Agricultural Plant Disease Detection and its Treatment using Image Processing

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Abstract—Recognizable proof of the plant ailments is the way to keeping the misfortunes in the yield and amount of the agrarian item. The plant's investigations ailments mean the investigations of outwardly detectable examples seen on the plant. Wellbeing observing what's more, ailment location on plant is extremely basic for feasible farming. It is extremely hard to screen the plant illnesses physically. It requires colossal measure of work, expertise in the plant maladies, furthermore require the extreme preparing time. Consequently, picture handling is utilized for the identification of plant ailments. Malady recognition includes the progressions like picture obtaining, picture pre-handling, picture division, highlight extraction and arrangement. This paper talked about the routines utilized for the identification of plant infections utilizing their leaves pictures. This paper additionally talked about some division and highlight extraction calculation utilized as a part of the plant illness discovery.

Key words: Image Acquisition, Plant Diseases, Pre-processing, Segmentation, Feature Extraction, Support Vector Machine, Artificial Neural Network

I. INTRODUCTION

India is a developed nation and mostly of the populace relies on upon horticulture. Farmers have huge scope of assorted qualities for selecting different suitable products and discovering the suitable pesticides for plant. Ailment on plant prompts the huge decrease in both the quality and amount of farming items. The investigations of plant illness allude to the investigations of outwardly discernible examples on the plants. Observing of well-being and malady on plant assumes an imperative part in effective development of harvests in the homestead. In right on time days, the checking and investigation of plant maladies were done physically by the skill individual in that field. This requires colossal measure of work furthermore requires unnecessary handling time. The picture handling systems can be utilized as a part of the plant sickness discovery. In a large portion of the cases infection side effects are seen on the leaves, stem and natural product after detecting ailments provide treatment on it. The plant leaf for the discovery of malady is considered which demonstrates the sickness indications. These papers gives the prologue to picture preparing method utilized for plant sickness identification and provide treatment on sickness.

II. LITERATURE SURVEY

Savita N. Ghaiwat, and Parul Arora developed Detection and Classification of Plant Leaf Diseases Using Image processing Techniques: A Review This paper present survey on different classification techniques that can be second-hand for plant piece of paper ailment arrangement. A classification technique deals with classifying each pattern in one of the distinct classes. A classification is a method where leaf is classified based on its different morphological features. There are so many classification methods such as k-Nearest Neighbor Classifier, Probabilistic Neural Network, Genetic Algorithm, Support Vector Machine, and Principal constituent Analysis, Artificial neural network, Fuzzy logic. Selecting a classification method is always a complex task because the quality of result can vary for different input data.

Anand.H.Kulkarni1, Ashwin Patil R. K. Published Paper Applying image processing technique to detect plant diseases, That Paper work proposes a methodology for detecting plant diseases early and correctly, using diverse image giving out techniques and artificial neural network (ANN). Farmers familiarity great difficulties in changing from one disease control policy to another. Relying on pure naked-eye surveillance to detect and order diseases can be exclusive various plant diseases pose a great threat to the farming sector by reducing the life of the plants. The present work is aimed to develop a simple disease detection system for plant diseases.

Chunxia Zhang et al developed “Design of Monitoring and Control Plant Disease System Based lying on DSP & FPGA”. The yearly universal losses because of tree sickness and insect pest account for about one-third of total grain output, so plant disease and insect pest control is an urgent issue for refined agriculture. Most agriculture producers just fertilize and spout pesticide blindly, which results into waste in human, financial and material resources, and also badly influences the product quality because of low identification ratio, difficult diagnosis and no effective steps to control plant disease. With the development of science and technology, image and video processing is used in plant disease diagnosis and control systems. Image and video processing is an effective way to plant disease diagnosis and control which can precisely tell cause of plant disease or insect pest and give effective steps to get over.

The division of leaf picture is critical while separating the component from that picture. Mrunalini R. Badnakhe, Prashant R. Deshmukh look at the Otsu edge and the k-means bunching calculation utilized for tainted leaf investigation as a part of. They have reasoned that the extricated estimations of the elements are less for k-means grouping. The clarity of k-means bunching is more precise than other strategy.

III. SYSTEM ARCHITECTURE

The methodological analysis of the present work has been presented pictorially in Figure 1. The job in accurate with capturing images using cameras or scanners. These images are made to undergo pre-processing stepladder similar to filtering and segmentation. Then different surface and color skin tone are extracted from the processed image lastly, the
feature values are fed as effort to the ANN classifier to classify the given image.

A. Image Acquisition:

In Acquisition Process Diseases images of the plants are captured through the digital camera. This image is in RGB (Red, Green and Blue) form. Color transformation structure for the RGB leaf image is created, and then, a device-independent color space conversion for the color alteration construction is applied such as HIS model.

B. Image Pre-processing

To uproot shout in picture or further item migration, distinctive pre-handling systems is considered. Picture cutting i.e. trimming of the leaf picture to get the intrigued picture locale. Picture smoothing is done utilize the smooth channel. Picture advance is done for growing the discrimination. the RGB pictures into the murky pictures utilizing shading change utilizing geometric statement(1).

\[ f(x)=0.2989*R + 0.5870*G + 0.114.*B \]

Then the histogram modification which appropriates the pictures' intensities is coupled on the picture to recover the plant infection pictures. The total propagation capacity is utilized to mingle force values.

C. Image Segmentation

Segmentation means partitioning of image into diverse part of same skin tone or having some likeness dissection means parceling of picture into different part of same elements or having some likeness. The division should be possible utilizing different strategies like otsu' strategy, k-means bunching, varying over RGB picture into HIS model.

D. Feature Extraction

The input image is improved to conserve information of the affected pixels before extracting chili folio color from the background. The color space correspondingly is used to reduce effect of illumination and distinguish between disease and non-disease leaf color resourcefully the resulting color pixels are clustered to acquire groups of colors in the image is shown in Fig. 2.

E. Classification

In plant leaf categorization leaf is classified based on its different morphological facial appearance. Some of the classification techniques used are Neural Network, Genetic Algorithm, Support Vector Machine, and Principal Component Analysis, k-Nearest neighborhood Classifier. Plant leaf infection classification has wide application in cultivation.

F. Treatment

When the ailment is identify the Treatment will be Provided Using SVM (Support Vector Machine) and arrangement Algorithm, otsu Threshold Algorithm.

IV. ALGORITHM

A. K-Means Clustering:

The K-means clustering is used for categorization of object based on a set of skin texture into K number of classes. The classification of object is done by minimizing the sum of the squares of the distance flanked by the object and the corresponding cluster.

The algorithm for K–means Clustering:
1) Pick center of K cluster, moreover arbitrarily or based on some heuristic.
2) Assign each pixel inside the picture to the cluster that minimizes the detachment flanked by the pixel and the cluster midpoint.
3) Again calculate the cluster centers by averaging all of the pixels in the cluster. Replicate steps 2 and 3 until convergence is attained.

B. Otsu Threshold Algorithm:

Thresholding creates twofold images from grey-level images by setting all pixels below some threshold to zero and all pixels beyond that threshold to one.
1) According to the threshold. Separate pixels into two clusters
Agricultural Plant Disease Detection and its Treatment using Image Processing

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2) Then find the mean of each cluster.
3) Square the variant between the means.
4) Multiply the number of pixels in one cluster times the number in the other.

The tainted leaf shows the symptoms of the disease by changing the color of the leaf. Hence the greenness of the leaves can be second-hand for the detection of the tainted section of the leaf. The R, G and B component are extracted from the image. The threshold is designed using the Otsu’s method. Then the green pixels is veiled and detached if the green pixel intensities are less than the computed threshold.

C. Support Vector Machine

Support Vector machine (SVM) is a non-linear Classifier. This is a new drift in machine knowledge algorithm which is used in many pattern gratitude problems, together with surface classification. In SVM, the input data is non-linearly mapped to linearly estranged data in some high dimensional space provided that good classification presentation. SVM maximizes the in significant space between unlike module. The division of classes is approved out with different kernels.SVM is planned to work with only two classes by decisive the manic plane to divide two classes. This is done by maximizing the outskirts from the hyper jet to the two classes. The samples nearby to the margin that were selected to conclude the hyper plane is identified as sustain vectors . Fig under shows the hold up vector apparatus concept. Multiclass classification is also pertinent and is fundamentally built up by various two class SVMs to resolve the problem, either by using one-versus-all or one versus-one. The winning class is then strong-minded by the maximum output role or the maximum votes respectively.

Fig.1: Support vector machine

V. RESULTS AND ANALYSIS

In this move toward, the network is qualified on 140 samples from which 8 samples are alternaria, 26 sample be BBD and 89 sample are Anthracnose are worn for training and trying. The underneath table shows the credit rate.

<table>
<thead>
<tr>
<th>Diseases</th>
<th>Recognized Samples</th>
<th>Misclassified samples</th>
<th>Recognition Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alternaria</td>
<td>20</td>
<td>2</td>
<td>90.76</td>
</tr>
<tr>
<td>BBD</td>
<td>21</td>
<td>3</td>
<td>81.76</td>
</tr>
<tr>
<td>Anthracnose</td>
<td>66</td>
<td>3</td>
<td>95</td>
</tr>
</tbody>
</table>

Table 1: Recognition rate of the diseases with uniform background

From the above conducted examination the table clearly shows that the recital of neural network is not only depending ahead the number features; number of hidden neurons and the extinction mistake rate but also depends on the quality of trial picture. therefore an optimization have to be tested with number of feature values, number of concealed neurons and the killing error rate in various diverse input circumstances in order to correctly classify sample to their equivalent module.

VI. CONCLUSIONS

The precisely discovery and arrangement of the plant ailment with its treatment is very important for the successful cultivation of harvest and this can be done using image processing. This paper discussed a variety of techniques to sector the ailment part of the plant. This paper also discussed some characteristic drawing out and classification techniques to extract the features of impure leaf and the classification of plant diseases. The use of ANN methods for classification of virus in plants such as nature organizing characteristic map, back propagation algorithm, SVMs etc. can be professionally used. From these methods, we can truthfully identify and categorize a variety of plant diseases and gives treatment using image dispensation techniques.

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REFERENCES


