which will greatly affects urban environment study. The emerging of high spectral resolution image with sub-meter level of accuracy lead to high potential in order to identify detailed urban land-cover features. By adopting object based approached instead of pixel based will avoid the 'salt and pepper' effect that will decrease the accuracy of land-cover classification. Using Worldview-2 multispectral satellite image as a primary data, together with ancillary data which include normalized Digital Surface Model (nDSM) derived from Light Detection and Ranging (LIDAR) data and indices layer, the image segmentation process utilizing multiresolution segmentation algorithm was conducted. Twelve segmentation levels were constructed in order to create meaningful image objects before going through the classification process. Three supervised object based classifier namely Support Vector Machine (SVM), BAYES and K-Nearest Neighbour (KNN) were tested in order to identify which classifier gives the best classification result of the urban area of the study. Thirteen sets of experiment were created, which consist of different combination bands (8 multispectral band of worldview-2, panchromatic band, indices layer, texture image, spectral transformation image) to be tested by each classifier. The results from the study indicate statistically significant difference in classification accuracy between each classifier and experiment sets: SVM outperforms BAYES and KNN as produced highest overall accuracy (87.93%), however based on Kappa statistics per class, user's and producer's accuracy, as well as visual examination and overall accuracy performance, BAYES with overall accuracy of 85.51% has depicted to have the best land-cover classification accuracy result.

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