

UNIVERSITI TEKNOLOGI MARA

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

NURHANISAH BINTI HASHIM

Thesis submitted in fulfillment
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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.

Name of Student : Nurhanisah Binti Hashim

Student I.D. No. : 2014252594

Programme : Master of Science (Built Environment) – AP781

Faculty : Architecture, Planning & Surveying

Thesis Title : Urban Landcover Features Identification Utilizing
Multiband Combinations And Multi-Level Image
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Signature of Student :

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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.

