Bell Pepper Ripeness Classification based on Support Vector Machine

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Abstract—This article presents a content-based image classification system to monitor the ripeness process of bell pepper (sweet pepper) via investigating and classifying the different maturity/ripeness stages. The proposed approach consists of three phases; namely preprocessing, feature extraction, and classification phases. Since the color of bell pepper surface is the most important characteristic to observe ripeness, this system uses colored histogram for classifying ripeness stage. It implements principal components analysis (PCA) along with support vector machine (SVM) algorithms for feature extraction and classification of ripeness stages, respectively. The datasets used for experiments were constructed based on real sample images for bell pepper at different stages, which were collected from farms in Minya city, Upper Egypt. Datasets of total 175 images were used for both training and testing datasets. Training dataset is divided into 5 classes representing the different stages of bell pepper ripeness. Experimental results showed that the proposed classification approach has obtained ripeness classification accuracy of 93.89%, using One-against-One Multi-class SVM with linear kernel function and 10-fold cross-validation.

Keywords-image classification; features extraction; ripeness; principal component analysis (PCA); bell pepper; support vector machine (SVM).