UNIVERSITI TEKNOLOGI MARA

Building Detection using Object-Based Image Analysis (OBIA) and Machine Learning (ML) Algorithms

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Thesis submitted in fulfillment

Of the requirement for degree of

Bachelor of Surveying Science and Geomatics (Hons)

Faculty of Architecture, Planning and Surveying

January 2020

AUTHOR'S DECLARATION

I declare that the work in this thesis/dissertation 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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ABSTRACT

The information of building features especially in the urban area is very important to support urban management and development. Nevertheless, the automated and transferable detection of building features is still challenging because of variations of the spatial and spectral characteristics to support urban building classification using remote sensing techniques. Most previous studies utilized high-resolution images to discriminate buildings from other land use in the urban area and indeed it involves a high cost to achieve that purpose. Consequently, this study utilized a medium resolution remote sensing image, Sentinel-2 with 10-meter spatial resolution to classified the building in Selangor, Malaysia. In order to obtain a good classification accuracy, the suitable segmentation parameters (scale, shape and compactness) and features selection have been determined and Machine learning (ML) algorithms, namely Support Vector Machine (SVM) and Decision Tree (DT) classifiers have been applied to categorized five different classes which are water, forest, green area, building, and road. The result from these two classifiers was then have been compared and it is obviously showing that the SVM classifier is able to produce 20% better accuracy with 93% and kappa is 0.92. Thus, by enhancing the classification techniques in OBIA, building extraction accuracy using ML algorithms for medium resolution images can be improved and the expenses also can be reduced indirectly.

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