

Egg Freshness Detection Based On Digital Image Processing

Kapare Avinash A.¹, Mahangare Tushar T.², Pawar Nitesh D.³, Patane Yogesh B.⁴, Patil Sanjay B.⁵

Department of Electronics and Telecommunication,
Shri Chhatrapati Shivajiraje college of engineering, Dhangawadi
Pune, India

¹kapareavinash@gmail.com

²tushmahangare@gmail.com

³niteshpawar21291@gmail.com

⁴pataneyogesh01@gmail.com

⁵patilsbp@gmail.com

Abstract:

India is an agriculture based country, where in horticulture science is subsidiary branch of agriculture. Indian poultry industry that is one of the fastest growing segment of the agro sector today in India. Yolk index and air room height, two main measures for egg freshness detection, are very difficult to be accurately measured in practices. This paper investigated an image-based egg freshness detection method. The perspective image of egg was obtained by computer vision device. The characteristic regions, including the yolk region and air room region were separated from the obtained egg picture by image processing. The pixel areas and lengths of the above characteristic regions were respectively calculated and analyzed. The relative ratios of the pixel area and length of characteristic regions to that of the whole egg region were selected as characteristic parameters. It was shown that the above relative ratios increased while egg freshness reduced according to a detailed analysis. Three detection models of egg freshness were set up based on the correlations between the characteristic parameters and freshness. The test results showed that the accuracy rates of these models were 93, 94 and 92% respectively. The egg freshness detection based on image characteristic of yolk and air room was efficient and feasible.

KEYWORDS: Egg yolk, air room, freshness, digital image, Web/mobile camera.

I. INTRODUCTION

India is an agriculture based country, where in 70% population depends on farming. These are farming is basically known in three forms agriculture, horticulture and floriculture. Out of this the Indian agriculture is very important considering Indian economy.

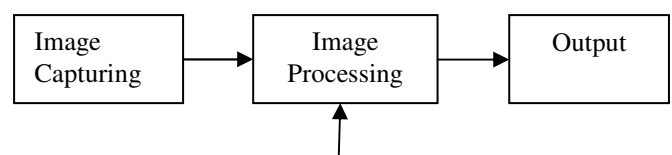
Horticulture science is subsidiary branch of agriculture. In that include animal science and poultry industry. Indian poultry industry that is one of the fastest growing segment of the agro sector today in India. As production of agriculture crops has been rising at the rate of 1.5% to 2 % per annual. While the production of eggs and boilers per has been rising at the rate of 8% to 10% per annual. Today India is world's fifth largest eggs producer.

Today egg freshness detection in an interesting and important topic in the food safety researches, mainly due to the fact that egg is closely related to the everyday lives of common people and egg content changes easily during storage. Many researchers have focused on egg freshness detection over the last decade. Due to limitations of human visuals there are possibilities of neglecting some important parameters which are important in quality checking. So to overcome disadvantages system is designed for checking quality of EGG based on "IMAGE PROCESSING". This system can easily

find out distance between yolk index and albumen index that decides the freshness of egg. In this system the parameter of fresh egg can be measured and compared with standard define dimensions, also it is compared with aged egg. Thus it easily find out the egg is contaminated. The term digital image refers to processing of a two dimensional picture by a digital computer. In a broader context, it implies digital processing of any two dimensional data. A digital image is an array of real or complex numbers represented by a finite number of bits. An image given in the form of a transparency, slide, photograph or an X-ray is first digitized and stored as a matrix of binary digits in computer memory. This digitized image can then be processed and/or displayed on a high-resolution television monitor. For display, the image is stored in a rapid-access buffer memory, which refreshes the monitor at a rate of 25 frames per second to produce a visually continuous display.

II. PROPOSED SYSTEM

Block diagram of egg freshness detection on digital image processing.



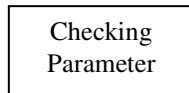


Fig.1. Block diagram

Fig.2.flowchart

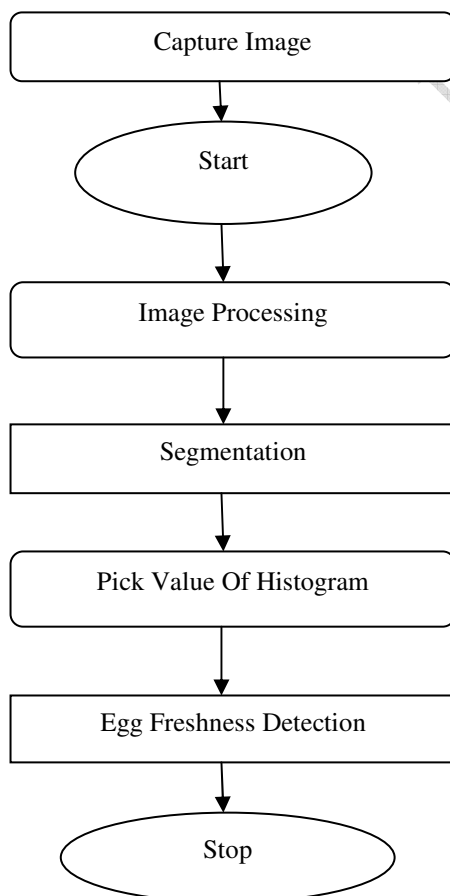
A. Image capturing: Image Capture is an application computer or the network. We are using digital camera for capturing the image of egg from different view. And also used for checking quality of egg.

B. Image processing: Image processing is processing of images using mathematical operations by using any form of signal processing for which the input is an image, such as a photograph. The output of image processing may be either an image or a set of characteristics or parameters related to the image. In image processing the separating the method of egg region from original picture.

C. Checking parameter: In checking parameter we can measure the yolk index and air room height can be viewed as main measure of egg freshness.

D. Output: The output can be use to find the egg freshness by image processing method. Image processing method is clearly view the egg yolk and air room were not obvious in the original transmitted images.

III. FLOWCHART



IV. MATERIALS AND METHODS

Egg samples:

Clean and fresh eggs, All of the eggs were numbered and stored at 25°C.

Experimental system:

The computer vision equipment used to take egg images. The testing equipment consisted of a light source, a LED, a dark box, a web/mobile camera and a computer with Matlab software installed.

Experimental procedure:

With using above computer vision equipment, the experimental procedure is designed as follows:

- (1) Every day images of ten eggs were taken and stored in computer at same time.
- (2) Repeated steps (1) a everyday until the yolks of the sample eggs stored for this experiment were found to become broken.

V. RESULTS AND DISCUSSION

Image processing:

Separation of the whole egg: The original picture obtained from the computer vision equipment is shown in Figure 3. The separating method of the egg region from the original picture is as follows: Convert the color image into I image (Figure 4) and then gray of I (Figure 5); Process the images by the contrast adjusted method (Figure 6) and binarization method (Figure 7); denoising filter and remove interferential value. Thus, a binary image with high quality was achieved (Figure 7). From Figure 7, the pixel area and length of the whole egg region can be easily calculated and measured.



fig 3. Original image

Separation of egg yolk: The egg yolk could not be seen in the original egg image (Figure 3). In this research, the three-components of R, G and B were separated from egg color

picture and then the color picture was converted into the gray scale image for finding the feature region of egg yolk.

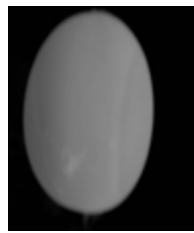


Fig 4.I Image



Fig 5. Gray of I

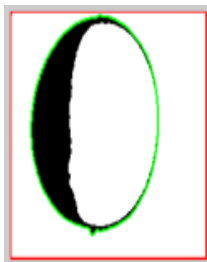


Fig 6. Median filter



fig 6. Contrast adjusted

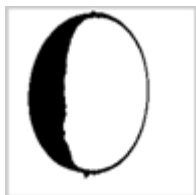


Fig 7. Binary image

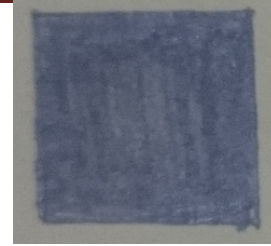


Fig 8. "2*2"cm square with black color.



Fig 9. Binary image of "2*2"cm square with black color.

It was very difficult to calculate the yolk area. For segmenting the yolk region, the binary image of egg was obtained with the binary procedure controlled by a threshold. The threshold was selected based on the histogram of gray scale image. The result was Various kinds of noises existed in the obtained digital image, so a filter could be selected for image denoising. Median 2filtering is a non-linear method of noise reduction.

Separation of air room: RGB and HSI are two commonly used color models in image processing. In this research the HSI model was selected to deal with the air room according to the former experimental experience

| Day | Air room ratio | Air room height |
|-----|----------------|-----------------|
| 1 | 0.020579 | 0.047962 |
| 2 | 0.02425 | 0.055755 |
| 3 | 0.024192 | 0.07645 |
| 4 | 0.028158 | 0.087026 |
| 5 | 0.03096 | 0.095875 |

VI. METHODOLOGY

- Connect the matlab handling device an IP web camera handling device with the same WiFi..
- Pest URL from IP web camera on matlab code.
- Resize of image in 200*200 using resize function.
- HSI image of RGB input image using (rgb2hsi).

- Enhancement of image .Mean value of pixel in image(calculate mean of image matlab using “mean” function).
- Image with white background(convert any image in to an white background image).
- Binary image of gray scale image(using gray thresh).
- %counting number of pixel of air.
- %image of "2*2"cm square with black color.
- Resize the image as original image (ie [200,200]).
- Medan filter(to noise remove).
- Gives bandy to air part(with read color).
- Eliminating an lower value(remove unwanted part).
- Area of air in pixel per centimeter square.
- Depend on area age of egg defines

VII.FUTURE SCOPE

Structural quality is measured by checking small crack during image processing..

Using conveyer belt, check the quality of maximum number of egg at a time.

VIII.CONCLUSION

This paper presents egg freshness detection by computer image processing.

(1) The egg yolk and air room were not obvious in the original transmitted light images, but which can be clearly viewed by the image processing method proposed in this paper.

(2) Area ratio of egg yolk, area ratio of air room, height ratio of air room, can not only reflect the morphological change of egg contents, but also eliminate impact of the external factors such as subjective or objective factors. These characteristic parameters are very sensitive to the changes of the egg yolk pixel area and the air room height.

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