

Machine vision for the maturity classification of oil palm fresh fruit bunches based on color and texture features

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Abstract

The quality of oil palm fresh fruit bunch (FFB) specified from the maturity level is visually classified based on the skin colour of the fruit. The maturity level classification of FFB can be performed automatically using machine vision. Classification becomes challenging when machine vision is applied to half-ripe FFB images, which generally have uneven colour, and to FFB images where emergent noise partially covers the fruit. In this work, a method is proposed to classify the maturity level of FFB into three classes: raw, ripe, and half-ripe. The proposed method applied colour and texture features required in the processes of feature selection and classification. The process of feature extraction was applied based on the colour and texture followed by feature selection using principal component analysis (PCA) to select the most substantial features. Subsequently, an artificial neural network (ANN) with a back-propagation algorithm was applied in the classification process to obtain the prediction class. The experiment was conducted using a local dataset consisting of 240 images (80 raw, 80 ripe, and 80 half-ripe). The results showed that the performance of the proposed method successfully achieved an accuracy of 98.3%. This classification based on colour and texture features is not restricted only to palm oil but can also be applied to other fruits.