

Comparative analysis of statistical and supervised learning models for freshness assessment of oyster mushrooms

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Abstract

Automatic assessment of the quality of fruits and vegetables is a growing field of research in this modern era in order to enable faster processing of good quality foods. In this work, we have analyzed ten major colour variant features of two sets of oyster mushrooms in terms of histograms of each layer of the red–green–blue colourmap, hue-saturation-vital component colourmap, luminance-chrominance colourmap and the greyscale image. Besides, texture analysis has been carried out using entropy window filtering. Apart from that, five other minor features, such as mean, standard deviation, entropy, kurtosis and skewness of each of these layers, and four other greyscale features, such as contrast, correlation, energy and homogeneity are analyzed in this work. Two different freshness assessment models employing statistical methods like principal component analysis (PCA) and supervised learning algorithms such as artificial neural network (ANN) have been used here to investigate the different features of the mushroom images and classify the same into fresh and deteriorated classes. Analysis revealed that the ANN classifier outperforms the PCA threshold classifier with almost all the features. The highest classifier accuracy is obtained as 94.4% using the ANN model and 93.3% using the PCA threshold freshness detector. Most importantly, the use of smartphones ensures portability, as well as the possibility of widespread application of the proposed models.