ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 9, Issue 3, March 2020

Automatic Fruit Grading System Using Computer Vision

S.Krishna Veni[1], Dr.S.Senthil Rani[2], Dr.B.Ashok Kumar[3]

Student, Department of Electrical and Electronics Engineering, Velammal College of Engineering and Technology, Madurai, Tamil Nadu, India[1]

Professor, Department of Electrical and Electronics Engineering, Velammal College of Engineering and Technology, Madurai, Tamil Nadu, India[2]

Professor, Department of Electrical and Electronics Engineering, Velammal College of Engineering and Technology, Madurai, Tamil Nadu, India[3]

ABSTRACT-Fruit quality determination is essential for the growth of accurate, fast quality assessment of agricultural products. To check the fruit quality using non-destructive method a computer vision. The fruit quality is analyzed by its size, colour and weight. The non-destructive method is practice technique displayed for fruit grading. By capturing and analyzing the fruit image quality inspection. For accuracy prediction of fruit quality proximity sensor is used and area algorithm is developed. There is only manual inspecting method for quality analysis of fruit. In this system image analysis is performed to identify the quality of fruit. Gas detector is used in this system to detect the harmful gases sprayed in the fruit. This paper presents the MATLAB software and detecting algorithms for identifying defects in fruits.

KEYWORDS-Fruits Grading, Digital Image Processing, Aurdino UNO, Proximity sensor, MATLAB

I.INTRODUCTION

The largest economic sectors are the agriculture and it plays a major role in Indian economy. Because of fruits organoleptic and chemical property they are consumed by man. In India about 64% of people dependent on agriculture for their live foods. The already existing fruit grading system has several drawbacks such as high cost and low efficiency. This automated system is designed with low cost and high efficiency and also it consists of hardware model using conveyor system.

Image processing can be involved to analyze the quality of fruit. Pomegranate is used for the quality detection. The image can taken only at angle 180 degree and multiple image cannot be capture [1]. A testing on tested 54 pink lady apples with 56 defects revealed that has been emphasized in the system only detected 52% [2]. In [3], the system it can only identified the types of fruit it will not detect the defect of the fruit .

In the proposed system the fruit is being selected and it is passed through the conveyor belt. The camera taken the video of the lemon and then the video is converted into image frame from which the background subtraction is made to get the object image. The IR sensor is used detect the presence of fruit. The system is trained with sample images and with the help of SVM classifier the real images are compared with the sample image. The defect can be identified on the bases of colour and size.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 9, Issue 3, March 2020

II.PROPOSED SYSTEM

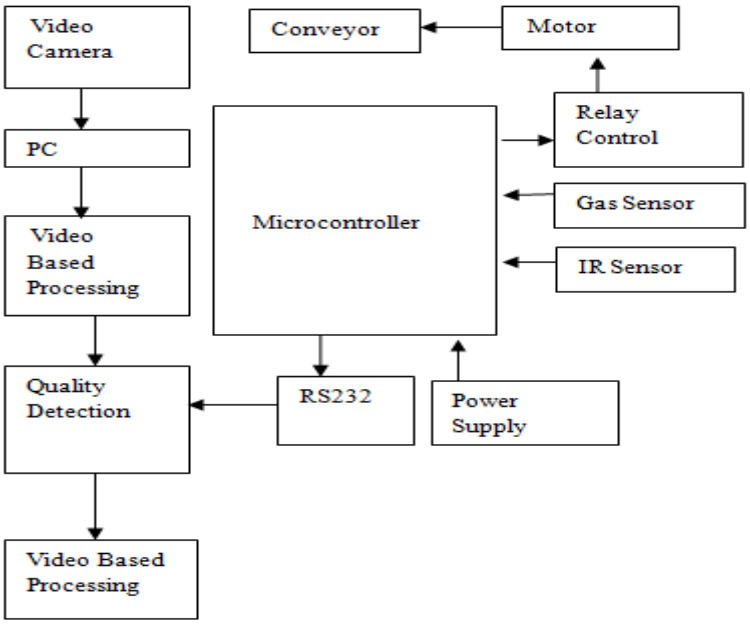

Fig.1 Overall Block Diagram

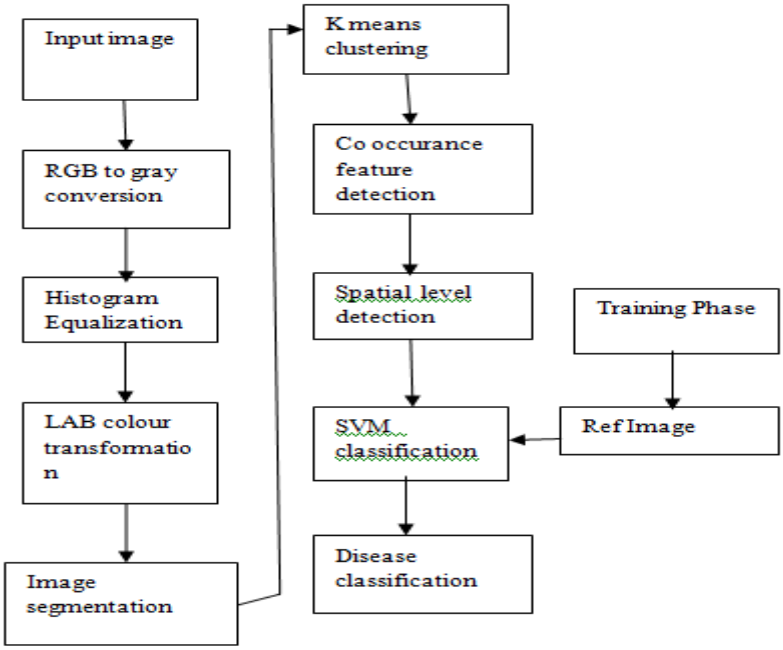

Fig.2. Image based analysis

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 9, Issue 3, March 2020

A. Microcontroller

Arduino UNO is used as a microcontroller. The board consists of set of digital and analog input/output (I/O) pins. The boards feature serial communications interfaces, including Universal Serial Bus (USB) on some models, which are also used for loading programs from personal computers. The programming language used are C and C++.

B.Video Camera

High Quality CMOS Image Sensor with Image Resolution of 25 Mega Pixels is used for Colour saturation, Brightness, Sharpness and Contrast. The lens used are f=6.0, f=0.2 and Anti –Flicker of 50Hz, 60Hz or out door. Image Quality is about RGB24 or 1420. When the fruit hits the stopper it gets rotated and then the rotation is recorded by the video camera. The recorded video then converted into multiple images.

C. Gas Sensor

Any gases that are sprayed in the fruit can be detected by using this device. It can sense many gases that are harmful to human life. With the help of LED the sprayed gases can be identified

D.IR Sensor

IR Sensor is used for various applications. It consists of IR Transmitter and IR Receiver. Whenever the radiation from IR Transmitter reaches the object is reflected back and it is detected by the IR Receiver, variation in the output voltage is used to detect the presence of the object.

E. Image capturing

The video is taken by the camera and the video is converted into image frame. The sample image is identified and RGB to gray conversion is made. Histogram equalization is used to improve the interpretability, visibility, and quality of the image basically used to bring out details that are obscured or simply to highlight certain features of interest in an image.

F.Image segmentation

Image segmentation is made on tha bases of LAB colour transformation L- chromaticity layer A- indicating where colour falls along the red-green axis and chromaticity layer B-indicating where the colour falls along the blue-yellow axis and chromaticity layer. A region based segmentation scheme is used to differentiate the signals.

G. Feature Extraction

By using K means clustering similarity patterns that is obtained from the segmented image is classified. Colour co occurrence is used to differentiate the colour and texture of an image is taken into account, to arrive at unique features.

H.Image classification

Spatial Gray level dependence Matrices is used to differentiate the inter variable features at the image particles for defect analysis. A SVM classifier is used to classify the pixel level issues that bring the variations of the images with a trained image. As the result defect of the fruit can be identified on the basis of trained data.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 9, Issue 3, March 2020

Fig.3.Hardware Setup

The fruit is being selected and it is passed through the conveyor belt. The camera taken the video of the lemon and then the video is converted into image frame from which the background subtraction is made to get the object image.

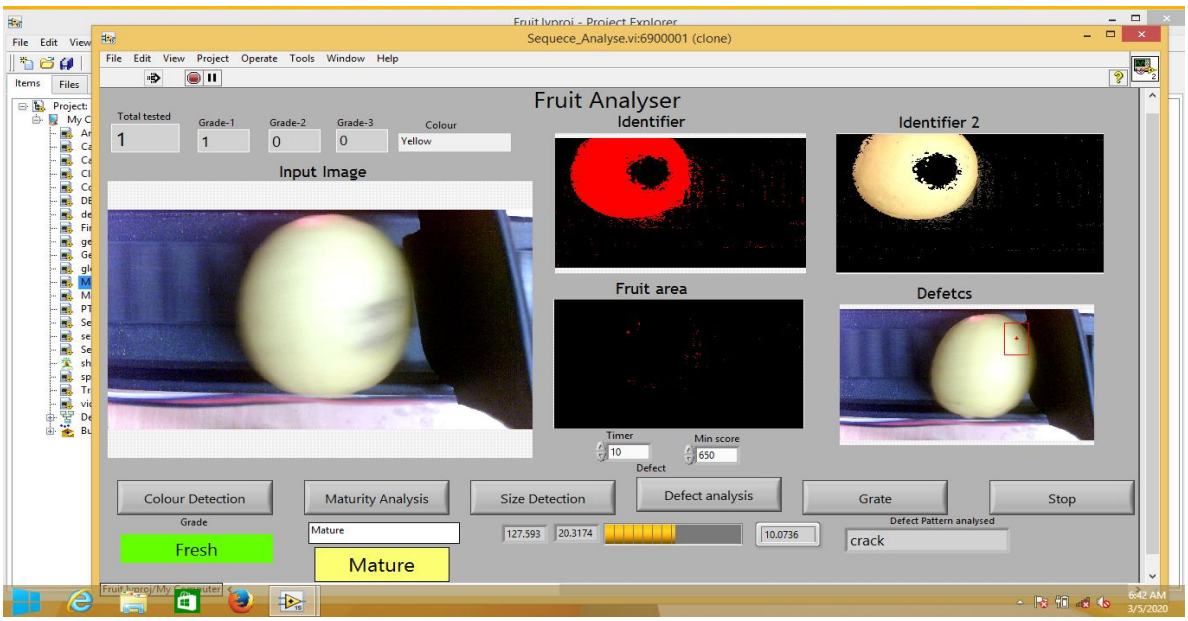

Fig.4.Final Output

The system is trained with sample images and with the help of SVM classifier the real images are compared with the sample image. The defect can be identified on the bases of colour and size. The defects isdisplayed on the screen by comparing with the trained images.

ISSN (Print) : 2320 – 3765
ISSN (Online): 2278 – 8875

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

(A High Impact Factor, Monthly, Peer Reviewed Journal)

Website: www.ijareeie.com

Vol. 9, Issue 3, March 2020

III. CONCLUSION

This paper reviews has been used to increasing in industry for inspection and quality evaluation purpose as they can provide rapid economic and hygienic assessment. The accuracy and quality requirements need in this highly competitive and changing industry.

ACKNOWLEGEMENT

I got privilege work under my guide Dr. S. Senthil Rani. I would like to thankful for her valuable support, guidance and encouragement.

REFERENCES

[1] Dipali Dhanwate, Rohini Jadhav, Payal Bhosale, Nishigandha Patil, A.S. Vibhute,"Features based fruit gradation system using image processing" , *International Journal of Recent Technology and Engineering*, Volume 8, Issue 1, May 2016.
[2] Bennedsen B.S., Peterson D.L., Amy Tabb, "Identifying defects in images of rotating apples".
[3] Bern.A, Kuzivanov.I, " Classification of fruits machine vision".
[4] SiddhikaArunachalam, Harsh H. Kshatriya, MamtaMeena "Identification of Defects in Fruits Using Digital Image Processing"-*International Journal of Computer Sciences and Engineering Open Access*, Volume 6, Issue 10, October 2018.
[5] GurayTonguc, Ali Kemal Yaku,"Fruit grading using digital image processing Techniques" *TarimMakinalariBilimiDergisi*.
[6]Gerrard, D.E., Gao, X., Tan, J., "Beef marbling and colour score determination by image processing ", *Journal of Food Science*, 1996.
[7] .Kanali, C., Murase, H., Honami, N., "Three-dimensional shape recognition using a chargesimulation method to process image features", *Journal of Agricultural Engineering Research*, 1998.
[8] Paulus, I., Schrevens, E., " Shape characterization of new apple cultivars by Fourier expansion of digital images", *Journal of Agricultural Engineering Research*, 72, pp.113-11, 1999.
[9] Paulus, I., De Busschers, R, Schrevens, E., "Use of image analysis to investigate human quality classification of apples", *Journal of Agricultural Engineering Research*, 68, pp.341-353, 1997.
[10] Gunasekaran, S., "Non-destructive Food Evaluation Techniques to Analyze Properties and Quality", *Food Science and TechnologySeries. Marcel Dekker, New York*, pp. 105, 2001.
[11] .Ruiz, L.A., Molto, E., Juste, F., Pla, F., Valiente, R., "Location and characterization of the stem calyx area on oranges by computer vision", *Journal of Agricultural Engineering Research*, 64, pp. 165-172, 1996.
[12].Bato, P.M., Nagata, M., Cao, Q.X., Hiyoshi, K., Kitahara, T., "Study on sorting system for strawberry using machine vision (part 2): development of sorting system with direction and judgement functions for strawberry (Akihime variety)", *Journal of the Japanese Society of Agricultural Machinery*, 62(2), pp.101-110, 2000.