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Processing and classification of landsat and sentinel images for oil palm plantation detection

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Abstract

The increasing demand for remote sensing, along with the advancement of technology, has led to the development of robust, sensible, and user-friendly products that can utilise remotely captured images . Remote sensing in agriculture has gained a lot of interest recently, especially in plantation management. This technology is useful for controlling and monitoring various aspects of the plantations. One of the capabilities of remote sensing is the detection of oil palm plantations. Therefore, this paper attempts to determine the best methods for image classification , especially for land cover classification of oil palm plantations. It first focuses on the correction algorithm needed to estimate the true surface reflectance value of the satellite image data before the image is filtered

to reduce any noise. The process includes the analysis of both supervised and unsupervised modules in terms of their contrast visual and reflectance spectral curve to find the best method of extracting the images ' features. In distinguishing oil palm trees, optimisation of the pre-processing of the images enables the extraction of useful information based on its spectral signature, before they are utilised as an input for the soft computing method. The results show that Artificial Neural Network (ANN) performed the best image classification with the highest overall accuracy and kappa coefficient compared to other supervised classifications. The parameters for ANN were later adjusted to identify the best ANN classification , resulting in an overall accuracy of 98.2857% and 0.9792 of kappa coefficient, and manages to effectively detect oil palm trees from the background. © 2022 Elsevier B.V.

Author keywords

Artificial neural network (ANN); Remote sensing; Soft computing spectral signature

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