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An Image Processing Algorithm for Silkworm Egg Counting

Gowthami D, Kavitha P R,
Lavanya Sanjeev Poojary, Megha G V
Electronics and communication, SVIT, Bengaluru, India

Suryanarayana N K
Assistant professor, Electronics and communication, SVIT, Bengaluru, India

Abstract— Sericulture has become one of the contributors towards India's GDP. The major task involved in this field, apart from nurturing the silkworms and their eggs is to estimate the approximate number of eggs that can be collected. Many researchers have been constantly working towards addressing the issue of counting these eggs. This paper explains the image processing approach for the same.

Keywords: Sericulture; Image Processing; Silkworm; Eggs; Counting

I. INTRODUCTION

Sericulture is a process of raising silkworm eggs in order to obtain raw silk. There are lots of steps involved in the production of silkworm seeds and this paper concentrates on the step involving counting of silkworm eggs. Mulberry trees are planted for the purpose of sericulture. The number of silkworms for mulberry trees plantation should be approximated to avoid the wastage of mulberry leaves and to obtain a good yield. Grainages are the centers where the production of silkworm seeds is done and the farmers look to grainages for the supply of silkworm seeds.

Eggs are made to lie on the DFLs (Disease free laying sheet) and are then supplied to the farmers. There can be variation in the number of eggs leading to economic losses. Counting also determines the fecundity and hatching percentage for silkworm rearing. While selling the seeds, eggs need to be counted so that the farmers can pay accordingly and will avoid any loss to the farmers.

Traditional method of counting eggs is by using ink/sketch pen, but this method can harm the embryo when pressure is applied on the egg and is time consuming and labor intensive and there are chances that the objects may appear overlapped, this makes the counting tedious. The difficulty can also arise due to their small size and color similarity with the background paper. In 1997, Karnataka State Research and development Institute modified a simple pocket calculator into egg calculator. This method is erroneous and time consuming in order to reduce the manual power and speed up the process we go for automatic egg counting using image processing algorithm.

II. LITERATURE SURVEY

In [1], image processing algorithm is developed in the LAB VIEW software to count the silkworm eggs. First step involved here is the conversion of the RGB image to gray scale image since it does contain any useful information. Out of the HSV component luminance plane is extracted, eliminating the hue and saturation planes. Top hat morphological filtering is performed to remove the non-uniform lighting and this step involves the subtraction of the original image form the one morphologically opened. The image is morphologically opened by performing erosion followed by dilation. IMAQ Threshold VI is used to binarize the image. Binarization involves converting the pixels of the image to either one or zero. Erosion is performed to remove noise in the background or to separate any overlapped eggs. To count the objects in the image IMAQ Count Objects VI is used.

Paper [2] presents egg segmentation by detecting the centroid position with constant radii area around. 3 steps where included in the process involving pre-processing, edge detection and foreground segmentation is done. Sobel's operator is selected for edge detection. In the segmentation process foreground image is differentiated from background image by considering the texture property and foreground. In the process foreground object is saved for further processing and the background is discarded. Second step is the Gray scale construction where the binary image is reconstructed to grayscale and the image is normalized in the range 0 to 255 using the thresholding operator. Individual object segmentation is applied to obtain individual object from clustered objects. Iterative operation is carried out in four steps; initially the binary image is converted to gray scale image by thresholding operation, the centroid of the object is estimated, decision is taken on acceptance of centroid position and all these steps are repeated.

[3] involves two steps; object detection and classification. In object detection, the aim is to obtain individual silkworm egg object. In this process the egg color image is converted into binary image, adaptive thresholding technique is performed to separate the foreground from the background. Morphological erosion operation is operated on the image; it is iteratively performed until one foreground image is separated from the other. In this process certain parameters are

considered, round of erosion and threshold variable are considered from averaging touching distance, diameter and area of eggs approximately. Next step is the object classification here Gaussian Mixture Model (GMM) which is based on the Maximum Likelihood(ML) estimation using expectation maximization(EM) algorithm was adopted for the classification of type of egg. GMM technique is used to check for the composition of the RGB image. For estimation, EM algorithm is applied to get the information about color distribution. Graphic user interface (GUI) software is proposed to divide the full image into sub image and parallel process it.

III. DISADVANTAGES

In the process, smaller eggs are treated as background and are eliminated leading to decrease in the count compared to the actual count. Overlapped eggs were detached into many pieces and this increased the count.

It consumes lot of time in the analysis of the high resolution image and this is mainly due to the tiny physical dimension of the eggs. It is observed that if the prepared paper inhibits noisy background, there is increase in the number of the centroids detected.

IV. CONCLUSION

From all of the referred papers it is clear an algorithm is to be developed that is more reliable and can overcome the above disadvantages. To make it effective we implement Moore's Algorithm using image processing tools.

REFERENCES

[1] A. Pandit, J. Rangole, R. Shastri and S. Deosarkar, "Vision system for automatic counting of silkworm eggs," International Conference on Information Communication and Embedded Systems (ICICES2014), Chennai, 2014, pp. 1-5.

[2] K. Kiratiratanapruk and W. Sinthupinyo, "Worm egg segmentation based centroid detection in low contrast image," 2012 International Symposium on Communications and Information Technologies (ISCIT), Gold Coast, QLD, 2012, pp. 1139-1143.

[3] K. Kiratiratanapruk, N. Watcharapinchai, I. Methasate and W. Sinthupinyo, "Silkworm eggs detection and classification using image analysis," 2014 International Computer Science and Engineering Conference (ICSEC), Khon Kaen, 2014, pp. 340-345.