ISSN 2348-1196 (print)
International Journal of Computer Science and Information Technology Research ISSN 2348-120X (online)
Vol. 5, Issue 1, pp: (60-65), Month: January - March 2017, Available at: www.researchpublish.com

Lemon Tree Disease Detection by Analyzing Lemon Leaf

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Abstract: **The plant disease identification by a visual way is the more laborious task and at the same time less accurate and can be done only in limited areas. Where if automated detected technique is utilized it will take fewer efforts, less time and more accurately. The lemon leaf disease is detected by using the threshold based image segmentation and analyze the features by using the gradient boost algorithm and apply the feature classification through SVM base. The identification of disease in lemon leaves like armillaria root rot, bacterial blast, citrus nematode and etc. The SVM gives the better result for incrementing the precision of detection.**

Keywords: **MIAS, SVM, Threshold, HOG.**

I. INTRODUCTION

The studies of plant disease refer to the studies of visually overt patterns on the plants. Monitoring of health and disease on plant plays an important role in successful cultivation of crops in the farm. In beginning stage, the monitoring and analysis of plant disease was found manually by the skillfulness person in that field. This needs tremendous amount of work and also needs excessive processing time. In most of the cases disease syndrome are visibly perceived on the leaves, stem and fruit. The disease syndrome will be shown by the plant leaf.

In this section, we briefly review the most relevant researcheson: salient object detection, image-basedplant species identification, tree constructionand hierarchical classifier training.Hierarchical clustering accession had been developed in this paper to learn the total tree features and parameters clustering in a end of the segmentation.

Label tree approach- the known species plant labeled automatically through discriminate learning model. Joint approach- the collection of parameters i.e. the framework of each block and make it as a joint features compared to database and classify the tree label.

The disadvantage of the labeltree approach is that it may affect from high cost for achieving the confusion matrix of more probability features which makes complement with collected features.Thedrawback of the joint approach is that its performance andcomputational cost may largely depend on the quality of initialrandom partitions of object classes. End of the result tells only more complexity to realize the result of species classification. S.Arivazhagan et al.[2] attempted to detect unhealthy regions of plant using texture features. The image is transformed to HSI color module since it is based on human perceptions. Texture features like contrast,energy, local homogeneity,cluster shade and prominence are computed. From these features plant diseases can be further classified.

II. RESEARCH METHOD

A. Input:

The source of process considered as input, here the image database name is Mammographic Image Analysis Society (MIAS). Format ofgif(graphics interchange format).

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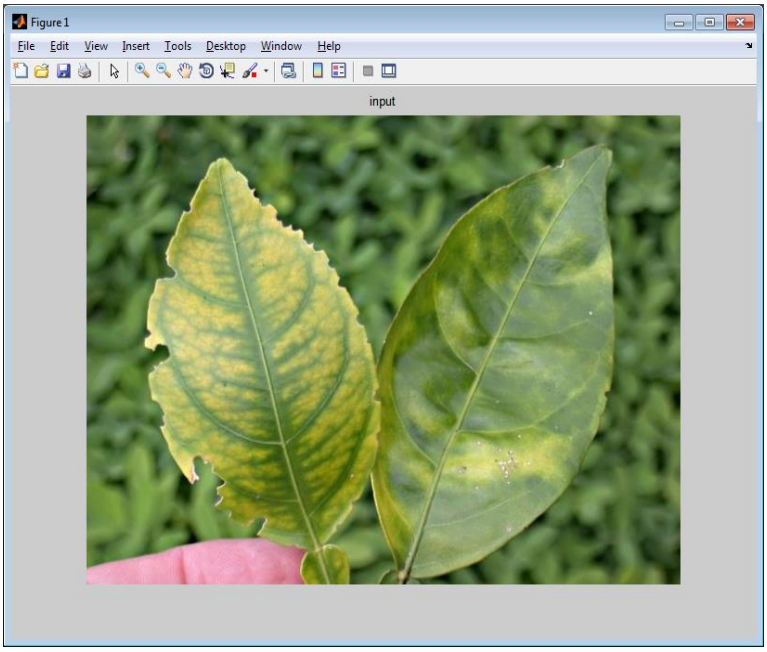

Figure 1. Input Image

B. Preprocessing:

Preprocessing images generallyinvolves separating low-frequency background noise, balancing the intensity of the specific particles images, removing reflections, and masking portions of images. Image preprocessing is the technique of enlarging data images previous to computational processing.

Leaf image which is in RGB color format is converted to a gray scale image.

RGB-Gray Conversion G= rgb2gray

G = 0.299*r + 0.587*g + 0.114*b[1]

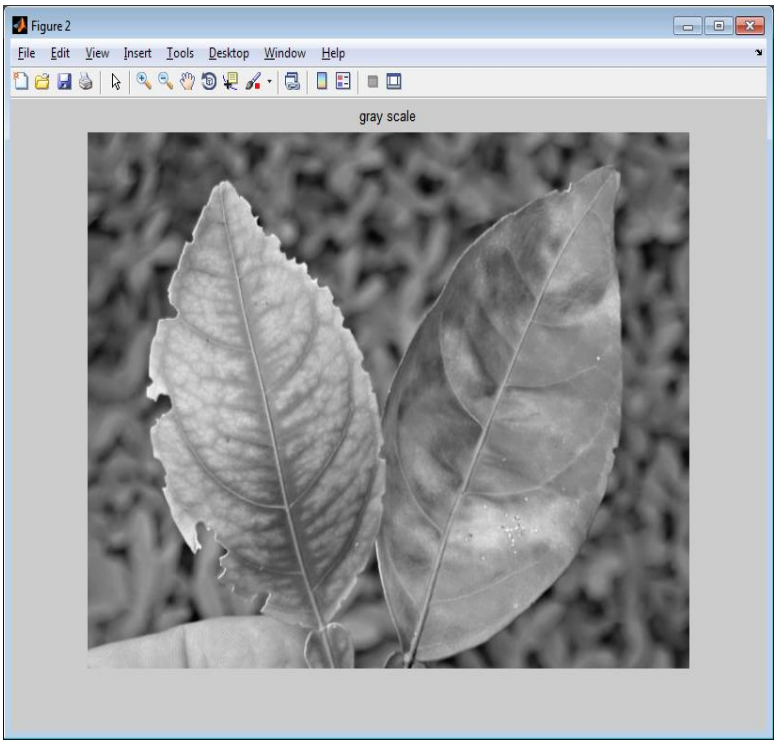

Figure 2. Preprocessing (Gray Scale)

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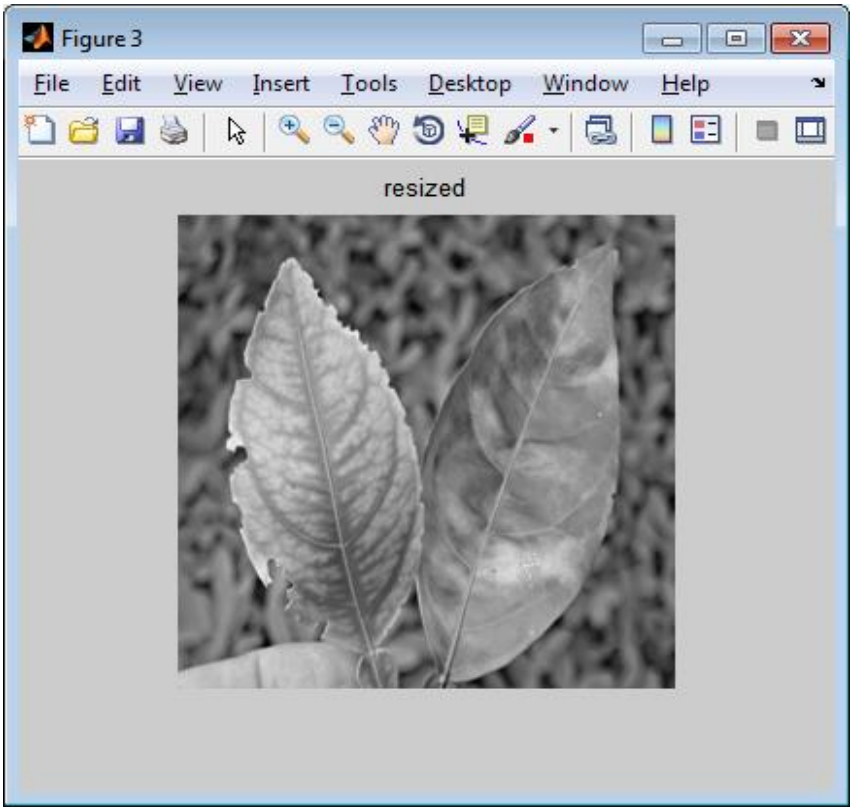

Figure 3.Image Pre-processing (Resized)

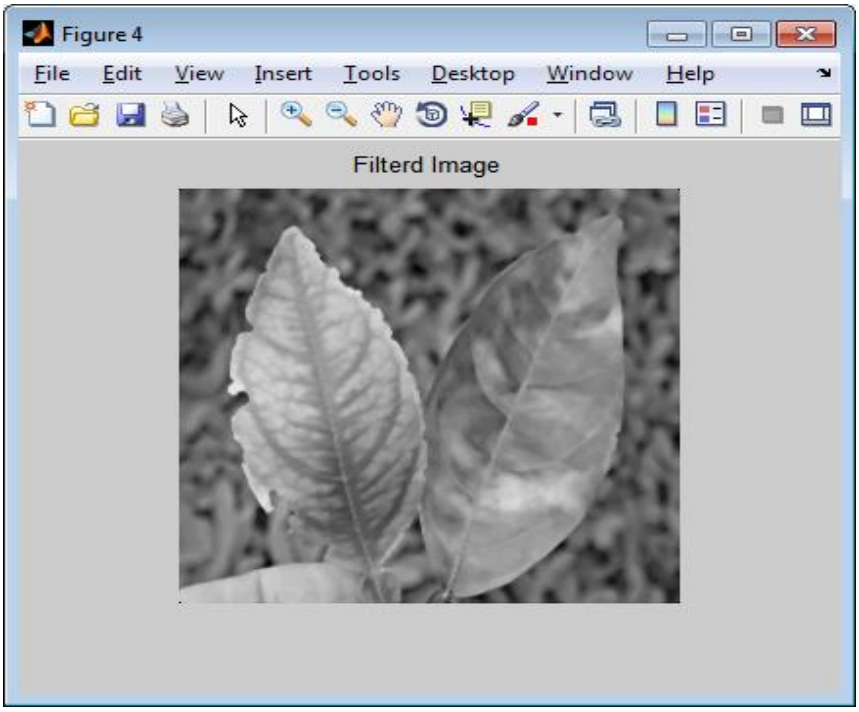

Figure 4. Pre-processing (Filtered Image)

C. Segmentation:

The process of separating a digital image into multiple parts. Image segmentation is typically used to identify objects and boundaries (lines, curves, etc.) in images. The main motive of segmentation is to change the delegation of an image into something that is more meaningful and simple to analyze.

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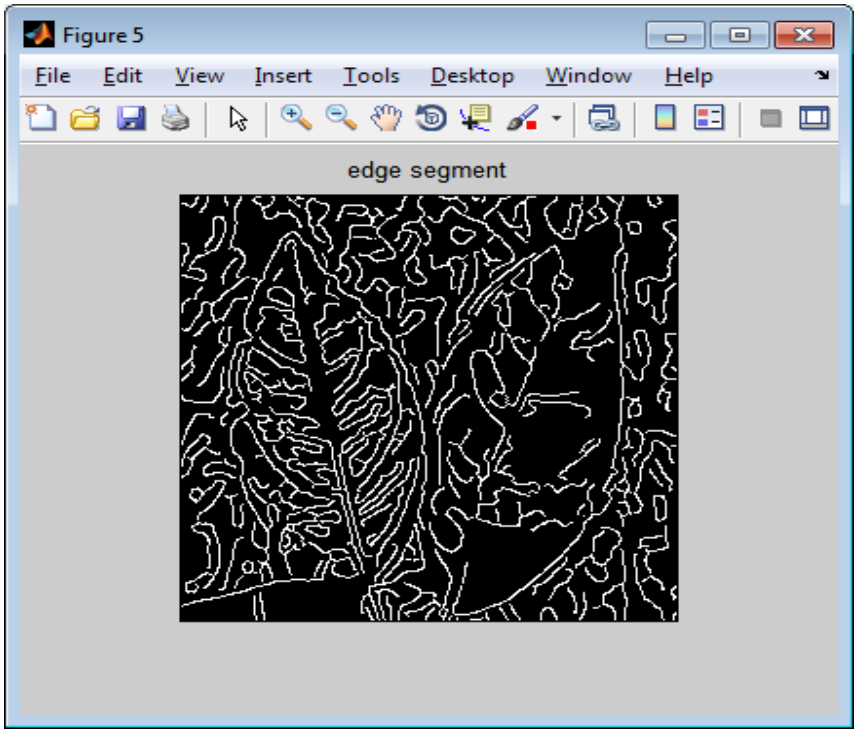

Figure 5. Segmentation

D. Feature Extraction:

The histogram of oriented gradients (HOG) is a specialty caption used in computer vision and image processing for the purpose of object detection. The technique computes circumstances of gradient orientation in localized portions of an image. This method is identical to that of edge orientation histograms, scale-invariant specialty transform descriptors, and shape contexts, but differs in that it is computed on a dense grid of uniformly spaced cells and uses overlapping local contrast normalization for increased accuracy of angle, magnitude, and gradient.

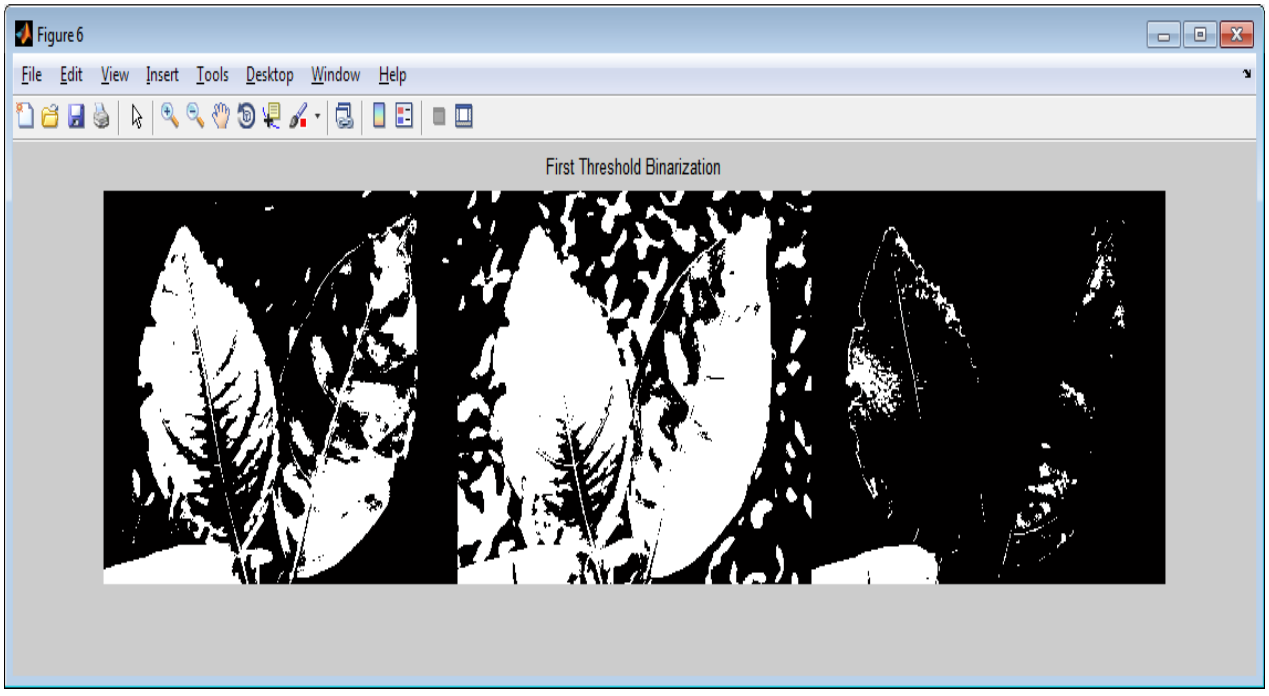

Figure 6. Threshold Calculation

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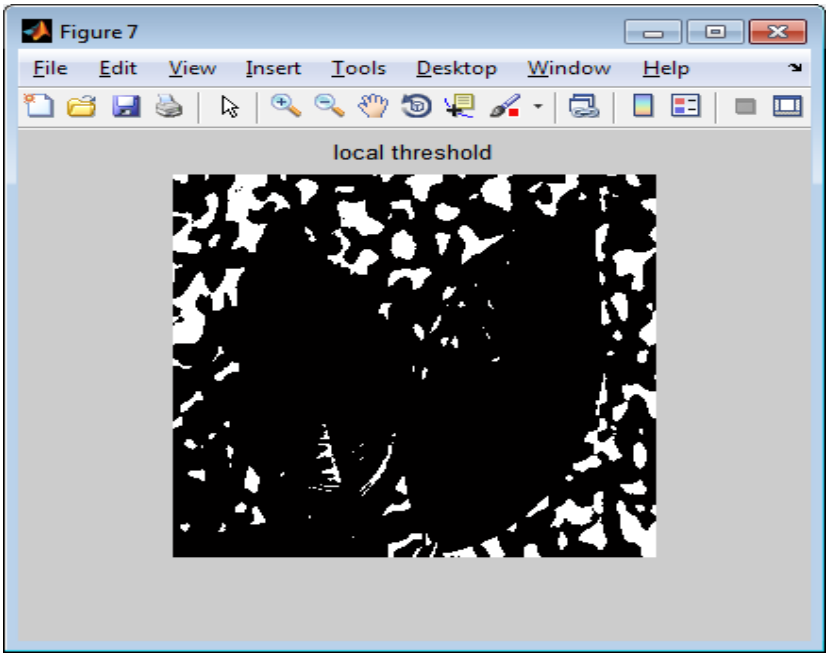

Figure 7. Local Threshold

E. Classification:

To decrease the single multiclass problem into multiple binary classification problems. Efficiently perform a non-linear classification using kernel method SVM training finds a global minimum, and their easiest geometric interpretation provides fertile ground for further investigation. W.Forstner et al.[3] has proposed a classification system for plant diseases that is completely automated and is based upon stereo and multispectral images. Sweet beet leaves have been tested in this approach. The diseased area is extracted using segmentation and is graded as per the calculations of disease spot and areas of leaves.

F. Output:

The tested image features of HOG observed and compare the parameters were already trained images. Which one is matched with this criteriawe define the result. Normal, benign and malignant.RadhiahBinti et al.[4] developed a prototype for detection of paddy diseases using neural networks and image processing which results in 92.5% accuracy rates.

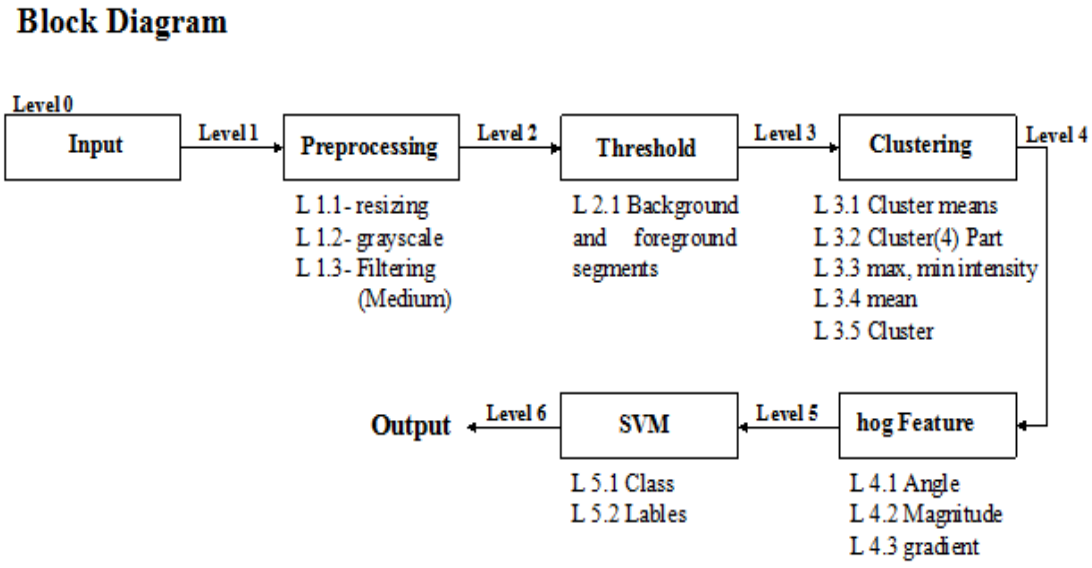

Figure 8. Architecture diagram

G. Conclusion Acknowledgement and Appendix:

Collection of more lemon leaf databases regarding disease attacks in a plant and leaf also. Make a consideration of feature collection for knowledge learning. Threshold based segmentation shows the background and foreground models to help focus the leaf of lemon plant. Gradient boost algorithm features like pixels of regularity presence, slope of gradient difference between similarity pixels and non-linear region of the leaf. Integrates these scaled features compared to pattern recognition model - SVM and classifies the result with low complexity reduction matrix comparison.

Boosting of the gradient features reduce the complexity of plant pixels reading.

✓ Linear SVM type of soft kernel model gives support vectors relevant to the leaf modification in the sense of which kind of disease attack in lemon leaf.

✓ Accuracy of SVM model is good.

- Agriculture application
- Economically avoid spreading the disease in full plant of species and increase the growth.

III. CONCLUSION

The proposed system is used to find the malformation or defectiveness in lemon leaf. The citrus diseases are identified by the farmer in a visual way. In our proposed system, the gradient boosting algorithm, Hog with GLCM features give a perfect feature extraction and SVM that gives an effective comparison between the image-under-test and the one stored in the database. The system is efficient, accurate and fast. The system is giving the easiest way to find the detection of disease easier by complete automation and notification of the disease and remedies are sent to the farmer promptly. It will be very useful for the farmers to find the disease and give the remedy instantly.

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