Abstract

Nashwa M Mohamed Elbendary

Using machine learning techniques for evaluating tomato ripeness

Tomato quality is one of the most important factors that helps ensuring a consistent marketing of tomato fruit. As ripeness is the main indicator for tomato quality from customers perspective, the determination of tomato ripeness stages is a basic industrial concern regarding tomato production in order to get high quality product. Automatic ripeness evaluation of tomato is an essential research topic as it may prove benefits in ensuring optimum yield of high quality product, this will increase the income because tomato is one of the most important crops in the world. This article presents an automated multi-class classification approach for tomato ripeness measurement and evaluation via investigating and classifying the different maturity/ripeness stages. The proposed approach uses color features for classifying tomato ripeness stages. The approach proposed in this article uses Principal Components Analysis (PCA) in addition to Support Vector Machines (SVMs) and Linear Discriminant Analysis (LDA) algorithms for feature extraction and classification, respectively. Experiments have been conducted on a dataset of total 250 images that has been used for both training and testing datasets with 10-fold cross validation. Experimental results showed that the proposed classification approach has obtained ripeness classification accuracy of 90.80%, using one-against-one (OAO) multi-class SVMs algorithm with linear kernel function, ripeness classification accuracy of 84.80% using one-against-all (OAA) multi-class SVMs algorithm with linear kernel function, and ripeness classification accuracy of 84% using LDA algorithm.