PLANT LEAF DISEASE DETECTION USING IMAGE SEGMENTATION AND NEURAL NETWORKS

[1]K.Tejaswini, [2]Ms. P.Sravya, [3]G V Hindumathi
[1]M.tech, [2]M.Tech,(Ph.D) Assistant Professor, [3]M.Tech,(Ph.D) Assistant Professor
Computer Science and Engineering,
Gayatri Vidya Parishad college engineering, Madhurawada,
Andhra Pradesh, India.

i.ABSTRACT

Farmers are backbone of the country and agriculture is the main sector in India from long time ago. Farmers facing a lot of difficulties in identifying the plant leaf diseases. It is not possible to identify the disease of each crop by every farmer because it is hard skill and farmers gain that skill with a lot of experience and it may not accurate every time. Also, not all farmers are experienced and there are wide variety of crop diseases. It may also take so much time for monitoring big forms of crops. Hence image segmentation and neural networks are used for automatic disease detection by using Genetic algorithm and artificial neural networks. Here Genetic algorithm is used for segmentation and artificial neural networks is used for classifying the diseases. The experimental results shows the combination of both increases the Accuracy of plant leaf disease detection better than Support Vector Machine. The results from Support vector machine classification and artificial neural networks classification are compared.

ii.INTRODUCTION

Plants getting affected by disease is natural but if precautionary steps aren't taken well then it causes serious effects on plants, various factors like product quality, quantity and health of people may get affected. This Plant diseases are important factors, as it can cause a reduction in both quality and quantity of crops. If we consider large field of crops then it takes more amount of time to monitor and detect the diseases. Farmers in India are less educated and does not have much knowledge about the diseases and they want to consult the experts which are far away from their villages. Therefore, image segmentation and classification techniques are used to detect the plant diseases at early stages. As they produce fast and accurate results in a less amount of time when compared to naked eye observation. In Support Vector Machine classifier the training time is more and also the accuracy can be increased. In proposed to improve the recognition rate of classifier we want to change the classifier to Artificial Neural Network. First, we have to remove the noise present in images. If there is a noise in images, then we don't get the accurate results. For removing noise present in images through median filter and it works better with the images containing salt and pepper noise. wiener filter is used for removing blurriness in an image, then we improve the quality of the image by using image enhancement techniques and also we resize all the images to fixed length. After that we segment the image using Genetic algorithm and we train the neural network with ta dataset to classify the leaf disease.

iii.PROPOSED METHODOLOGY

Firstly, consider an RGB image which is acquired by using digital cameras or similar devices or we can collect the images of diseased leaves that are used for testing. processing of input image for improving quality and also for getting better result. Below diagram fig. 1 depicts the steps that are involved in the proposed System.

The Step by Step procedure of Proposed System:

1. select an image from dataset
2. Apply pre-processing techniques.
3. Mask and remove the green-pixels.
4. Obtain the useful segments in the image using Genetic Algorithm.
5. Extract the features from image
6. Classify the disease using Support Vector Machine and Artificial Neural Network

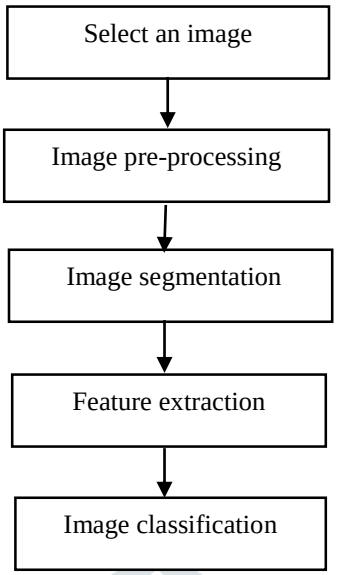

Figure 1 Block diagram of proposed approach

3.1 Select an image:

Here sample images of the diseased leaves are selected which are used for testing

Figure 2 Input Image

3.2 Image pre-processing:

Processing of input image for improving quality and also for getting better result. So we have to restore those images by applying various filters based upon the noises. Median filter is used for removing the salt and pepper noise in an image. Salt and pepper noise means images contain the dark pixels (black dots or pepper) and bright pixels (white dots or salt). Median filter works by arranging all the pixels either in ascending or descending then find median values of pixels and replaces the intensity value of noise pixels by the median value. For removing the blurriness wiener filter is used.

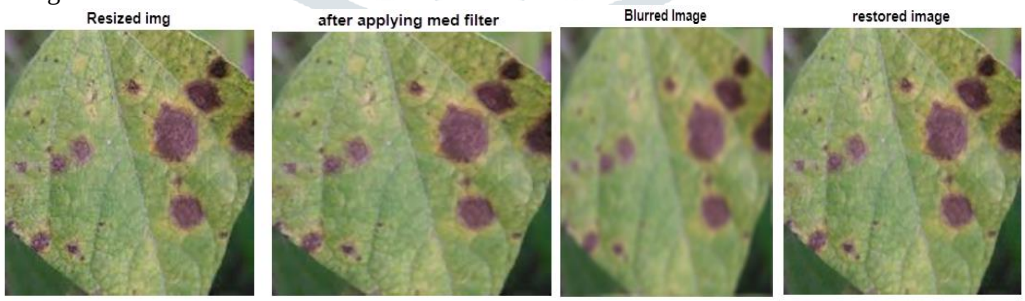

Figure 3 After Applying Pre-processing Techniques

3.3 Masking and removing green pixels:

Here we have to mask the green pixels in an image and remove those pixels in an image which are not useful for the further process and this can be done by using the thresholding. We have to compute the threshold value for green pixels using histograms. Based on the threshold value, green pixels are removed. The pixels that are less than the threshold values are assigned to zeroes and remaining to ones.

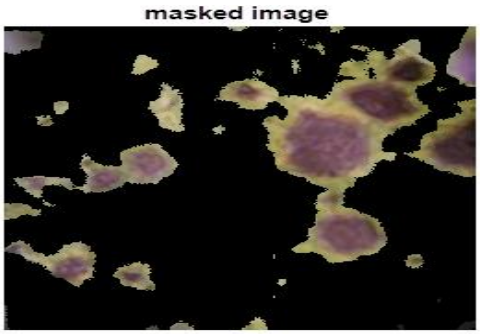

Figure 4 Image After Masking

3.4 Image Segmentation:

The image will be segmented into different parts according to the region of interest. Purpose of image segmentation is to divide the image into some meaningful regions. And obtain useful segments to classify the disease. Genetic Algorithm is used in order to obtain the useful segments.For doing clustering appropriately Genetic Algorithm can be used as the name itself tells that it is an optimization technique used for selecting best centroids. In k-means segmentation user have to the initial cluster centroid. So sometimes it may lead to misclassification of clusters. In order to reduce that Genetic Algorithm is used, it contains the set of population called chromosomes. Each chromosomes contains the numbers of cells which stores the cluster centers. By using Genetic fitness function best chromosome will be selected next round. Initially the pixels of an image can be clustered according to nearest clusters. New clusters can be obtained by calculating the mean of those pixels. Now the fitness function is computed by calculating Euclidean distance between the pixels and their respective cluster by using following equations

$$M = \sum M_i$$

$$M_i = \sum_{x_j \in c_i} |(x_j(r,g,b) - z_i(r,g,b))$$

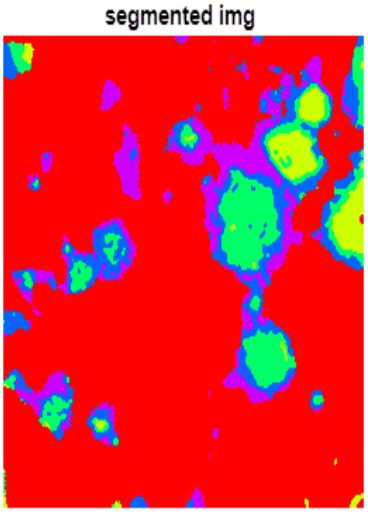

Figure 5 Segmented Image

3.5 Feature Extraction

Extract the features of an image using grey level co-occurrence matrix by considering the color and texture of an image. Instead of giving whole image as input to classifier only extracted features of an image will be given as input which contains useful information.

The features that are extracted from the input image are Contrast, Correlation, Energy, Homogeneity, Mean, Standard Deviation, Entropy, RMS, Variance, Smoothness, Kurtosis, Skewness, IDM.

3.6 Image Classification

In this system two classifiers are used for detecting the disease present in leaves. The classifiers are Artificial Neural Networks and Support Vector Machine. These classifiers are used to classify the disease which takes the extracted features for the leaves as an input and compared it with the feature values stored in the Dataset. After getting output for each classifier compare the result of each classifier and decide which will give the most optimum result.

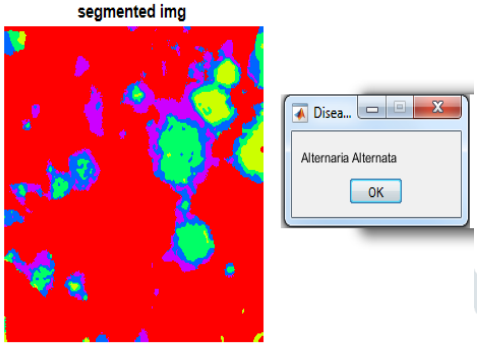

Figure 6 Classification Result

iv.COMPARISON OF RESULTS

Table 1.1 Comparison of results

Classifiers	SVM	ANN
Accuracy	90.54	94.50

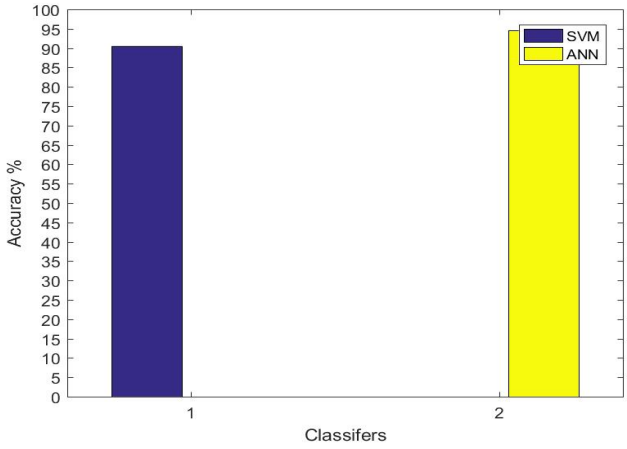

Figure 7 Accuracy Comparison Graph

v.CONCLUSION

The current project presented the implementation of Plant Leaf disease detection using image segmentation and classification techniques to predict the disease name of the given input image. This project presents the survey on different classification and image segmentation techniques used for automatic plant leaf disease detection. Related diseased leaves were considered for classifying the disease. The results shows that the performance of ANN classification is better compared to SVM. Efficiency of the proposed algorithm

is high when compared with existing one for the recognition and classification of the leaf diseases. Another advantage of using this method is that the plant diseases can be identified at early stage so that farmer can take appropriate remedies in order to overcome that disease which does not leads to great loss in money. Further to improve recognition rate in classification process Convolutional Neural Network, Bayes classifier, Fuzzy Logic and hybrid algorithms can also be used.

vi.REFERENCES

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