Durian recognition based on multiple features and linear discriminant analysis

ABSTRACT

Many fruit recognition approaches today are designed to classify different type of fruits but there is little effort being done for content-based fruit recognition specifically focuses on durian species. Durian, known as the king of tropical fruits, have few similar characteristics between different species where the skin have almost the same colour from green to yellowish brown with just slightly different shape and pattern of thorns. Therefore, it is hard to differentiate them with the current methods. It would be valuable to have an automated content-based recognition framework that can automatically represent and recognise a durian species given a durian image as the input. Therefore, this work aims to contribute to a new representation method based on multiple features for effective durian recognition. Two features based on shape and texture is considered in this work. Simple shape signatures which include area, perimeter, and circularity are used to determine the shape of the fruit durian and its base while the texture of the fruit is constructed based on Local Binary Pattern. We extracted these features from 240 durian images and trained this proposed method using few classifiers. Based on 10-fold cross validation, it is found that Logistic Regression, Gaussian Naïve Bayesian, and Linear Discriminant Analysis classifiers performed equally well with 100% achievement of accuracy, precision, recall, and F1-score. We further tested the proposed algorithm on larger dataset which consisted of 42337 fruit images (64 various categories). Experimental results based on larger and more general dataset have shown that the proposed multiple features trained on Linear Discriminant Analysis classifier able to achieve 72.38% accuracy, 73% precision, 72% recall, and 72% F1-score.