_____

Pomegranate Fruit Separation Using MATLAB Based on Size

Nikhil Kailas Kumbhar
Department of electronics and telecommunication
Fabtech College of Engineering and Research Centre,
Sangola, India
Email:- nikhilkumbhar43@gmail.com

Vaibhav Shrimant Pawar
Department of electronics and telecommunication
Fabtech College of Engineering and Research Centre,
Sangola, India

Omkar Pandurang Kumbhar
Department of electronics and telecommunication
Fabtech College of Engineering and Research Centre,
Sangola, India
e-mail:-omkarkumbha7157@gmail.com

Pankaj Suresh Kadu
Department of electronics and telecommunication
Fabtech College of Engineering and Research Centre,
Sangola, India.
e-mail:-pkadu1985@gmail.com

*Abstract:-*This paper aims at presenting the concept of fruit quality management, a system which determines the quality of fruit by its size. Sorting tons of fruits manually is a time consuming, costly, and an inaccurate process. Automation of quality assessment of fruits is important in order to reduce human efforts and save time. In this work the identification of good and bad Fruits is focused on the methods using MATLAB. India is an agricultural country, where about 70% of people spend their lives by agriculture.

*Keywords:-*Image Acquisition, image preprocessing.

_____*****_____

I.   INTRODUCTION

Agriculture is the back-bone of Indian economy as over 75% of its population is directly or indirectly engaged in this profession. Beyond the traditional agriculture, new trends in cropping pattern have been recognized for changing the status of rural community. Importance of horticulture may not be ignored as the horticulture sector contributes about 12% of value added agriculture. The production of fruits and vegetables at present is 6.0 million tons and 7.0 million tons respectively and will be enhanced to 9.4 million tons and 10.0 million tons. Grading of these minor fruits is considered very important as it can fetch higher price to the grower. Grading also improves packaging, handling and other post-harvest operations. Grading is basically separating the material in different homogenous groups according to its specific characteristics like size, shape, color and on quality basis. Which has increased the quality of the product in the area of the interest. This was done manually which consumes time, to overcome an automatic system is proposed to improve the time consuming factor with the use of Matlab Software.

II.   METHODOLOGY

Image preprocessing plays the important role in it. The input image provided t the system will be the real time image and will be compared with the database available with the system.

III.   IMAGE ACQUISTION:-

In this process the camera is used to take the picture from the area of interest. The acquired image is saved then and is helpful for the further process. The acquired image is then proposed to the Matlab software in which the image is stored for the further processing.

IV.   IMAGE PREPROCESSING

The image preprocessing deals with the morphological operations such as opening,closing ,erode, dilate, etc. Basically the images which are obtainedduring image acquisition may not be directly suitable for identification and classification purposes because of some factors, such as noise, weather conditions, and poor resolution of an images and unwanted background etc.We tried to adopt the established techniques and study their performances.

_____

The steps involved in this process are as follows:-

1. Image capturing

2. RGB to Gray conversion.

3. Background separation.

4. Gray to Binary image conversion.

This are the basic steps required for the further processing of the image.

4.1. INPUT IMAGE:-

RGB is one of the formats of colour images. Here the input image is represented with three matrices of sizes regarding the image format. The three matrices in each image corresponds to the colours red, green and blue and also says that of how much of each of these colours a certain pixel should use.

4.2. BACKGROUND SEPARATION:-

Background subtraction is a process of extracting foreground objects in a particular scene of a image. A foreground object is defined as an object of attention which helps in reducing the amount of data to be processed.

4.3. GRAY IMAGE:-

Gray scale images have one colour which is a shade of gray in various ranges in between. Monochrome image is another name of gray image. This denotes the presence of only one (mono) colour (chrome). To convert any colour image to a gray scale representation of its luminance, we must obtain the values of its red, green, and blue (RGB) primaries in linear intensity encoding, by gamma expansion.

4.4. BINARY IMAGE:-

A Binary Image is a digital image which has two assigned pixel values. Typically the two colors used for a binary image are black and white. The gray image of Fruits is converted to binary image this means that each pixel is stored as a single bit (0 or 1). Binary images used in digital image processing as masks or as the result of some frequent operations such as segmentation, thresholding, and dithering.

4.5. FILTERING:-

The purpose of filtering is to smooth the image. This is done to reduce noise and improve the visual quality of the image. Often, smoothing is referred to as filtering. Here filtering is carried out by median filter since it is very useful in detecting edges.

V. PARAMETERS:-

5.1. SIZE:-

We consider this parameter for the quality purpose so that the fruit with the appropriate size can be selscted for the dealing purpose. The quality of the fruit will be maintained as the growing competition in the market demands the quality.

To detect the size of the fruit we used the edge detection technique so that the boundary is detetcted and the it becomes to find the other parameter required to calculate the actual size of the fruit which will indicate the quality of the fruit. The database with us contains the various sized of fruit images which will be compared with the image being processed. To detect the edge of the fruit we can use three kind of techniques named as
i. Sobel
ii. Canny
iii. Prewitt.
This anyone can be used for the processing the fruit image to obtain the edge of the fruit.

5.1.1 SOBEL:-

This operator is used to find out the edge of the fruit which makes easier to identify the centroid of the image or the fruit.

5.1.2 PREWITT:-

This is another operator used to identify the edge , as if the result obtained from the sobel are not suitable prewitt will be helpful to get the result required .this does not happens most of time.
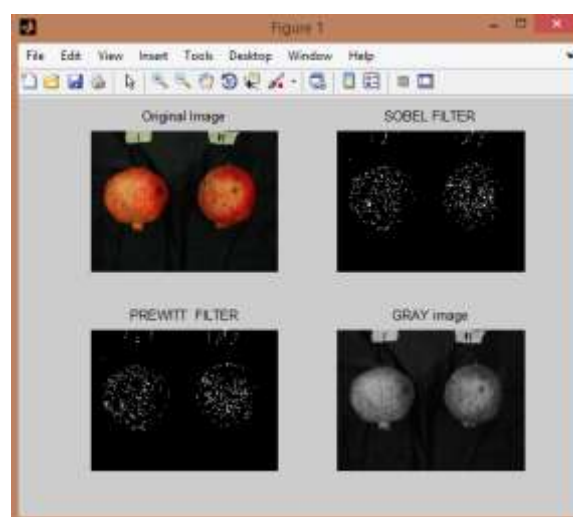

Fig 1. Output of sobel and prewitt

5.1.3:- CANNY EDGE DETECTION:-

The Canny edge detector is an edge detection operator that uses a multi-stage algorithm to detect a wide range of edges in images. It was developed by John F. Canny in 1986.

471

Canny also produced a computational theory of edge detection explaining why the technique works.

5.1.4. DEVELOPMENT OF THE CANNY ALGORITHM:-

Canny edge detection is a technique to extract useful structural information from different vision objects and dramatically reduce the amount of data to be processed. It has been widely applied in various computer vision systems. Canny has found that the requirements for the application of edge detection on diverse vision systems are relatively similar. Thus, an edge detection solution to address these requirements can be implemented in a wide range of situations. The general criteria for edge detection includes: Detection of edge with low error rate, which means that the detection should accurately catch as many edges shown in the image as possible. The edge point detected from the operator should accurately localize on the center of the edge A given edge in the image should only be marked once, and where possible, image noise should not create false edges. The Process of Canny edge detection algorithm can be broken down to 5 different steps:

- Apply Gaussian filter to smooth the image in order to remove the noise
- Find the intensity gradients of the image
- Apply non-maximum suppression to get rid of spurious response to edge detection
- Apply double threshold to determine potential edges

Track edge by hysteresis: Finalize the detection of edges by suppressing all the other edges that are weak and not connected to strong edges.
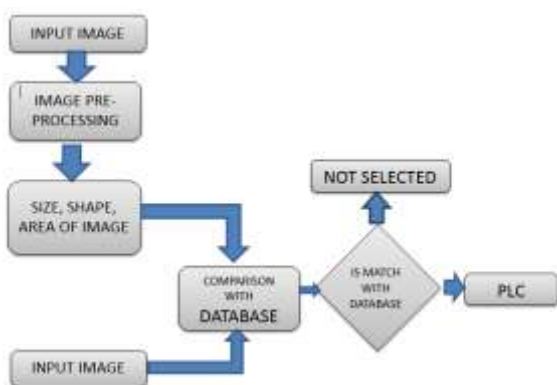
VI.   PROPOSED SYSTEM:-

Fig 4. Block diagram of system

This above fig represents the block diagram of the system in which the work of system can be easily understood

5.2 AREA:-

K-Means Clustering algotrithm is used for the area calculation. Hence we require the centroid to calculate the area though we use the k-means clustering for that purpose.

K-Means Clustering Algorithm

STEP1: The training vectors are grouped into M clusters based on the distance between the code vectors and the training vectors using the below equation (1) and (2).

$$dy = |xi - yi| kj = 1 \text{ -------------1}$$

Where dy is the distance between the training vector Xi and the code vector Yi .

$$Sumij = Xij \text{ --------------2}$$

Where, c is the cluster strength

STEP2:

Compute the sum vector for every cluster by adding the corresponding components of all the training vectors that belong to the same cluster using the equation (3).

$$Centroid = Sumij / ni$$

Where i=1, 2….n)

STEP3: Compute the centroid for each cluster by dividing the Individual components of the sum vector by the cluster Strength in using the equation (3).

STEP4: Replace the existing code vector with the new centroid to form the revised codebook.

STEP5: Repeat the steps 1 through 4 till the codebooks of the consecutive iterations converge[6]

OUTPUT:-

Some of the parameters to be calculated are been calculated and made presented the output in front of us, remaining parameters are still to be calculated hence the paramemeter remaining for the calculation are in process.
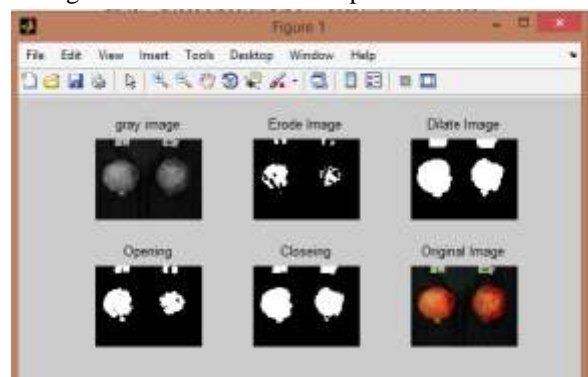

Fig 2 ;Some morphological operations
Opening, closing, erode, dilate.

472

Using this morphological operation it becomes more easier to obtain the clear edges of the fruit in the image. After completion of morphological operations we get the result as shown above in fig2 and then we should apply the edge detection techniques in it so that exact edges can be detected as shown in below fig 3
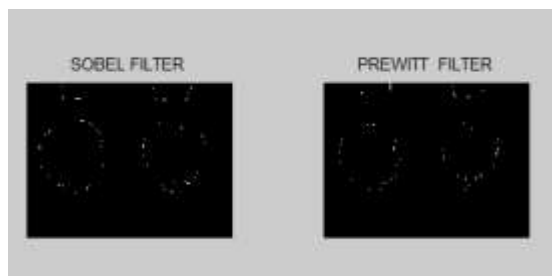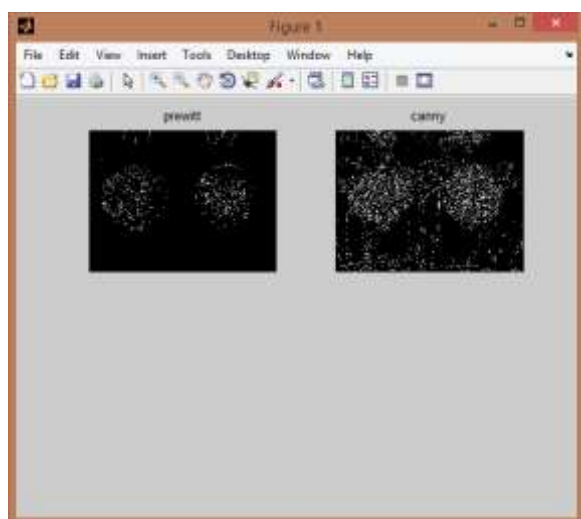

Fig. 3.

The fig 4 shows the output without using the background separation and without converting it to the binary image which does not provide the output required with the necessary information from the image it contains the canny and prewitt detection technique.

VII. FUTURE SCOPE:-

The output required when is satisfied through it the fruit is then forwarded for the further processing , hence fourth the PLC can be used for the better and faster inspection of the quality which can also consume more less time than the regular one.

VIII. CONCLUSION:-

In this paper the identification of good and bad fruits based on quality in image processing using MATLAB is successfully done with 80% accuracy. The effect on the quality of the fruit testing its quality will be increased and the time required for the quality analysis will be decreased, asper the market demand the quality plays an important role in the daily business life. The shape, size and the area are the key parameters of sorting an image using the Matlab.

REFERENCES:-

[1] Guo Feng and Cao Qixin," Study on Color Image Processing Based Intelligent Fruit Sorting System",Proceedings of the 5" World Congress on Intelligent Control and Automation, pp. 4802-4805, June 15-19, 2004 .

[2] Guo Feng and Cao Qixin," Study on Color Image Processing Based Intelligent Fruit Sorting System",Proceedings of the 5" World Congress on Intelligent Control and Automation, pp. 4802-4805, June 15-19, 2004 .

[3] J. Blasco, N. Aleixos, J. Gómez, and E. Moltó, "Citrus sorting by identification of the most common defects using multispectral computer vision," Journal of Food Engineering, vol. 83, no. 3, pp. 384-393, December 2007

[4] Dae Gwan Kim, Thomas F. Burks, Jianwei Qin, Duke M. Bulanon," Classification of grapefruit peel diseases using color texture feature analysis", International Journal of Agricultural and Biological Engineering ,Vol. 2, No.3,pp. 41-50,September,2009.

[5] Sanjay B. Patil, ShrikantK.Bodhe, Leaf Disease Severity Measurement using Image Processing, International Journal of Engineering and Technology Vol.3 (5), 2011

[6] Ms.Chinki Chandhok et al.," An Approach to Image Segmentation using K-means Clustering Algorithm", International Journal of Information Technology (IJIT), Volume – 1, Issue – 1, August 2012.