International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395 -0056
Volume: 03 Issue: 03 | Mar-2016 www.irjet.net p-ISSN: 2395-0072

ASSESSMENT OF FRUIT MATURITY USING DIRECT COLOUR MAPPING

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Abstract **- Success of image processing and its expansion to numerous fields of applications like medical, engineering and remote sensing has paved its way to application in agriculture. Maturity stage of fresh fruit is an important factor that affects the fruit quality during ripening and marketability after ripening. The ability to identify maturity of fresh fruit will be a great support for farmers to optimize harvesting phase which helps to avoid harvesting either under-matured or over-matured cherry and strawberry fruit. This study used an inexpensive method to predict sweet cherries and strawberry's colour parameters by image processing. The colour measuring technique consisted of a CCD camera for image acquisition and MATLAB software for image analysis. To demonstrate the usefulness of this technique, changes of cherry and strawberry color during ripening will be analyzed. Evaluation of *L**, *a** and *b** values showed the possibility of reliable use of this system for determination of absolute color values of foodstuffs in automatic packing systems for export with a much lower cost.**

Keywords **-** Colour Image processing, segmentation, Color parameters L, a and b, automatic system for packing.I.

1. Introduction

Agriculture is an important sector in an economy that provides basic needs and food for human beings. The role of information technology has increased the potential of agriculture sector by using automated system in various activities. Computer vision, machine vision and image processing are various techniques used in the development of an automated system to serve different purposes. In recent decades, image processing has become an inevitable area in agricultural sector as it acts as an expert system with decision support system. Input image taken in real time is processed and transformed into useful information as an output to support farmer.

For many agricultural products, certain colors are preferred and command higher selling prices. This is true for apples, broccoli, and cranberries. In fresh produce markets such as red delicious apples and peaches, dark red represents higher quality than light red. Without consistent and reliable color grading, the evaluation of product quality is erratic and product value cannot be maximized.

Color can be used to evaluate fruit maturity for tomatoes, watermelons, bananas, and dates. Consider, for example, the problem of determining time to market for tomatoes. In general, tomatoes must be harvested while still green. After
harvesting, the fruit continue to ripen and their color turns lighter green, then pink, and eventually red. Due to transportation delays, tomatoes that are already ripe (red) when picked must be sold to local markets. Green tomatoes can be shipped to customers over much greater distances. Color can also be used to detect surface blemishes or defects on apples, pears, and oranges. Another unique example is skin separation detection on dates. After the drying process, some dates end up in lower quality grades because of skin separation (peel) that occurs as they dry. It is therefore critical that the maturity of each harvested date is evaluated accurately before drying, and that skin separation defects are detected reliably before packing.

Cherry and strawberry fruits play an important role in human diet from both economic and nutritional points of view. This fruit represent a significant component of the diet and helps the body to fight against cancer, aging and headaches. Cherry and strawberry provides us with the perfect amount of calories required daily. This fruits that are a rich source of vitamins, antioxidants and minerals.

Fruit maturity has a major influence on fruit quality which is
determined by biochemical, physiological, and structural changes occurring during fruit ripening.

Climacteric fruits such as cherry and strawberry fruits can be harvested when mature and ripened off the plant . Fruit maturity stage at harvest determines the basic fruit quality and shelf-life which is essential to consecutive fruit sorting towards different distribution channels. However, it is difficult to identify a harvesting time that represents the best pass judgment between consumer-oriented and commercial qualities . A fruit that is harvested when is fully ripe has better organoleptic properties but has a shorter shelf-life being ready to eat and thus more adaptable to softening and decay. Contrarily, fruits early-harvested when mature or under-

mature have an increased shelf-life and may undergo longer post-harvest handling chains.

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2. Literature Review

Dah-Jye Lee[1], proposed a new color mapping concept of converting 3-D color spaces to 1-D color indices for automated color grading. Unlike other color grading techniques, this approach makes the selection and adjustment of color preferences much easier. The user can change color grade thresholds in a manner consistent with human color perception, simply sliding a cutoff point to include fruit that is “slightly darker,” “a bit lighter green,” or “lighter red.” Furthermore, these changes in preferred color ranges (defined entirely by the user) can be completed without reference to precise reference colors.

Sudhir Rao Rupanagudi, Ranjani B.S., Prathik Nagaraj, Varsha G Bhat[2] This paper describes a novel methodology to perform tomato grading in farms with a high level of accuracy and a low cost setup. As mentioned in the previous section, an overall 98% accuracy was obtained. Also, it is worth mentioning, that the algorithm utilized is less complicated and more processor friendly.

D. Surya prabha, J. Satheesh kumar[3] describes various applications of image processing have been discussed. These methods are supportive in development of automation model and obtaining higher accuracy of information. Image enhancement and image segmentation method are an inevitable method in varied applications and it determines the accuracy of the automation

Meenu Dadwal, V.K.Banga[4] , In this paper, a novel color image segmentation algorithm that can examine the ripeness level of apple using RGB color space and fuzzy logic is proposed. This approach can operate directly on RGB color space without the need of color space transformation

Stefania Matteoli[5] , This paper presents an automated approach for peach fruit maturity grading by exploiting fiber-optic spectroscopy based sensors and multivariate processing techniques which minimizes the operator

intervention while reducing discharge and waste. A novel three-step approach is proposed where nondestructive measurements of peach fruit reflectance are carried out in the first step. Fruit flesh firmness is recovered in the second step by means of multivariate techniques, and lastly the recovered flesh firmness values are processed with a maturity fuzzy classifier in the third step.

Alok Mishra, Pallavi Asthana, Pooja Khanna[6], This paper presents a hierarchical grading method applied to the Fruits. In this the identification of good and bad Fruits is based on the methods using MATLAB. First we extract some features from t he input fruit image, after using different method like thresholding, segmentation, k-means clustering we get related databases.
Thus this paper analysis the good and bad fruits with high accuracy using image processing.

S. Taghadomi-Saberi1[7] , This paper used an inexpensive method to predict cherries color parameters by combining image processing and artificial neural network (ANN) techniques. The color measuring technique composed of a CCD camera for image acquisition, MATLAB software for image analysis, and ANN for modeling. To demonstrate the functionality of this technique, changes of cherry color during ripening were studied.

Kamalpreet Kaur, Preeti Gulati[8] Fruit quality extraction in terms of its shape, size and ripen stage, Penetration of disease into the fruit and Final fruit quality. A k-means assembling for color extraction and statistical features like area, radii and perimeter are used for estimation of fruit quality

3. Proposed Work

To determine the maturity of the fruit we follow the method one by one as shown in below block diagram. In this we first take an RGB input of fruit. After then divide this into B channel and R channel which further converted to R mask and B mask images of fruit. After taking intermediate mask from the R mask and B mask then take intermediate fruit area and intermediate colour indices then removal of shadow area and final mask is taken which is combined with RGB input, final fruit area are obtained. Segmented fruit are taken from above image, take R channel and binary R of that image.

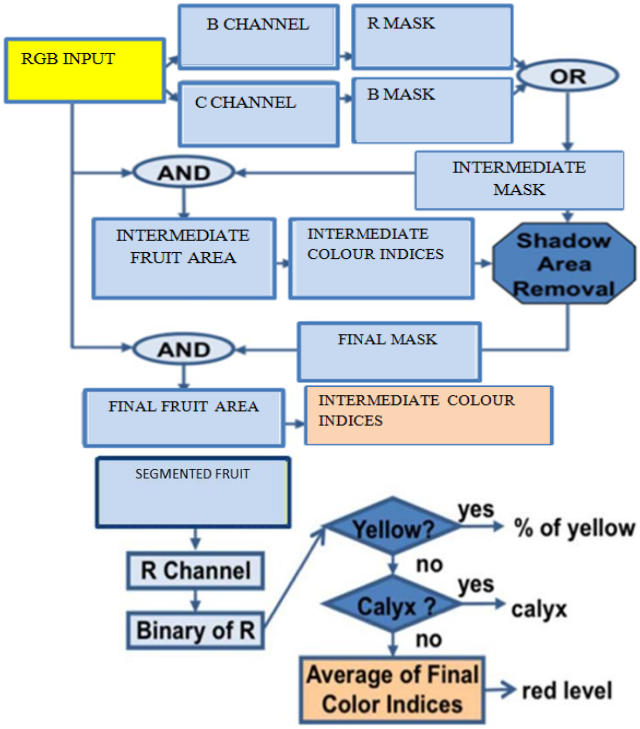

Fig: Flowchart of maturity evaluation algorithm.

The main objective for this paper is to check whether the fruit is pre-mature , mature or over-mature .

4. Conclusion

From the above proposed plan it can be expected allowing us to develop systems that do not interfere with the plant at the same time we can measure fast and very close to testing done by laboratories. From the above we come to the conclusion that Unlike other colour grading techniques, this approach makes the selection and adjustment of colour preferences much easier.. Thus, in this ways, the prototype explained in this paper could be utilized more universally for a wide variety of fruits in a cost-effective and accurate manner by the farmers of both developing and developed nations across the world.

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BIOGRAPHIES

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