

AUTOMATION OF FRUIT QUALITY ANALYSIS SYSTEM

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ABSTRACT

This paper presents the development in automatic vision based technology. This technology helps to increase the growth of agriculture and fruit industry. By this way the accuracy of the fruit can be increased. The main aim of this system is to estimate defected part of the fruit using image processing techniques. Image processing is done to get the required features of fruit such as texture, colour and size. Defected part of the fruit can be detected based on the threshold value ,size, colour and shape of the fruit.

INTRODUCTION

Agriculture has got a prime role in Indian economy. Various types of fruits produced through-out the year. Fruits and vegetables provide health benefits and are important for the prevention of illnesses. Eating the recommended amount of fruits and vegetables each day can reduce the risk of occurrence of the diseases. In agriculture, there are two parts pre-harvesting and post-harvesting. The post-harvesting process includes sorting and grading of fruits. In India, mostly fruit grading did manually. But manual grading is costly, time-consuming, inconsistent and less efficient. In order to overcome the problem it is necessary to research the process of automation detection.

The purpose of this project is to describe the quality of the fruit. Different quality factors are considered for sorting and grading of fruits. The factors are internal quality factors and external quality factors. The external quality factors are texture, shape, colour, size and volume, and internal quality factors are test, sweetness, flavour, aroma, nutrients, carbohydrates present in that fruit. This technology helps to increase the growth of agriculture industry. The scope of this project is to detect the defected part of the fruit using image processing techniques.

LITERATURE SURVEY

Ms.Rupali et al (2013)[1] designed a system in which fruit quality analysis is based on both internal and external quality factors. In this system X-ray is used to detect the internal quality factors. To detect the external quality factors are size and colour of the fruit. The size detection algorithm is based on symmetry of the fruit and the algorithm contains two parts are finding the center coordinate of the fruit and axis in the image. Colour detection is based on red,green and blue band values in the image. J.Ramprabhu et al (2015)[2] developed a system for fruit quality management in which colour factor segmentations is performed with the help of K-means clustering algorithm. And the processing flow of this system includes reading the image, convert the RGB image to L*a*b colour space after then the classification of colours are based on the k-means clustering algorithm. To measure the difference between two colours Euclidean distance metric is used. Edge detection of the fruit is based on the canny edge detection algorithm.

Methodology	Advantage	Disadvantage
Canny edge detection algorithm [1]	Gaussian filter	Complex computation process

k-means clustering is used for segmentation process and canny method is used for edge detection[2].	K-means useful for image analysis	Complex computation process
Gaussian mixture model and Canny edge detection algorithm[3]	Gaussian mixture model.	Background light condition.
Discrete curvlet transform[4]	Wavelets are well localized	Loss of generality

PROPOSED SYSTEM

The functions of the system include various operations they are:

Preprocessing:

In the preprocessing step,

- The input is a RGB image which is converted into a gray scale image.
- Next, there is a process of Colour detection which is helped for the purpose of feature extraction.
- At last filter is added to remove the noise from the image.

Segmentation:

The OTSU thresholding algorithm is used for segmentation process. After then k-means

clustering is used to segment image. K-means clustering algorithm works on the basis of Euclidean distance between the clusters. For that, first define the number of cluster and initialized all the clusters; then find the center cluster; after that find the Euclidean distance between the clusters.

Feature extraction:

In feature extraction texture and shape of the fruit is calculated. Texture of the fruit gives the Contrast, Correlation, Energy, Homogeneity, Mean, Standard_Deviation, Entropy , RMS, Variance, Kurtosis and Skewness values.

Classification:

The Multi-Class support vector machine (MSVM) based classification method is incorporated into the image. MSVM classification is one of the supervised classification technique. This technique is used to classify both training and testing set. Finally, the Euclidean distance is calculated to find out the matching. The matched value is specified whether the fruits are defected or normal fruits.

Conclusion

In this paper automatic vision based system is discussed for grading the fruits based on its color and size of the fruit. K-means clustering algorithm is used to group the defected part of the fruit. The automation process helps to increase the efficiency in results and reduce the time required to estimate the quality of the fruit.

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