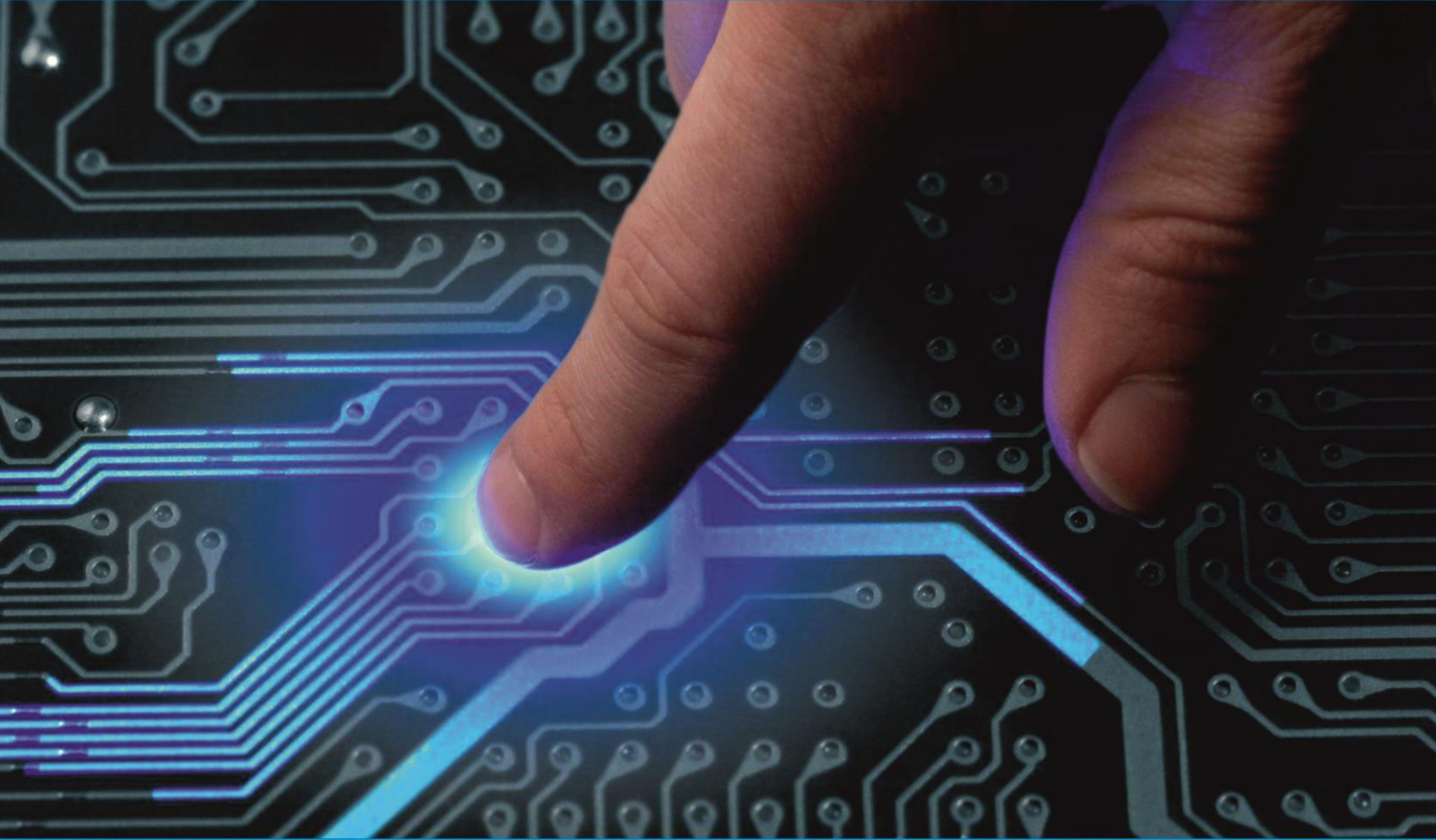




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Fruit Grading System Using Keras

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ABSTRACT: In recent years, automated machine vision-based technology has become more potential and important in many areas like Agricultural Sector and Food Processing Industry. Grading and Sorting of the fruit is one of the most important process, but this procedure is mostly carried out manually which is not efficient as it tends to human error. An automatic fruit quality inspection system helps in speed up the process improve accuracy and efficiency and reduce time.

The Main aim of the proposed system is to Sort and Grade the variety of Fruits by implemented Image Processing Techniques and keras. By using Image Processing Techniques we can make the sorting and grading process more efficient than the manual work. It will improve the quality as well as it will take less time.

KEYWORDS: Fruits, OpenCV, Contours, Image Processing, Edge Detection , Color Detection, Canny Edge Detection, Neural Network ,Camera.

I. INTRODUCTION

To design and develop an algorithm for fruit classification based on shape and color. Classification based on Shape and Color will help to provide the perfect sorting and grading of fruits. To evaluate the system performance for fruit sorting and classification in term of accuracy and precision. As there are many manual system available in market but it much more time consuming then the Automated System.

Keras is an open-source software library that provides a Python interface for artificial neural networks. Keras acts as an interface for the TensorFlow library.

The Threshold value plays an important role for the Color Module for RGB where we will take average of R, G, and B and for shape the Edge Detection will provide proper shape and size of a fruit. In this paper we are using different types of Fruits like Apple, Orange,

Strawberry, and so on. The quality of the fruits is important for the customers and become the requirements from the supplies to provide fruits with high quality. The grading are considered as the most important step to achieve the high quality standards. Generally, the fruits quality depends upon parameter such as SIZE, COLOR, SHAPE, and INTENSITY, but Color and Size is the most important factor for Grading and Sorting of fruits. Color is very important in the sorting of fruits but due to the similarity of colors between some of the fruits, the size also help in solving problems. Different types of algorithm and classifier are available to extract features of the fruits so that we can provide the exact result about the fruits.

II. PROBLEM STATEMENT

The Main aim of our system is to Sort and Grade the variety of Fruits by using different Image Processing Techniques and keras. Image Processing Techniques like converting color image to gray scale image so with the help of thresholding we can get the amount of color the image would be having like RGB color, canny edge detection and Neural Networks (Sequential Neural Net-work) for detecting the edge of fruits with help of this techniques we can make the sorting and grading process more efficient than the manual work .It will improve the quality as well as it will take less time.

III. LITERATURE SURVEY

A. Orange Sorting by Applying Pattern Recognition on Colour Image.

The objective of this paper is to provide Automated Grading based on Pattern Recognition. This paper proposes the research work for automated grading of Oranges using pattern recognition techniques applied on a single-color image of the fruit. This research is carried out on 160 Orange fruits collected from varied geographical locations in Vidarbha

Region of Maharashtra. System designed can automatically classify an Orange fruit from this region, given its single-color image of 640 480 pixel resolution, taken inside a special box designed with 430 lux intensity light inside it, by a digital camera. Only 4 features are used to classify oranges into 4 different classes according to the maturity level and 3 different classes as per size of oranges.

B. Automated Sorting and Grading of Vegetable using image Processing Description.

The computer vision based system for automatic grading and sorting of agricultural products like strawberry and brinjal based on maturity level is presented in this paper. The application of machine vision based system, aimed to replace manual based technique for grading and sorting of fruit and vegetable. The manual works obtained problems in maintaining consistency in grading and uniformity in sorting. To speed up the process as well as maintain the consistency, uniformity and accuracy, a prototype computer vision based automatic grading and sorting system is developed. The proposed method is implemented by k means clustering segmentation and color detection process with strawberry and brinjal. Feature extraction for various features like Entropy, Mean and standard deviation are calculated. The main aim of the proposed system is to sort and grade the variety of vegetables like strawberry and brinjal is implemented using image processing techniques.

C. Automated Fruit Grading System.

The quality of the fruits is important for the consumers and become the requirement from the suppliers to provide fruits with high standards quality. So, in the past few years, fruit grading systems have established to fulfill the needs of the fruit processing industry inspection. Besides that, the process of fruits involves several steps that can generally be classified into grading, sorting, packaging, transporting and storage. The grading are considered as the most important steps towards the high standard of quality. Two kinds of fruits have been inspected in this project; namely are apple and mango. A prototype of an automated fruit grading system is designed and developed in this paper to detect the defects on of the surface of fruits. The system is capturing the fruit's image using camera and the fruits are placed onto of a rotating desk.

IV. PROPOSED MODEL

The Following Grading Module is Shape Module.

Shape Module: In Shape Module, the important detection is an Edge Detection from which we can get the accurate shape of the Fruits. In edge detection, we find the boundaries or edges of objects in an image, by determining where the brightness of the image changes dramatically. Edge detection can be used to extract the structure of objects in an image detection uses an approach where the intensity variations occur in the image points is declared as the edge. It is a series of actions used to identify the points in an image where clear and defined changes occur in the intensity. This series of action is necessary to extract the image related information e.g image sharpening, enhancement and object location present in the image

ALGORITHM: Color Detection Algorithm

- └ Step 1: Start.
- └ Step 2: Read the input color image using imread function.
- └ Step 3: Read the input pixel of color image in three different planes (RGB) and store it into three variable r,g and b.
- └ Step 4: Read the small region of fruit to detect color of fruit.
- └ Step 5: Store in different variable r1, g1, b1.
- └ Step 6: Calculate the mean of r1, g1, b1 and store into variable r2, g2, b2.
- └ Step 7: Compare the value with Threshold.
- └ Step 8: if $g2 > \text{threshold}$, Color detected is green. └ Step 9: if $r2 > \text{threshold}$, Color detected is red.
- └ Step 10: END.

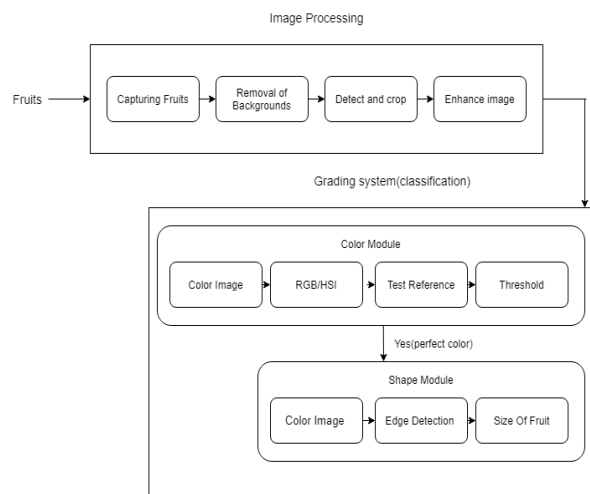


Fig shows the system architecture of grading of fruits modules.

RGB Module: In the RGB model, an image consists of three independent image planes, one in each of the primary colours: red, green and blue. Specifying a particular colour is by specifying the amount of each of the primary components present.

Gray Scale Module: A gray scale (or graylevel) image is simply one in which the only colors are shades of gray. The reason for differentiating such images from any other sort of color image is that less information needs to be provided for each pixel. In fact a ‘gray’ color is one in which the red, green and blue components all have equal intensity in RGB space, and so it is only necessary to specify a single intensity value for each pixel, as opposed to the three intensities needed to specify each pixel in a full color image

V. CONCLUSION

Our system will provide an Automatic Fruit Grading System, which will save time, effort and provide better accuracy than the Manual Sorting. The techniques contains, the Color Detection and Edge Detection. Color Detection is used to identify the defected part with the Threshold level. Edge Detection is used for finding the boundaries of objects within images. We are going to design this System to meet the demands in Grading Fruits operation compared to manual grading.

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