Durian Types Recognition Using Deep Learning Techniques

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Abstract— Fruit or plant recognition is a very pragmatic and specific application of deep-learning technique. As compared to conventional method, the technique requires a larger quantity of data for training while at the same time promises a higher level of accuracy. Among various classes of neural network, convolutional neural network (CNN) is arguably the most commonly used method in image classification. The aim of this research work is to develop an effective method to classify the various cultivars of Durio zibethinus (or commonly known as durian) based on the crop's visual features via the application of CNN to improve the accuracy and speed of the cultivars recognition. Meanwhile, a reliable database consisting of labelled durian cultivars has been created. A total of 800 images consisting of the bottom view of 3 classes of cultivars and non-durian images are used during the training process of the neural network. The research work starts with the pre-processing and conversion of the images then followed by one-hot labelling of the data, construction of the network architecture, training and validation of the model then lastly exporting the trained model for general application. Important system parameters and prediction accuracy are obtained, including the graphs of loss function and accuracy against the number of epochs, confusion matrix, miss-classified images, the effect of network architecture on prediction performance, etc. The prediction accuracy of the trained model on the perfect bottom-view images of Durio zibethinus is 82.50%. With the addition of non-durian images, the prediction accuracy is slightly dropped to 81.25%.

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