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A role of computer system for comparative analysis using image processing to promote agriculture business.

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Abstract

The computer system play a very important role using image processing for agriculture business using technological approaches for food processing & food engineering during production in agriculture. In this research paper a updated of hassu algorithm is proposed to quality analysis and detect defects of fruits(i.e. Guava, orange, desi berry) further which can be implemted for grading and sorting of a particular fruit (i.e. same category) by its visual color of surface using the non-destructive technique to automated quality verification systems for agricultural products with the help of digital images which involve visual examination and inspection of color, size, shape, defects and texture are highlighted further for image processing. So here color is the key and unique attribute for determine the quality, where intensity value of pixel of digital image is recognize using MATLAB

Keyword: fruits, color, pixel value, camera

1. Introduction

The application of agriculture science such as image processing. There are various types of image processing systems for agriculture application that have been developed with different purposes.

India is an agricultural country; wherein about 70% of the population depends on agriculture. Farmers have wide range of diversity to select suitable Fruit and Vegetable crops. However, the cultivation of these crops for optimum yield and quality produce is highly technical. It can be improved by the aid of technological support. The management of perennial fruit crops requires close monitoring in the sense of quality management from diseases that can affect production significantly and subsequently the post-harvest life.

A fruit & its plant (i.e. Guava, orange, desi berry (with stone) is required to protect from the insects, which create hole and then enter in fruit which infected to fruit and that infected and defected area of the fruit decrease the standard level of fruit quality. Which also effect on market and production value of the fruit?

Figure 1: show near ripe white Indian guavas.

Figure 2: Show Indian desi berry fruit.

Figure 3: Show oranges near to ripe.

Chandigarh has well defined seasons mixed with hot and cool climates.

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- Summers (March to May) are very hot and temperatures remain in 35 °C to 42 °C in most of the days, but maximum reaches up to 46 °C.
- Monsoons (June to August) are humid and sultry, but reduces the temperatures of hot summer days.
- Autumn (September and October) has a temperature range of 13 °C to 36 °C, which is pleasant and moderate.
- Winters (November to February) maximum temperature level generally lies in 7 °C to 20 °C, but minimum touches 2 °C to 5 °C. Frost is a common occurrence during winters.

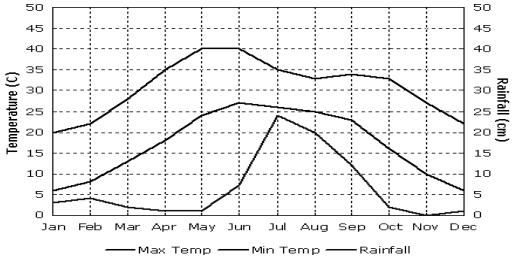

Figure 4: Represent temperature and rainfall in a year.

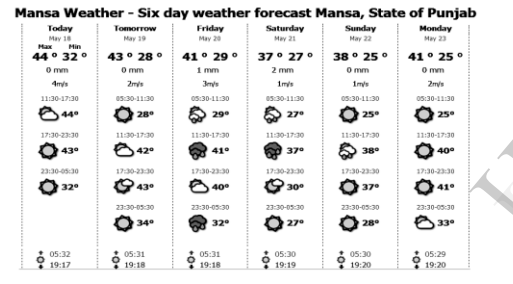

Figure 5: Represent natural environmental change of Mansa district of Punjab, India

In the above figure 5 that show six day weather forecast of district Mansa state Punjab, INDIA, which represent atmosphere changes of six days from May 18 to May 23, 2011. Further which used to analysis day temperature, sun rays, rainfall, wind are affects on fruit ripening process due to environmental changes in a season (summer and winter) of a year.

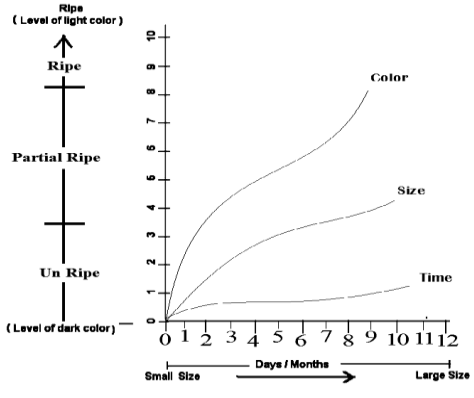

Figure 6: Show changes in color, size and time.

In figure 6 which represent change in color conversion from dark level to light level color. During the same time period size of fruit also increase from small to large in a standard size after day-by-day movement and in months of a year.

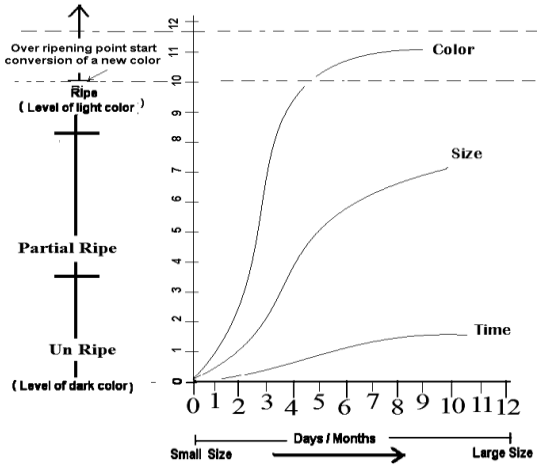

Figure 7: Show the over ripening of a fruit.

In figure 7 represents overripe after completing a ripe level of color that indicates starting point of over ripening with new color generate ,which may includes some extra light and dark color shades (i.e. defects) will generate with color conversation, which may identify, measure and analysis bad quality of fruit.

Because ripening is one of important process in fruits which changes involve in color, size, flavour, thereby making then most acceptable for eatable purpose.

1.1 A Digital image

In computer system a digital image i.e. collection of bits and bytes in the form of pixels which have different intensity values and also mainly focus on bit and pixel recognization in a digital image. An image is collection of different objects and all these object of image are collection of number of pixels in the area of images. Numerically each pixel i.e. represent as ON & OFF pixels, if pixel is zero i.e. is OFF (inactive) pixel and if pixel value 1to 255 i.e. ON (active) pixel, format pixels represent their value can be 0 to 255 color intensity and in this greyscale images use eight bits for each pixel to 256 different shades of greyscale so

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according to above said also a single pixel has 256 different quantities in Red Green Blue (RGB) color.

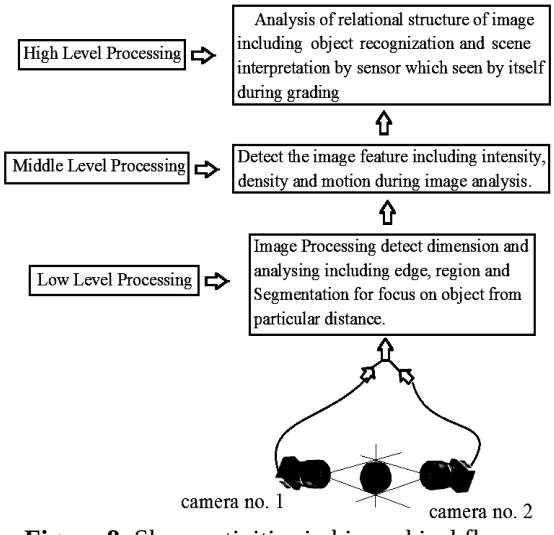

Figure 8: Show activities in hierarchical flow.

1.2 Image Processing & Pre-processing:

Image processing and pre-processing involving changing the nature of an image and also filters typically, which are required to correct acquisition artefacts. Image processing is also acts for examine images for the purposes of identify objects and judging.

Digital image processing focuses on following:

1. Improvement of pictorial information for human interpretation.
2. Processing of image data for storage and transmission.
3. Representation for autonomous machine perception.
4. Processing images for measurement of the features and structures present.

For example Adobe Photoshop Element 8.0, paint and also can be use color feature of MS- Word 2007/2010 for preprocessing in which we can select only required object and remove extra portion from image so that can easily comparable with the all image of same category.

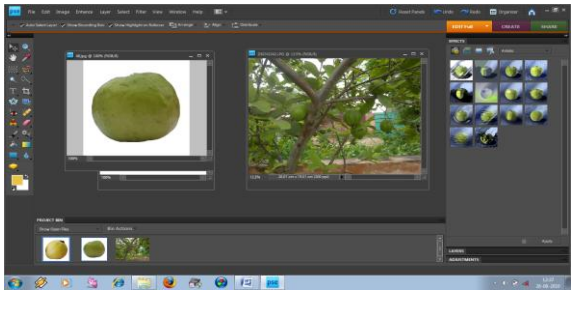

Figure 9: Show image processing and pre- processing system for guava fruit**.**

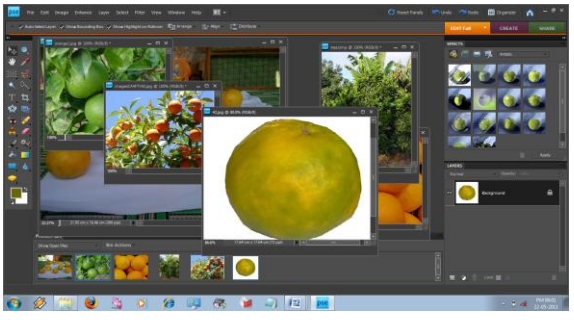

Figure 10: Show image processing and pre- processing system for orange fruit**.**

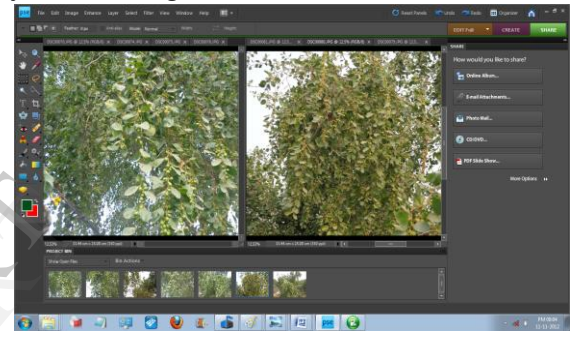

Figure 11: Show image processing and pre- processing system for Indian desi berry**.**

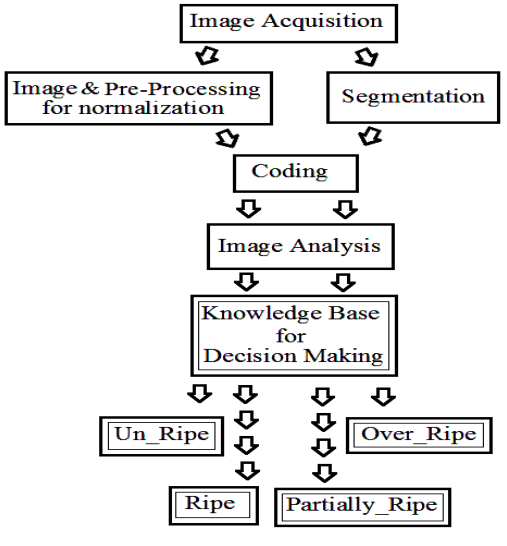

Figure 12: Show activities in hierarchical flow of the system.

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The image processing can be used to promote agribusiness in agricultural applications for following purposes:

1. To quality analysis of fruits.
2. To detect diseased in fruits.
3. To quantify affected area by disease.
4. To find shape of affected area of fruit.
5. To determine color of affected area of fruit.
6. To determine size & shape of fruit.

More……..

2 Objectives:

Main aim of the research is to develop a new and efficient algorithm for identify the quality of fruits. The goal will be achieved through the attainment of following objectives.

1. To identify quality of fruits.
2. Development of a new & updated algorithm for quality analysis of fruits.
3. To compare the speed of identification for checking the quality of fruits with manual method.
4. To compile the research work in the form of Phd. thesis based on the results obtained.

The scopes of objective are to develop a complete system to undergo color detection before quality analysis and grading of the fruits by digital image. The whole system will be undergoes real time analysis as possible.

3 Literature Review.

Several fruit recognition techniques are developed based upon color and shape attributes in the literature survey. Different fruit images may have similar or identical color, size and shape values.

Quality is also born from experience so that reviews mean know old research and then go forward for a new one research.

4 Research Methodology.

A complete computer system which supports graphical user interface (GUI) with latest good configuration is acceptable I use Vaio Laptop Intel Core i3-330M Processor 2.13 GHz, Window 7 Home Basic (64 bit), hard disk 320 GB and 3 GB internal RAM memory and inbuilt ATI 512 Graphic card.

Due to lack of resources that I use Cyber-shot W630 has a host of impressive features that will delight any photo enthusiast. Its Optical SteadyShot (Active Mode) ensures clear and blur-free HD movies and its 16.1 megapixels image sensor results in awe-inspiring shots.

- 16.1 Megapixels
- 4 Picture Effect modes
- 5x Optical Zoom
- Intelligent Auto Mode
- Optical SteadyShot (Active Mode)

16.1 effective megapixels CCD sensor - Captures extremely high quality images, allowing detail-packed enlargements

5x optical zoom/25mm wide angle lens - High quality zoom lens by Carl Zeiss® covers a wide range of shooting situations, with wide angle for group shots / landscapes

BIONZ™ processor - Powerful image processing ensures clear, detailed, low-noise images and quick, responsive shooting

Intelligent Auto Mode - Camera recognises a wide range of common shooting situations, optimising settings for clear, natural results without fuss

Artistic Picture Effect modes - Create four exciting 'in camera' effects - Toy Camera, Partial Colour, Soft High-Key, Pop Colour

720p HD movie - Record smooth, high quality HD video clips using Motion JPEG format (720p): optical zoom possible during video shooting

Optical SteadyShot Active Mode - Cuts shaky camera movements when shooting video, even while walking or zooming: Optical SteadyShot cuts blur when shooting stills

360 Sweep Panorama - Sweep the camera and grab extra-wide images of landscapes, city scenes and tall buildings; new 360 mode captures an all-round view

6.7cm/2.7" Clear Photo LCD - High quality LCD screen (230k dot resolution) offers excellent detail, high contrast and wide viewing angle

HD output - View video and still images on HD TV (requires optional cable): PhotoTV HD enhances viewing on compatible BRAVIA™

Face Detection Automatically adjusts focus, exposure and white balance for clearer portraits and priority selectable for children / adults

Figure 13: Show Image of Sony cyber soft dsw630model 16.1 mega pixel high definition camera

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4.1 Proposed updated hassu Algorithm to analysis quality of fruits.

Prerequisite: [50 Reference Images], [camera], [computer system]

Step1:- i) Load 50 reference images of fruit.

ii) Pass all 50 reference images through color array to calculate image value by intensity value in the continuous series with help of step deviation method.

Step2:- i) Take new image of fruit.

ii) Pass it through color array to calculate image value by intensity value in the continuous series with help of step deviation method.

If image value match lie between 1 to 33 image.
Then
Result is un-ripe
Else if
Image value match lie between 34 to 40 images.
Then
Result is partially ripe
Else if
Image value match lie between 41to 45 images.
Then
Result is ripe
Else if
Image value matches with 46 and 50 image.
Then
Result is over ripe

Step3:- Repeat the Step 2 for next new image.

Step4:- Exit.

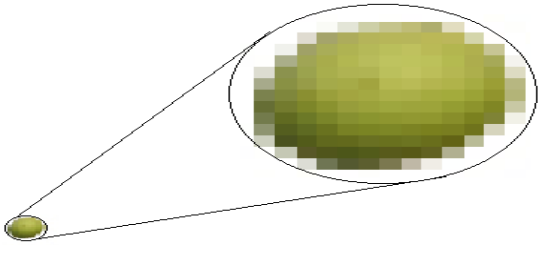


Figure 14: show berry fruit in 25x25 dimension image with zoom for pixels intensity representation of green color.

Example for implementation of proposed algorithm using 5x5 dimension (25 pixels) image of different color quantity & intensity and following formula:

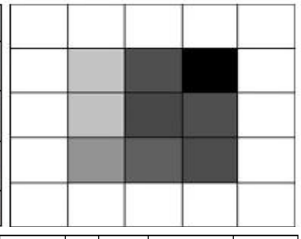
$$\text{Image Value} = \frac{f_1*d_1+f_2*d_2+f_3*d_3+\ldots\ldots\ldots\ldots+f_{64}*d_{64}}{f_1+f_2+f_3+\ldots\ldots\ldots\ldots+f_{64}}*c$$

Where f_i = no. of pixels that belong to color intensity of pixels Class interval (64 spells)

d_i = step deviation of range between color intensity of pixels Class interval

c = length of Class interval in color intensity of pixels

0	0	0	0	0
0	30	180	200	0
0	40	86	180	0
0	189	155	190	0
0	0	0	0	0



Color intensity value of pixel CIP) between as follow	f_i	m_i	$d_i = m_i/c$, $c=4$	$f_i d_i$	Color intensity value of pixel (CIP) between as follow	f_i	m_i	$d_i = m_i/c$, $c=4$	$f_i d_i$
01-03	0	2	0.5	0	128-131	0	129.5	32.375	0
04-07	0	5.5	1.375	0	132-135	0	133.5	33.375	0
08-11	0	9.5	2.375	0	136-139	0	137.5	34.375	0
12-15	0	13.5	3.375	0	140-143	0	141.5	35.375	0
16-19	0	17.5	4.375	0	144-147	0	145.5	36.375	0
20-23	0	21.5	5.375	0	148-151	0	149.5	37.375	0
24-27	0	25.5	6.375	0	**152-155**	**1**	**153.5**	**38.375**	**38.375**
28-31	**1**	**29.5**	**7.375**	**7.375**	156-159	0	157.5	39.375	0
32-35	0	33.5	8.375	0	160-163	0	161.5	40.375	0
36-39	0	37.5	9.375	0	164-167	0	165.5	41.375	0
40-43	**1**	**41.5**	**10.375**	**10.375**	168-171	0	169.5	42.375	0
44-47	0	45.5	11.375	0	172-175	0	173.5	43.375	0
48-51	0	49.5	12.375	0	176-179	0	177.5	44.375	0
52-55	0	53.5	13.375	0	**180-183**	**2**	**181.5**	**45.375**	**90.75**
56-59	0	57.5	14.375	0	184-187	0	185.5	46.375	0
60-63	0	61.5	15.375	0	**188-191**	**2**	**189.5**	**47.375**	**94.75**
64-67	0	65.5	16.375	0	192-195	0	193.5	48.375	0
68-71	0	69.5	17.375	0	196-199	0	197.5	49.375	0
72-75	0	73.5	18.375	0	**200-203**	**1**	**201.5**	**50.375**	**50.375**
76-79	0	77.5	19.375	0	204-207	0	205.5	51.375	0
80-83	0	81.5	20.375	0	208-211	0	209.5	52.375	0
84-87	**1**	**85.5**	**21.375**	**21.375**	212-215	0	213.5	53.375	0
88-91	0	89.5	22.375	0	216-219	0	217.5	54.375	0
92-95	0	93.5	23.375	0	220-223	0	221.5	55.375	0
96-99	0	97.5	24.375	0	224-227	0	225.5	56.375	0
100-103	0	101.5	25.375	0	228-231	0	229.5	57.375	0
104-107	0	105.5	26.375	0	232-235	0	233.5	58.375	0
108-111	0	109.5	27.375	0	236-239	0	237.5	59.375	0
112-115	0	113.5	28.375	0	240-243	0	241.5	60.375	0
116-119	0	117.5	29.375	0	244-247	0	245.5	61.375	0
120-123	0	121.5	30.375	0	248-251	0	249.5	62.375	0
124-127	0	125.5	31.375	0	252-255	0	253.5	63.375	0
Total						**9**			**313.375**

A Image Value = . $\frac{f_1*d_1+f_2*d_2+f_3*d_3+\ldots\ldots\ldots\ldots+f_{64}*d_{64}}{f_1+f_2+f_3+\ldots\ldots\ldots\ldots+f_{64}}*c$

$$= \frac{313.375}{9} * 4 = 139.2777$$

Suppose new image value is match with image value of reference image (bench mark as database)

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between any levels using proposed algorithm then result will be considered. Which is very useful in large database for same type category of a particular fruit?

5 Result Discussion:

The proposed work is related to RGB color quantities which is analysis a digital images of a guava, orange and Indian desi berry fruit using the help of digital computer vision system, human vision system and image acquisition system to measure quality standard level by color recognition of visual surface of different sizes of fruit from the digital images of same dimension that may be un-ripe, partially ripe, ripe or fully ripe (ready to eat) and also be a over ripe fruit (bad fruit) due to atmosphere changes that impact positive/negative on plants and their fruits

6 Conclusion.

The proposed method reviewed & updated algorithm can implement using MATLAB. There are different 50 images were used as database of different size and shape, The proposed algorithm after implementation tells us about spherical shape and size of fruits i.e. un-ripe, partial ripe, ripe and over rip.

This can help grading sorting fruit according their ripening level and quality level to make different eatable food product. So hence a computer system play a valuable role for comparative analysis using image process to promote agriculture business and also support in food science, food processing & food engineering.

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7 Future Scope.

The proposed hassu algorithm can also be used for different size and shape of eatable fruits of different categoery, which may be possible to develop an robotic machine for food processing in field before pluck fruit from the plant.

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