Applying Automatic Image Segmentation for Detection of Crop Diseases

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Abstract

Agricultural productivity is something on which economy highly depends. If appropriate concern of various plants disease is not taken then the severe effects on respective product, its quality and the overall productivity is measured. Distinguishing evidence of the plant disease is the way to counteracting the misfortunes in the field of agriculture. Monitoring of farms of crops by automatic technique may lead to detection of plant disease at very early stage. In Present paper an automatic image segmentation techniques has been applied on plant leaf dataset to discover the plant disease at early stage.

Keywords: Image Segmentation, SVM, Crop Diseases, Thresholding

I Introduction

Agricultural productivity is something on which economy highly depends. If appropriate concern of various plants disease is not taken then the severe effects on respective product, its quality and the overall productivity is measured. Distinguishing evidence of the plant disease is the way to counteracting the misfortunes in the field of agriculture. Monitoring of farms of crops by automatic technique may lead to detection of plant disease at very early stage. With the help of automatic techniques symptoms of diseases may be tracked when they start appearing on the plant. Health monitoring and disease detection on plant is very critical for sustainable agriculture. The investigations of the plant illnesses mean the investigations of outwardly noticeable examples seen on the plant. Image processing techniques are being involved in the area of agricultural research. An image can be done at various levels. It may be done using perceptual features. Perceptual features like color, texture, shape, structure can easily depict any object. Image can be described using the spatial relationship i.e. the descriptive metadata. Descriptive metadata can easily explain and the meaning of the images. In present manuscript a framework has been proposed which can detect the disease starting on the plant leaf in early stage by analyzing the images of plant leaf. The proposed framework uses perceptual features of images of plant leaves.

II Literature Survey

Computer vision, and object recognition in particular, has made tremendous advances in the past few years. In [1] authors have presented a novel classification algorithm for detection of plant leaf disease. In preprocessing phase the RGB image first has been changed to white and finally into grey scale image. In second phase vein's image is extracted from the leaf. Image is converted into binary image after applying the Morphological functions. After that if binary pixel value is 0 it is converted to corresponding RGB image value. Finally by using Pearson correlation and dominating feature set and Naïve Bayesian classifier disease is detected.

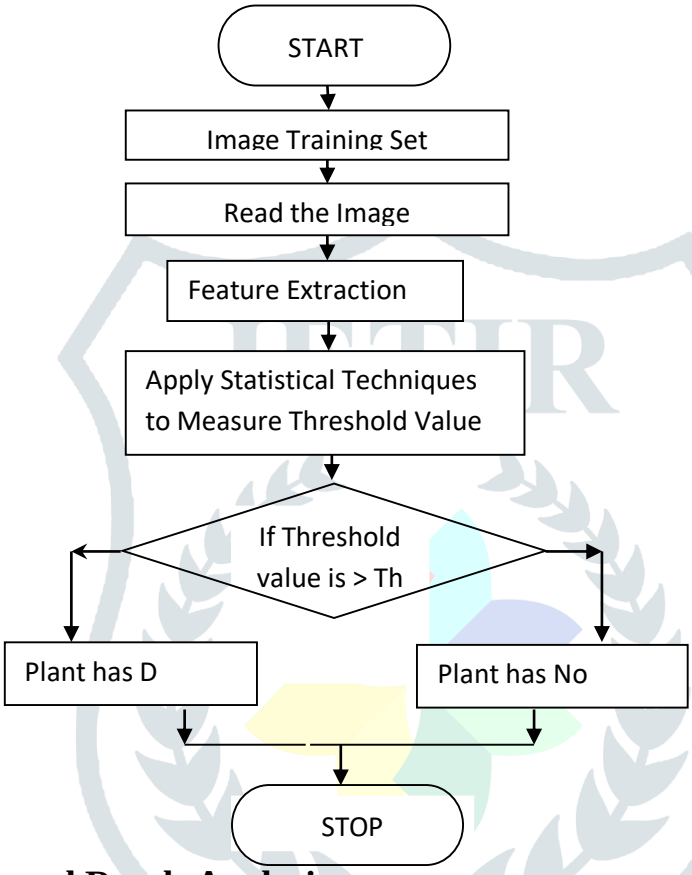
In [2] Gaussian filter is applied for removal of noise. To extract all green color component thresh holding is done. K-means clustering is used for segmentation. All RGB images are converted into HSV for extracting feature.

In [3] detection of unhealthy plant leaves take account of steps are RGB image acquisition. The input image has been converted to HIS from RGB format. Ostu's[4] method is applied for segmentation. Color co occurrence methodology is applied for computing the texture features and by applying the Genetic Algorithm classification of the disease has been done. Image segmentation groups an image into different parts. Computers can't intelligently recognize objects until a specified methodology is applied which can segment images. In segmentation process various features found in the images are used for recognition of objects. The color, texture or boundaries features etc can be used for segmentation of an image. Presently there are varieties of ways through which image segmentation may be performed. The simplest form of used for image segmentation is thresholding. Such methodology generally corresponds to the way in which humans can easily separate different views of an image and individual objects [5, 6]. We have used SVM based image classification.

In Traditional 2-Mode Method Thresholding, the threshold is set manually. Manual thresholding lacks identification efficiency. In the next section the steps automatic image segmentation has been discussed.

III Proposed Model

In our proposed Model image segmentation can be performed by setting thresholding value automatically using descriptive statistical analysis. The RGB color value and Grey value feature vectors are used for identification of plant leaf disease identification [7]. The steps for proposed model are shown in Figure 1.



IV Implementation and Result Analysis

Descriptive Statistical Analysis and SVM based classification has been applied. The protocol is implemented using Python programming language. In the prototype of proposed system total 08 features were extracted. From the basic feature color two characteristics value Hue and Saturation were extracted. From texture feature energy and homogeneity values matrix were selected. Finally for shape feature extraction the gray level HLAC features were selected [8]. The statistical matrix is used to present four characteristics features. Finally the SVM based classification is applied for discovery of presence of disease on leaf [9]. In Table 1 accuracy of image recognition in sample data is shown. Sample data set contains total of 35 images. In sample data four cases of images have been used. The data set contains images of leaf in normal situation, minor disease and severe disease.

Table 1 Recognition Accuracy on Sample Data

Type of Image	Correct Recognition	Wrong Recognition	Accuracy
Normal Leaf Image	14	1	93.33%
Minor Disease Leaf Image	7	3	70%
Severe Disease Leaf Image	9	1	90%

Our results show that statistical matrix based SVM classification provides good accuracy level in all the cases of images.

V Conclusion

In this paper we have used an image segmentation methodology where automatic thresholding is being performed. SVM based classification is applied and a good level of accuracy is achieved.

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