Chapter 3
Identification of Good One From the Damaged Crops/Fruits Using Decision-Level Information Matching

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ABSTRACT

Identification of useful items that can be picked up from the damaged crops or batch of fruits/vegetables is a challenging task nowadays. Humans may fail to identify them correctly with their naked eyes due to strain. Image processing techniques can help to maximize the amount of the good agro-items easily by comparing the existing goods to templates. This chapter introduces an effective recognition method to spot good agro-items by extracting the local features using Gabor filter for orientation information. Another local information of that fruit/vegetable is extracted by speeded up robust features (SURF) algorithm. The extracted features are matched with their templates which results in the decision of individual feature extraction method. Finally, both local information is fused at decision level individually with AND operation (i.e., both algorithms will give correct decision to identify the good agro-item).

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INTRODUCTION

Agriculture is one of the old industries in the world. The growth of agriculture decides the development of the whole country. In this modern world, agriculture should be developed along with technical growth. In every field, the technically qualified skill experts will be needed to reduce the investment cost and also to increase the output from the field in order to meet the increasing demand. If all this is done properly, then that industry will get good benefits and profits (Moallem et al., 2013; 2014).

Fruit production industry needs some technical growth in order to meet increasing consumption of them by all the people in the world (Razmjooy et al., 2012; 2013). One important thing to be concerned in this industry is to provide a good quality of fruits for all persons. So the separation or identification of good fruit/crop from the defected one is the most challenging task or problem. In addition, some other difficulties accumulated with this problem are workers cost, investment cost, and proper delivery fruits at the time. Automatic identifying the good crop from defect one is a good solution for the above all problems.

The main purpose of this chapter is to acquire a good quality fruit/crop through image processing methods. The image processing method can inspect the fruits better than human perception in a very fast manner. Pham and Lee (2015) proposed the automatic detection of food fruits from the plant through k-means clustering. The small regions of fruit were obtained through k-means clustering. These regions are merged through Region Adjacent Graph (RAG) method with thresholding values. Finally, RAG is matched to find the good fruit. A novel approach of detecting the fruit using Convolutional Neural Network (CNN) was proposed by Sa et al. (2016). The CNN detects the objects in a very fast manner. CNN is a type of supervised learning done by updating the weights of features through convolution and polling.

The traditional Gabor filter has been used for time and frequency analysis. This filter was modified by Yang et al. (2003) by splitting the single kernel function into two kernel function to analyze x and y spatial domains as bandpass and low pass filter. The image was enhanced due to this modified Gabor filter. The novel dimensionality reduction method was obtained by combining the Gabor feature with Principal Component Analysis (PCA) by Pan and Ruan (2008). The method was applied for palmprint recognition by extracting the features at various orientations in order to recognize more efficiently than the existing one. Zhang et al. (2011) have achieved the low error rate for recognizing the Finger Knuckle Print (FKP) biometric. In that paper, they fused two methods namely local and global information. The local information was attained from the Gabor filter and global one was obtained by Discrete Fourier Transform phase value named as bandlimited phase-only correlation. The matching was done fusion values of stored value with query value.
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