Identification of Plant Diseases

Wagh Dhananjay[1], Shubham Kherde[2], Piraji Pandilwad[3], Ajit Ghule[4]
Department of Information Technology
[1, 2, 3, 4] D. Y. Patil College of Engineering, Akurdi

Abstract-*India is agricultural country where approximately 18% of crop yield is lost due to pest attack every year which is valued around Rs. 90,000 million. Large use of pesticides harms the soil, has acute toxicity to humans and animals, changes in pest status in agro-ecosystems, high cost of control practices, residue problems in environment, etc. Whiteflies are well-known harmful insects present on leaves of plant, excrete sticky honeydew, cause yellowing or death of leaves and harm the crop yield. The increase of whiteflies has been mostly relied on visual judgment by farmers. The visual judgment by farmers for density of whiteflies has been less accurate because of the different levels of identification skills. Also, it takes long time for detection of Whiteflies present on leaves in laboratory. Due to economic importance of crops and strong impacts of damage levels, detection of whiteflies at early stages has become important.*

In proposed solution, using android application, we are calculating affected area of plant and based on affected area we are calculating severity of disease. Also we will suggest treatment in Hindi for detected disease.

Keywords- Image Acquisition, Plant Diseases, Pre-processing, Segmentation, Feature Extraction, Support Vector Machine.

I. INTRODUCTION

Agriculture has become much more than simply a means to feed ever growing populations. Plants have become an important source of energy, and are a fundamental piece in the puzzle to solve the problem of global warming. There are several diseases that affect plants with the potential to cause devastating economical , social and ecological losses. In this context, diagnosing diseases in an accurate and timely way is of the utmost importance.

There are several ways to detect plant pathologies. Some diseases do not have any visible symptoms associated, or those appear only when it is too late to act. In those cases, normally some kind of sophisticated analysis, usually by means of powerful microscopes, is necessary. In other cases, the signs can only be detected in parts of the electromagnetic spectrumthat are not visible to humans. A common approach in this case is the use of remote sensing techniques that explore multi and hyper spectral image captures. The methods that adopt this approach often employ digital image processing tools to achieve their goals.

Image processing is best way for detecting and diagnosis the diseases. In which initially the infected region is found then different features are extracted such as color, texture and shape. Finally classification technique is used for detecting the diseases. There are different feature extraction techniques for extracting the color, texture and edge features such as color space, color histogram, grey level co-occurrence matrix (CCM), Gabor filter, Canny and Sobel edge detector. There are also different classification techniques such as Support Vector Machine (SVM), Artificial Neural Network (ANN), Backpropagation (BP) Network, Probabilistic Neural Network (PNN), Radial Basis Function (RBF) Neural Network.

II.LITERATURE SURVEY

In this section, various method of image processing for plant disease detection is discussed. Wenjiang Huang et al developed the new spectral indices for identifying the winter wheat disease. They consider three different pests (Powdery mildew, yellow rust and aphids) in winter wheat for their study. The most and the least relevant wavelengths for different diseases were extracted using RELIEF-F algorithm. The classification accuracies of these new indices for healthy and infected leaves with powdery mildew, yellow rust and aphids were 86.5%, 85.2%, 91.6% and 93.5% respectively [1].

Enhanced images have high quality and clarity than the original image. Color images have primary colors red, green and blue. It is difficult to implement the applications using RGB because of their range i.e. 0 to 255. Hence they convert the RGB images into the grey images. Then the histogram equalization which distributes the intensities of the images is applied on the image to enhance the plant disease images. Monica Jhuria et al uses image processing for detection of disease and the fruit grading in [3]. Zulkifli Bin Husin et al, in their paper [4], they captured the chilli plant leaf image and processed to determine the health status of the chilli plant. Their technique is ensuring that the chemicals should apply to the diseased chilli plant only. They used the MATLAB for the feature extraction and image recognition.

III.SYSTEM MODEL AND ASSUMPTIONS

To identify the affected area, the images of various leaves are taken with a digital camera or similar device. Then to process those images, various image-processing techniques are applied on them to get different and useful features required for later analyzing purpose

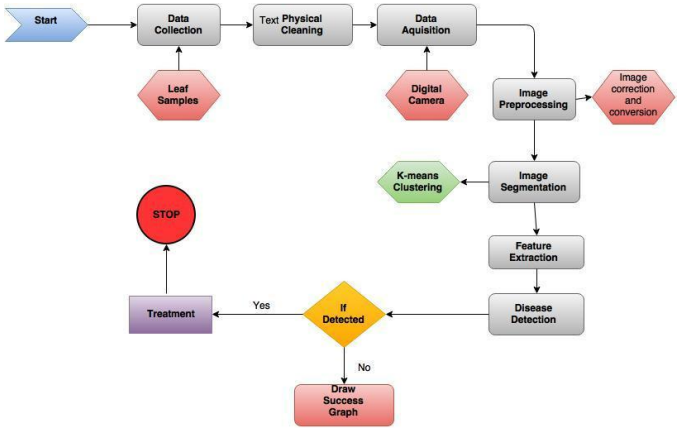


Fig 1. System Architecture

K-means clustering:

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

The algorithm for K –means Clustering:

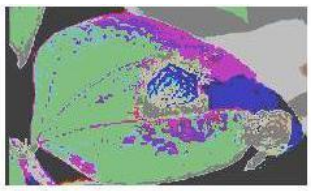
1. Pick center of K cluster, either randomly or based on s some heuristic.

2. Assign each pixel in the image to the cluster that minimizes the distance between the pixel and the cluster center.

3. Again compute the cluster centers by averaging all of the pixels in the cluster. Repeat steps 2 and 3 until convergence is attained.

The infected leaf shows the symptoms of the disease by changing the color of the leaf. Hence the greenness of the leaves can be used for the detection of the infected portion of the leaf. The R, G and B component are extracted from the image. The threshold is calculated using the Otsu's method. Then the green pixels is masked and removed if the green pixel intensities are less than the computed threshold.

Input image



Segmented Image

Image Acquisition:

The images of the plant leaf are captured through the 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 transformation for the color transformation structure is applied.

Image Pre-processing:

To remove noise in image or other object removal, different pre-processing techniques is considered. Image clipping i.e. cropping of the leaf image to get the interested image region. Image smoothing is done using the smoothing filter. Image enhancement is carried out for increasing the contrast. Then the histogram equalization which distributes the intensities of the images is applied on the image to enhance the plant disease images. The cumulative distribution function is used to distribute intensity values.

Image Segmentation:

Segmentation means partitioning of image into various part of same features or having some similarity. The segmentation can be done using various methods like otsu' method, k-means

Feature Extraction:

Feature extraction plays an important role for identification of an object. In many application of image processing feature extraction is used. Color, texture, morphology, edges etc. are the features which can be used in plant disease detection.

Leaf color extraction using H and B components:

The input image is enhanced by using anisotropic diffusion technique to preserve the information of the affectedpixels before separating the color from the background. To distinguish between grape leaf and the non-grape leaf part, H and B components from HIS and LAB color space is considered. A SOFM with back propagation neural network is implemented to recognize colors of disease leaf.

Classification :

It is final stage in disease detection. It is identifying a rule according to selected features and assigning each disease to any one the predetermined classes. The Artificial Neural Network and Support Vector Machine are mostly used as classifier.

ANN:

After feature extraction is done, the learning database images are classified by using neural network. These feature vectors are considered as neurons in ANN. The output of the neuron is the function of weighted sum of the inputs. The back propagation algorithm, modified SOM, Multiclass Support vector machines can be used.

Treatment:

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

IV. RESULT AND DISCUSSION

In this move toward, the network is qualified on 140 samples from which 6 samples are Phyllosticta, 21 sample be Tar Spot and 86 sample are Linden Leaf Blotch are damaged for guidance and trying.

Diseases	Recognized Samples	Misclassified Samples	Recognition Rate (%)
Phyllosticta	6	2	75
Tar Spot	21	5	80.76
Linden Leaf Blotch	86	3	96

The under table shows the credit rate From the above conducted examination the table clearly shows that the performance of neural network is not only depending ahead the number features, number of unseen neurons and the loss mistake rate but also depends on the quality of trial picture. Therefore an optimization have to beinnocent with number of characteristic values, number of concealed neurons and the killing error rate in various dissimilar input conditions in order to properly classify sample to their equivalent module.

Fig 2:The Result of after Detecting Disease Description.

The system was tested with image of 800x536 pixels. The total samples are 60 with different plants. The graphical user interface (GUI) result of disease plant shown in figure. All the plants samples are tested. Table 1 illustrated the samples result of plant disease that was implemented in this paper. The method implemented in this research paper is effective and fastest method in detection of plants disease. The overall result was satisfying (94.2%) and is considered as a successful project. This paper has introduce a number of technique in image processing for image and color recognition of an image photo. As a conclusion, this research strongly recommends to be use for early detection of plants diseases through leaf inspection. Plants images captured are processed to determine the robustness of each plant.

V.CONCLUSION

Thus, is important to correctly diagnose a disease before proffering management options. Diagnosis, being the process of determining the cause of a problem requires the attention of an expert. Extract the features of infected leaf and the classification of plant diseases from these methods, we can

accurately identify and classify various plant diseases and provide suitable treatment using image processing techniques.

REFERENCES

[1] Pranjali Vinayak Keskar, Shubhangi Nimba Masare, Manjusha Suresh Kadam and Prof. Mrs. Seema U.Deoghare," Leaf Disease Detection and Diagnosis", International Journal of Emerging Trends in Electrical and Electronics (IJETEE) Vol. 2, Issue. 2, April-2013.

[2] Zacharias N. Voulgaris,"Discernibility Concept in Classification Problems", University of London may 2009.

[3] Abdallah A. Alshennawy, and Ayman A. Aly," Edge Detection in Digital Images Using Fuzzy Logic Technique", World Academy of Science, Engineering and Technology 27 2009

[4] Vishakha Metre,Jayshree Ghorpade," An Overview of the Research on Texture Based Plant Leaf Classification", IJCSN International Journal of Computer Science and Network, Vol 2, Issue 3, 2013ISSN (Online): 2277-5420

[5] Prof. Meeta Kumar, Mrunali Kamble, Shubhada Pawar, Prajakta Patil,Neha Bonde," Survey on Techniques for Plant Leaf Classification", International Journal of Modern Engineering Research (IJMER) Vol.1, Issue.2, pp-538-544 ISSN: 2249-6645

[6] Noor Ezan Abdullah, Athirah A. Rahim, Hadzli Hashim and Mahanijah Md Kamal," Classification of Rubber Tree Leaf Diseases Using Multilayer Perceptron Neural Network",The 5tn Student Conference on Research and Development -SCOReD 200711-12 December 2007, Malaysia