ORIGINAL RESEARCH PAPER

Engineering

KEY WORDS: Morphological Technique , Computer vision, Image processing, Flower detection, Agricultural engineering.

DETECTION OF FLOWER FROM FIELD IMAGE USING MORPHOLOGICAL TECHNIQUE

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ABSTRACT

In this paper, we present an interactive system for recognizing flower images taken by digital cameras. Now a 'days agriculture is one field where automated systems for classification and grading of fruits can be very useful not only for farmers but at experts in taking fast and accurate decisions. Over some recent year's customers and buyers lifestyles and needs have increased and there have been many changes. Such lifestyle and changes have proved to be a challenge for the farmers and experts in the field of agriculture. Because of this with the help of technology a well-defined automated system need to be present in the market which would grade and analyze the agricultural products with minimum error. Thus giving the farmers best product to sell and make the customers feel happy for the money they have spent. The proposed system provides an interactive interface allowing each user to draw an appropriate bounding window that contains the interested flower region. Then, a flower boundary tracing method is developed to extract the flower region as accurately as possible. In addition to the color and shape features of the whole flower region, the color and shape features of the pistil/stamen area will also be used to represent the flower characteristics more precisely. The interactive system use an Hue based Segmentation which is used for recognize image, Gaussian filter for isolate the noise, feature extraction technique, feature comparison and Counting algorithm for Rose Flower recognition. This proposed paper provides an interactive and efficacious technique in counting Red flower that can extract flower from its boundary with preciseness.

I.INTRODUCTION

There are about 250,000 named species of flowering plants in the world. Everyday, we can see many blooming flowers in the roadside, garden, park, mountain path, wild field, etc. Generally, experienced taxonomists or botanists can identify plants according to their flowers. However, most people do know nothing about these wild flowers, even their names. In agriculture the counting of the number of fruits and flowers play an important role to estimate the amount of harvest. The manual counting of fruit and flowers in a farm is a very tiresome job, it needs plenty of time to complete the task, involves high cost and has low accuracy. Image processing techniques can help to accurately count the harvest of the field/orchard. Thus, automated fruit and flower counting is introduced in the agriculture field by using digital image analysis to count the total number of fruit/flowers and hence predict or estimate the yield of the produce. Digital Image analysis is commonly used in many applications for automating the process. Manual counting of products in a farm may lead to bad estimation due to the inaccuracy associated with it. In India, flower cultivation has been practiced since the primeval period of time but whereas floriculture has been practice into marketing only in the recent years. The increasing computational ability of segmentation and method in agriculture aspect given improvement in production. Improvement and concern over quality control makes market attract toward the technology and thus more resource in information and technology identifies an important feature in the development. Computer technology is widely used in agriculture for disease detection , grading and lesion estimation flower processing, crop cultivation and yield estimation. The flower recognition concern of domain specific knowledge is based on image segmentation.

Morphological technique is a process of separation any object from background through its physical features, where as color is considered as a fundamental physical property of flower to recognition. Features of object also include shape, size. According to the features, system detects and counts the number of flower in an image.

Minimization of time, work input, effort and improvement in quality of flower boost the yield profit are the basic goal of business management and marketing. Precision Agriculture provides the best suited result through low input cost in farming and increase the quality, efficiency in the production. Information provides the basic consideration as heart of precision agriculture. The lack of tools and equipment in the smaller agricultural land found a major obstacle for the successful implementation of precision agriculture. Yield mapping is used to measure the amount of crop cultivation in field of land and accumulate the record of harvesting system. It identifies the variability in the agricultural field.

In this demonstration, I have work upon the offline images taken from the field at arbitrary time. The complexity of image is high due to different size, shape, noise which crate a difficulty for identifying the optimize result.

II. METHODOLOGY

The aim of this study is to explore how the image processing places its part in the attempt of the designing the system by implementing the approaches to get the prediction information. There are different methods needed to be used like for preprocessing I have to apply the function of the filtering, cropping, To get accuracy in the output, the preprocessing of the images were done using filtering operation(Noise built in image is reduced by filter), cropping of images, etc. The idea is to get a deeper insight of how these methods plays role in the yield prediction works and finally propose a framework the agricultural field successfully used to get the production knowledge. Briefly, the purpose of this study is exploratory in nature, which is a used to get deeper understanding of the approaches and methods.

A. Assembling the images

The experiment of detecting flowers is carried out on the sample images taken of the flower from the field. View of entire field is difficult to capture in single image. Also, image containing big area of field may result in blurring and thereby poor discrimination of the flowers. Therefore, images are taken in parts of the field, processed individually and finally

result is combined.

Fig1. Sample image

B. Database

The image processing and analysis is performed using MATLAB 15 a software with image processing toolbox after that, get the accuracy and consistence in the result, the images were preprocessed using image cropping, filtering etc. Filter operation reduced the noise present in the images. Every image that is taken on the field in natural conditions is get polluted with noise. The noise may occur due to high or dull lights, shaking of camera etc. such images with errors affect the result of the experiments such as false negative or false positive detection of flowers. The images are taken on the field and with the help of digital camera along with date of image capture. Also, the color of the date portion was close to that of the flowers in the images. While segmenting the flower objects, date portion also get extracted as flower objects, generating error in the output. Therefore the date portion is removed by manual cropping, blurring etc.

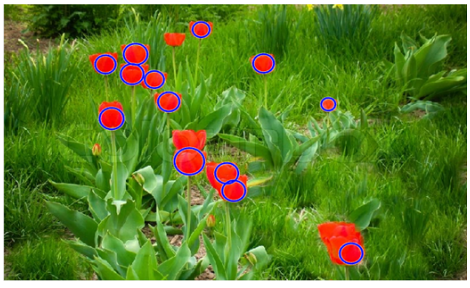

Fig. 2 Examples of tagged image

C. Algorithm

The computer vision algorithm was developed with MATLAB 2015a using its image processing and computer vision toolboxes. Its main procedure is depicted in Fig. 4. First, lighting conditions are calculated and the RGB image is transformed to the HSV color space. Second, the image is segmented into foreground and background using color cues according to lighting conditions, and third, a simple classification is performed on the segmented foreground as to what is flower and what is not according to size and location in the image. The algorithm inputs an RGB image and outputs a list of detected flowers, each described by a connected component and its X and Y location in the image, displayed as a binary image. In the development of each part of the algorithm feasibility of real time was taken into consideration. The flowchart of the process is as follows

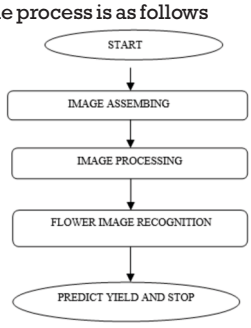

Figure 3. Flow chart

D. Image Analysis

In current study, the prime objective is to extract with red color flowers from the field images. Every flower has its own color. To extract these flowers, the color values need to be known. In the study, petal color is used to separate them from the background. From the literature review, HSV color space is considered for the object extraction. To extract the flower objects, the pixel class that represents the flower objects is determined using histogram.

E. Flowers Extraction

Identification and separation of flowers from the field images is performed with the help of image segmentation using thresholding technique. Thresholding consists of segmenting an image into two or more regions: object regions and a background region. For any gray scale image, the segmentation process is represented as Basically, this process works by setting to 1-white all pixels that cross the gray-level limit, called the threshold, and setting rest of the pixels in the image to 0-black (1). The resulting image is referred to as a binary image.

The threshold can be chosen manually or by using automated techniques. Manual threshold selection is normally done by trial and error, using a histogram as a guide. In our study, we have selected thresholds by analyzing the HSV histogram of flower images.

III. IMPLEMENTATION

The entire process of flower detection and extraction involve various steps. In order to detect the flower region, threshold value is determined. From the histograms of various red flower images threshold value is determined. Flower segmentation is then performed. The flower region features are extracted and recognized from the binary image. A GUI application is designed to combine individual operations using GUIDE facility provided by Matlab 15a.

These are the following steps to get the result

Step 1.

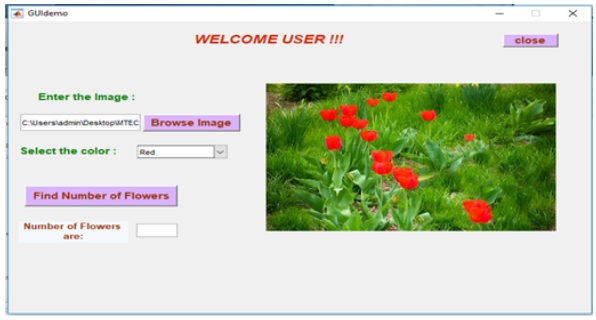

Figure 4. Starting window

Step 2.

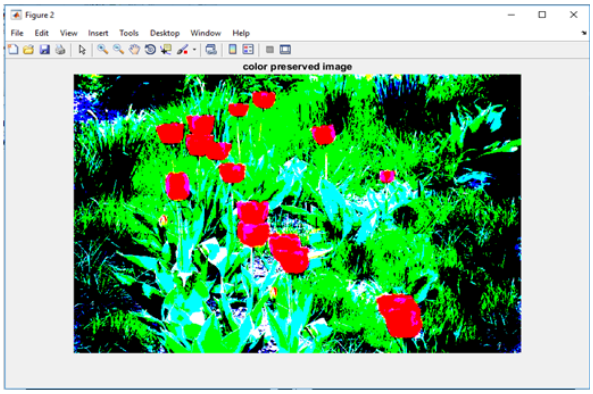

Figure 5. Color preserved Image

Step 3.

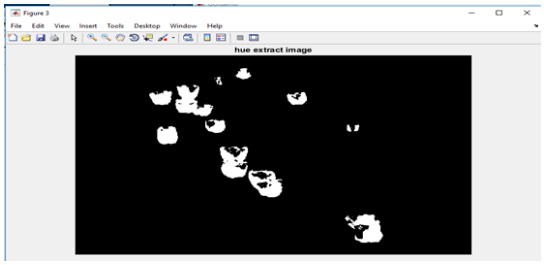

Figure 6. Hue Image

Step 4.

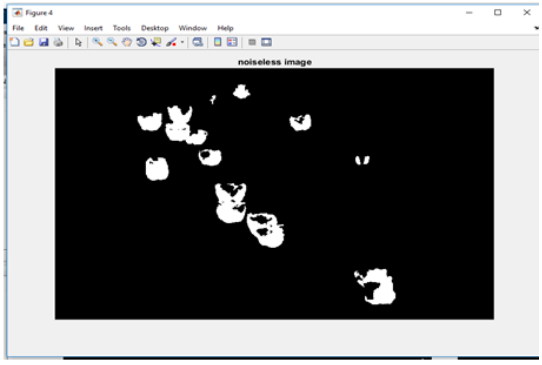

Figure 7. Noiseless Image

step 5.

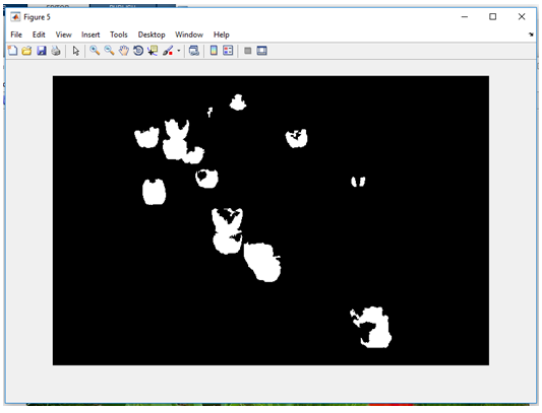

Figure 8. Extracted feature of flower image

IV. RESULTS

The designed Matlab system has produced the desired results. Total 6 images, containing flowers Red colors were tested in the system. In case of counting the flowers, the system accuracy was varying in different condition for Red flowers. The overall accuracy of the system found to be 87.03%. The counting results got contaminated majorly due to overlapping of flowers.

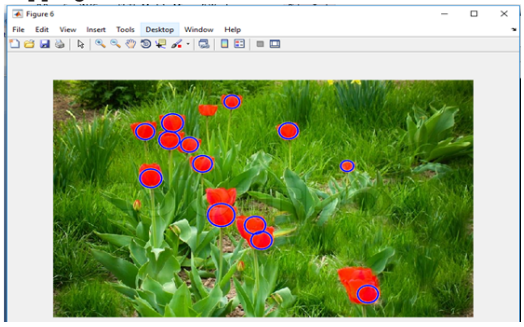

Figure 9. Marked flowers for counting

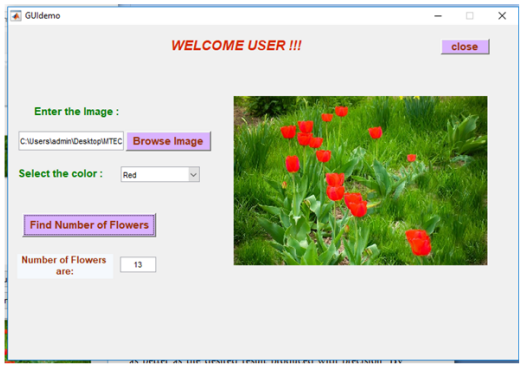

Figure 10. Result as count

Accuracy can be calculated using following expression

$$\text{Accuracy}(\%) = \left\{ \frac{\text{Algo count}}{\text{Manual Count}} \right\} * 100$$

Image no	Manual count	Algo count	Accuracy(%)
1	17	15	88.23
2	13	11	84.61
3	1	1	100
4	20	16	80
5	16	13	81.25
6	59	52	88.13
Overall accuracy is 87.03%			

V. CONCLUSION

In this research, the automated system which I had targeted to build in the beginning has able to fulfill its objective by detecting and identifying the number of flower from the images of the field which helps in providing the yield information. This study of the thesis has proved its best result in front of us as by using the better approaches than the other researches. So the approaches play its role in the image processing for getting the result as we desired. At some places this may affected due to some limitation in the image processing approaches which can be neglected at this stage of the study. These limitations mainly rely with the images taken at very extreme conditions or they might be having some segmentation problems. Images taken in the afternoon from an angle facing the plants provided better results in precision and recall than any other angle. Optimal hue values for detecting the red and yellow flowers were found as well. In this research, the system has able to fulfill the research objective by detecting and counting the flowers from images. The study has once again proved that computer vision can be effectively used in yield prediction. Somewhere result was affected by on field conditions. The errors in result are because of some basic limitations like illumination, overlapping etc.

VI. FUTUREWORK

Clearly the objective I have proposed had proved its result but at some places there is limitation due to the problems faced in the preprocessing of images. The images might have contained some noise problem, overlapping of flower and also the lack of some texture recognition problem, etc. So this sort of problem which have faced can be removed by taking the new approaches and applying the technique to the best. There can be use of an attempt in the future to make it as better as the desired result produced with precision. By the use of the different other approaches and methods like image segmentation methods, filtering methods, texture recognition methods etc we will usually prove this objective in the future as the better result and some issues must needed to be solved in the nearer future.

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