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JULY 2024

A COMPARISON OF PIXEL-BASED AND OBJECT-BASED
CLASSIFICATION METHODS FOR HYPERSPECTRAL TREE
SPECIES CLASSIFICATION

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SCHOOL OF GEOMATICS SCIENCE AND NATURAL RESOURCES
COLLEGE OF BUILT ENVIRONMENT
UNIVERSITI TEKNOLOGI MARA MALAYSIA

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**Thesis submitted to the Universiti Teknologi MARA Malaysia
in partial fulfilment for the award of the degree of the
Bachelor of Surveying Science and Geomatics (Honours)**

JULY 2024

DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original, and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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ABSTRACT

Forests in Malaysia play a vital role in sustaining terrestrial ecosystems, making accurate tree species classification imperative for biodiversity assessment and environmental conservation. However, the challenge lies in the complexity of classifying numerous tree species within dense and diverse ecosystems. In this study, the aim is to classify forest trees using pixel-based classification and object-based image analysis (OBIA), which is supported by Hyperspectral Analysis while its objectives are to determine which classification methods are the best to use in Malaysia tropical forest, to acquire the optimum parameter for each pixel-based classification methods, assess the accuracy assessment of each classification methods, emphasizing the composition and distribution of different species. The data will be take using MicroCASI-1920 Hyperspectral VNIR Imager with Spectral Resolution Full Width Half Maximum (FWHM) less than 5nm with 5.86-pixel size and focal length of 2.5. The methodology encompasses data preprocessing, object-based image analysis, and hyperspectral signature extraction. The expected outcomes include accurate tree species maps and an overall accuracy by using and comparing several classifiers. This research's most significant consequence lies in its potential to improve forest management, biodiversity monitoring, and conservation efforts in a short time through the application of advanced remote sensing technologies, unmanned aerial vehicle (UAV) innovation and transparent methodology.

Keywords: Malaysia tropical forest, tree species classification, pixel-based classification, object-based image analysis (OBIA), hyperspectral analysis, MicroCASI-1920 Hyperspectral VNIR Imager, spectral resolution, biodiversity assessment, environmental conservation, data preprocessing, classifier comparison, forest management, UAV innovation, accuracy assessment.

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