Image Processing Based Florical Surveillance Using Noise Robust Approach

Vineet Jain[#1]
[#]*Research scholar, Pacific University*
Udaipur, Rajasthan. India

Abstract

Applications of enhanced photograph processing and human structure modeling procedures performed mammoth function in advancement of Video surveillance. Right here we are presenting a proposed video surveillance approach for overlapped flower yield detection. In this discussed matter a digital camera is viewed as standing dealing with a mattress of flower for flower yield detection. Range of flower types are maintained together with yellow, purple and crimson petals in each state of affairs respectively for study consideration. For candidature of yieldable some valid parameters are considered such as flower dimension, quantity of petals etc. Various morphological operations viz. dilation, erosion, opening and closing algorithms is utilized after color modeling to remove any type of noise present in the image acquainted from digicam.

Keywords — *Yield, image processing, segmentation, CHT, erosion, morphological processing.*

I. INTRODUCTION

Floriculture is the branch of horticulture. Floriculture include normal and brand new flower crops wherein modern-day plant life are grown in polyhouse or greenhouse whilst ordinary plant life are grown in open fields[2]. Probably the most foremost purposes of precision agriculture are yield estimation. Yield estimation approach prediction of flowers in the field which can be competent for harvesting [1, 3]. Prior capabilities of yield will support farmer to preplan extra task like transporting, packaging, preorder to patrons and many others. For the yield estimation most of the categorization is finished manually so far which isn't handiest laborious however the cumbersome and time drinking as good. With the passage of time detecting and counting of vegetation and there yield prediction is completed with the aid of computer and pc vision [8, 7].

In India different states of floriculture are Nasik, Pune, Hauser, Kodaikanal, Kalimpong, Ooty, Darjeeling, Bangalore, Palampur, Shimla, Srinagar, Delhi, Ludhiana and Calcutta as proven in determine 1.1 (Sudhagar, 2013)[4]. Yield estimation may also be carried out underneath the precision agriculture. Precision agriculture (PA)[4-7] is outlined as know-how and science founded farm management method that establish, evaluate and manipulate variability inside farms for highest advantage, sustainability and aegis of the land useful resource (Bongiovanni and Lowenberg-deboer, 2004)[10].

Fig. 1. Major Floriculture Region over India (Sudhagar, 2013).

II. PRIOR ARTS

In [8] analyzed the residences of HSV color model which was once used for two purposes corresponding to segmentation and histogram analysis for object retrieval with the aid of variation in hue, saturation and value of pixel points [9]. Authors extracted photo pixel through either picking out the hue or the worth as the dominant property situated on the saturation of a pixel [1]. Results confirmed that segmentation used to be better making use of HSV color mannequin then in comparison with RGB colourmodel [3, 5].

In [4] offered an algorithm established on aspect detection and HSV color expertise. In the beginning authors detected aspect at the region-of-curiosity (ROI) [7] so they bought the axis of symmetry and the threshold of the automobile. After

detection of autos, shadow used to be discriminated with the support of HSV color information. The experiment confirmed that the algorithm can flawlessly resolve the situation of mistaking darkish moving object for shadow. The proposed algorithm promoted the accuracy of detecting shadow but its shortness for easy heritage. Complicated history like zebra crossing, human etc brought on error in shadow identification.
In [10] proposed an algorithm for flower snapshot retrieval including many steps like filtering for noise removal, 2RGB combined color model for picture segmentation, help vector desktop (SVM) headquartered algorithm for flower photograph retrieval using shape and texture feature. Three tests have been carried out for segmentation, in first one pyramid segmentation situated on HSV color model used to be utilized which had just right adaptability but bad segmentation for some flora. The second segmentation method was once centered on saliency map; their results had been bad for flowers which have equal history. Third one was based on RGB color blended mannequin supplied very good outcome for all type of plants and extracted flora from the historical past exactly.

III. PROPOSED ART

The various steps include in experiment of detecting and counting the number of flowers was carried out step by step. Whole algorithm is subdivided into subsections. The flowchart of the process is shown in figure2.

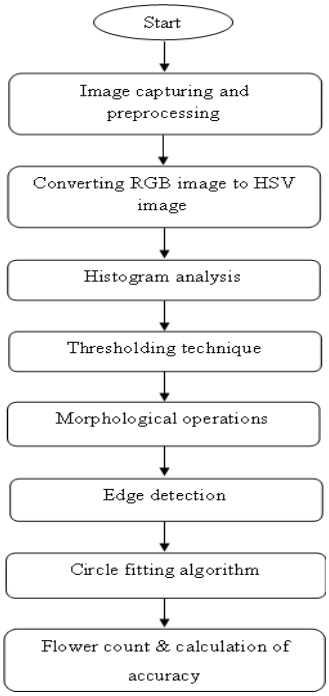

Fig. 2. Process Flow Chart For Developed Algorithm.

Gaussian filter is used for smoothing and enhancement of image. Gaussian filter is an image processing filter whose impulse response is Gaussian function. It is designed to minimize rise and fall time with no overshoot.

Gaussian filter uses the two dimensional Gaussian function. Gaussian filter is the product of two 1D Gaussian functions (one for each direction) and is given by:

$$g(x,y) = \frac{1}{2\pi\sigma^2} * e^{-\frac{x^2+y^2}{2\sigma^2}} \qquad (1)$$

For developed algorithm we use combination of color and shape analysis using HSV color model because it provide better results in case for occlusion and overlapping and HSV is also close to the human perception. Table 1.depicts the HSV color bars.

Circular Hough Transform (CHT) was introduced for pattern classification as a powerful tool to identify the targeted object. Hough transform is a widespread and robust algorithm used for many image processing applications. The idea of the Hough transform is that the feature points of an image (real space) produces trajectories in a so called Hough space describes the feature of geometric shape (Cauchie et al., 2008).

Table 1-HSV Color Bars

	Nominal Range	White	Yellow	Cyan	Green	Magenta	Red	Blue	Black
H	0° to 360°	-	60°	180°	120°	300°	0°	240°	-
S	0 to 1	0	1	1	1	1	1	1	0
V	0 to 1	0.75	0.75	0.75	0.75	0.75	0.75	0.75	0

CHT depend on equations for circles. The equation of the a circle is -

$$r^2 = (x-a)^2 + (y-b)^2 \qquad (2)$$

Here a, b = coordinates for the center, and r = radius of the circle. The parametric representation of this circle is -

$$x = a + r*\cos(\theta)$$
$$y = b + r*\sin(\theta) \qquad (3)$$

Accordingly, a circular hough transform depends on 3 parameters. These three parameters need

memory for storage, larger computation time and hence increasing the complexity in extracting the information from the input image. For the sake of simplicity, almost all CHT programs define the radius to a constant value (hard coded) or provide the user an option to set a range (maximum and minimum) before running the program.

Table 2. Matrix Representation of hue channel

hue

hue <400x533 double>

	172	173	174	175	176	177	178	179	180	181
57	0.2251	0.1834	0.1708	0.1645	0.1607	0.1580	0.1579	0.1626	0.1633	0.1590
58	0.2018	0.1788	0.1712	0.1653	0.1627	0.1594	0.1592	0.1618	0.1625	0.1603
59	0.1864	0.1741	0.1695	0.1667	0.1627	0.1594	0.1606	0.1632	0.1625	0.1603
60	0.1816	0.1724	0.1674	0.1660	0.1647	0.1594	0.1607	0.1619	0.1625	0.1582
61	0.1873	0.1703	0.1652	0.1639	0.1627	0.1607	0.1593	0.1599	0.1591	0.1576
62	0.2044	0.1757	0.1667	0.1645	0.1640	0.1607	0.1593	0.1607	0.1598	0.1571
63	0.2354	0.1939	0.1786	0.1698	0.1674	0.1633	0.1619	0.1614	0.1621	0.1580
64	0.2801	0.2214	0.1942	0.1796	0.1724	0.1690	0.1644	0.1631	0.1632	0.1599
65	0.3125	0.2619	0.2239	0.1970	0.1860	0.1778	0.1713	0.1667	0.1642	0.1652
66	0.3281	0.2895	0.2630	0.2356	0.2126	0.1920	0.1823	0.1779	0.1721	0.1718
67	0.3056	0.2969	0.2735	0.2630	0.2404	0.2184	0.2090	0.2090	0.1970	0.1831
68	0.2989	0.2989	0.2969	0.2838	0.2838	0.2796	0.2796	0.2796	0.2415	0.2108

IV. EXPERIMENTAL SETUP & RESULT

Numbers of flowers are processed using image analysis for counting purpose. The images undergo with several processing steps and finally we got the results. The basic flow diagram for developed algorithm is shown in figure 3.

Every image is captured in the farm so that captured image is affected by blur and noise. Open field images are affected more as compared to polyhouse images because of presence of wind and illumination. For removing of this attributes we use number of filters such as Average filter, Circular averaging filter, and Gaussian low pass filter.

For flower counting, radius of flower should be properly defined. Two radius values higher and lower are used as a threshold value in the algorithm which covers the entire flower radius. In order to find out the Range of radii for the circular objects we have to detect two-element vector, $[r_{min} r_{max}]$, of integers. This numeric value selection for maximum and minimum radius is very important in circle fitting algorithm. If it is not properly defined than it may be result in false detection of flowers.

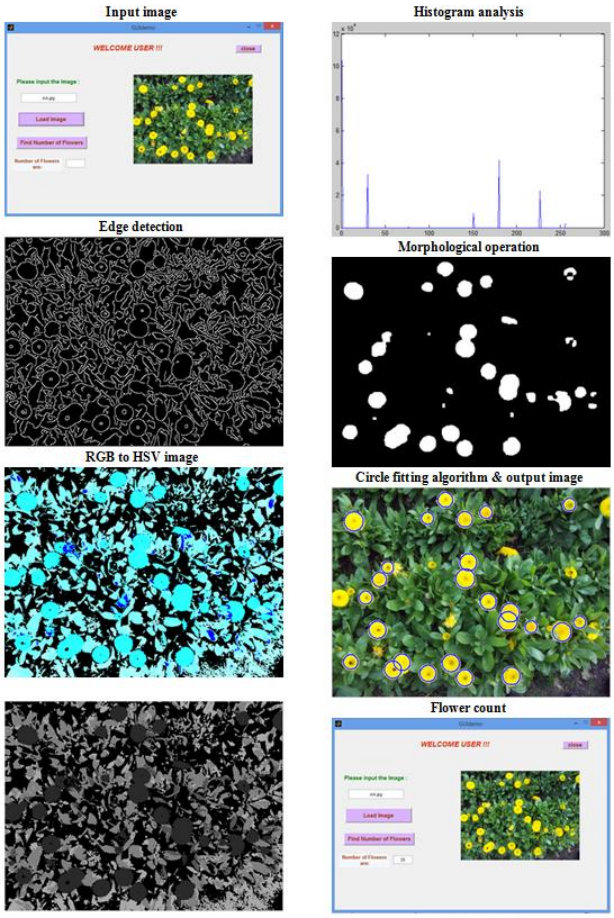

Fig. 3. Flow Diagram for Developed Counting Algorithm

Threshold value for radius is selected from hit and trial method which is shown in fig 4.

V. CONCLUSION

Meaning of "yield estimation/prediction" is estimation of crop in the farm after or before harvesting. Floriculture product is predictable by counting of all the flowers or calculating the weight for all. Limitation like overlapping of flowers affects detection and counting of yield. Thus affecting preplanning of a farmer for e.g. packaging material. In this thesis we worked on to detect overlapped flowers. Computer vision techniques are used for this task and proved its success. In computer vision applications first step is capturing of image of whole field.

Table 2 Summary of Accuracy for All Types of Flower

S No.	No. of images processed	Flower type	Accuracy
1	15	Yellow Gerbera	92.30%
2	20	Yellow Marigold	95.00%
3	10	Coltsfoot	90.64%
4	10	Dandelion	89.50%
5	10	Buttercup	89.57%
6	20	White Marigold	87.53%
7	10	Red Gerbera	92.90%
8	7	Water Lily	82.48%
9	2	Red Tulip	91.01%
Overall accuracy for developed algorithm = 90.10%			

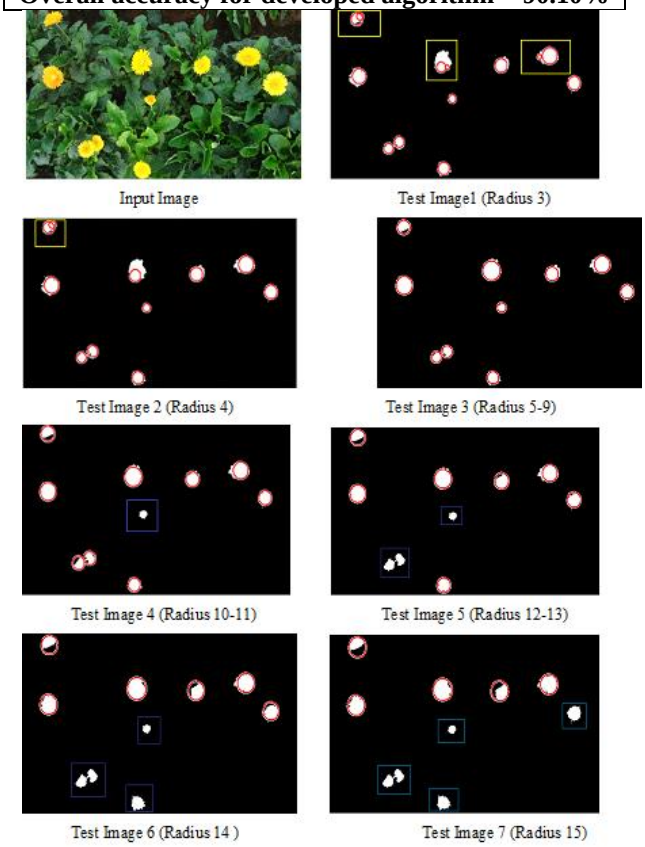

Fig. 4. Effects of Selection of Radius Range

And it is difficult to capture field in single image so images are captured in the parts of field and processed individually and after that their results are combined. HSV color space is used for extraction of flower. To get a good level of segmentation HSV transformation of color space of RGB image is used and it is device dependent model. After color segmentation based image, circle fitting algorithms was applied and then counting can be done.

Results obtain from simulation and various graphs showing that developed algorithm is more accurate and efficient. It detects and count number of flower closed to the manual count. For removal of noise we apply number of filters in which Gaussian filter provides best result. Gaussian filter give good result but not provider 100% removal of illumination problem from the image but minimize it to some extent. Radius range plays a vital role for efficiency of flower detection. Minimum threshold for range should be selected in such a way that it does not give false detection and also flowers are not missing for counting. Maximum threshold value of radius should be kept maximum. The radius range for developed algorithm is lie in between 10 (r_{min}) to 60 (r_{max}).

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