ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 2, February 2017

# Plant Leaf Disease Detector and Pesticide Identifier

[1]M.Thiruselvi, [2]M.Shanmugapriya, [3]N.Saranya, [4]Y.Shanmugapriya, [5]S.Aiswarya
Sri Eshwar College of Engineering (Affiliated to Anna University, Chennai)

***Abstract:*— Agriculture has been the prime occupation of India. Our country stands one among the major producers of many food crops in the world. But there are few declining factors like plant infection that reduce yield. Most plant diseases are caused by micro organisms. In the current scenario, the infected plants are identified through naked eye and treated manually which is inefficient. The proposed project uses image processing to detect and diagnose the diseases. Each disease has different symptoms, which is identified here with the help of GLCM and Clustering algorithm. The disease is identified and the pesticide to be used is displayed with the help of a LCD display thus reducing the effort of farmers in identifying the disease and finding the correct pesticide to be used. This ultimately increases the yield and quality of crops in a long term as soil damage is also reduced.**

***Index Terms*— Clustering, Image Processing, GLCM, Plant Disease Detection.**

## I. INTRODUCTION

Agriculture is an important field, which produce food for human being. It is very important to grow a plant healthy, but most of plants growth are affected by diseases and produce reduced yield. Hence identifying a plant disease in early stage is necessary in the field of Agriculture. Most of the farmers are identifying the diseased leaf through naked eye, but it is not possible to identify the disease in early stage. The proposed system uses Image Processing techniques to identify diseased Leaf and classify the diseases. After classifying the diseased leaf through GLCM( Gray Level Co-Occurance Matix) , SVM( Support Vector Machine) and Clustering algorithm, the system displays the Pesticide used for the found disease.


***Fig 1. Diseased Leaf***

Most of the plant diseases are caused by Bacteria, Fungi, Virus, etc. In this system, we are focusing on diseases like Alternaria Alternata, Anthracnose, Bacteria Blight, Cercospora Leaf Spot.

## II. EXISTING SYSTEM

The existing system uses the Pixel Level Classification algorithm. Here, the classification means identification of disease, differentiating and categorizing the data. This technique leads to the long process. The approximate detection is very complex using existing techniques.

## III. METHODOLOGY

The system uses following figure for proceeding operation.

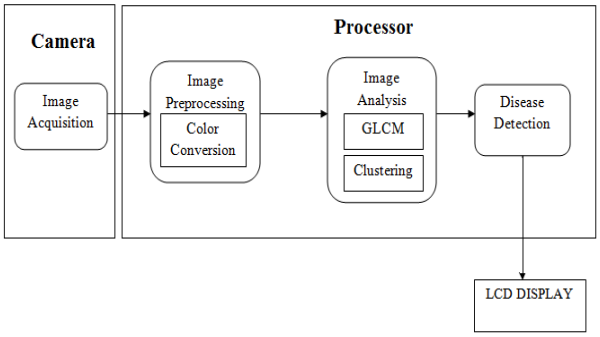



***Fig 2. Steps for the Process***

### *Image Acquisition*

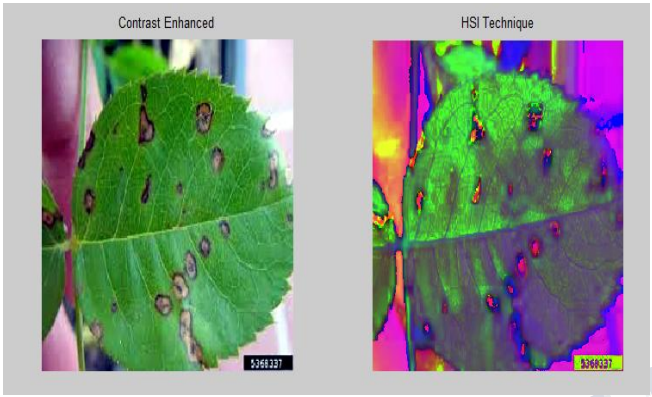
Image acquisition can be done by Digital camera, which captures the diseased leaf image. The camera is directly interfaced with the processor through cables and captured image is given to processor for further process.

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 2, February 2017

***Image Pre- processing***

Any image can be described by its red(R), Green(G), Blue(B) co-ordinate. The proposed system used to convert RGB to grey colour image for this the technique called HSI is used. It is used to detect affected area easily.




**. Fig 3. HSI Technique**

***Image Analysis***

***GLCM***

The color features can also be used for feature extraction. The properties like Energy, Contrast, Correlation, Homogeneity are found using the following equation.

| Property | Description | Formula |
|---|---|---|
| 'Contrast' | Returns a measure of the intensity contrast between a pixel and its neighbor over the whole image.<br>Range = [0 (size(GLCM,1)-1)^2]<br>Contrast is 0 for a constant image.<br>The property Contrast is also known as *variance* and *inertia*. | $\sum_{i,j} \lvert i-j \rvert^2 p(i,j)$ |
| 'Correlation' | Returns a measure of how correlated a pixel is to its neighbor over the whole image.<br>Range = [-1 1]<br>Correlation is 1 or -1 for a perfectly positively or negatively correlated image. Correlation is NaN for a constant image. | $\sum_{i,j} \frac{(i-\mu i)(j-\mu j)p(i,j)}{\sigma_i \sigma_j}$ |
| 'Energy' | Returns the sum of squared elements in the GLCM.<br>Range = [0 1]<br>Energy is 1 for a constant image.<br>The property Energy is also known as *uniformity*, *uniformity of energy*, and *angular second moment*. | $\sum_{i,j} p(i,j)^2$ |
| 'Homogeneity' | Returns a value that measures the closeness of the distribution of elements in the GLCM to the GLCM diagonal.<br>Range = [0 1]<br>Homogeneity is 1 for a diagonal GLCM. | $\sum_{i,j} \frac{p(i,j)}{1+\lvert i-j \rvert}$ |

***Table 1. Formula to calculate SGDM Properties***

***K-Means Clustering***

K-Means Clustering used for clustering and classification of diseases that affect on plant leaves.

***SVM Classifier***

The SVM(Support Vector Machine) is used for classification and regression analysis. SVM algorithm is used for mapping of given information. This helps to analysis the capture image with more accuracy. The Support Vector Machine is a hyperplane in a high dimentional space. This can be used for classification or other task on given image.

It is capable of working in different Kernal function. It uses the training point in decision making, hence the memory is efficiently used. The data are plotted in high dimensional space with the value of each feature being the value of particular coordinate. The classification can be done by finding hyper- plane that differentiate two classes.

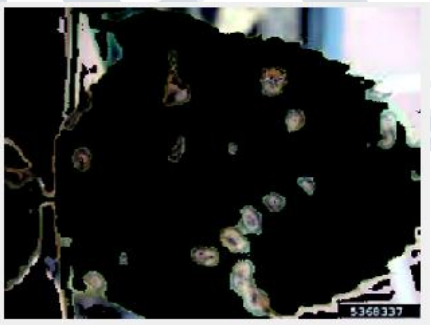


***Fig 4. Segmented Image***

## IV. RESULT

The result of the proposed system is

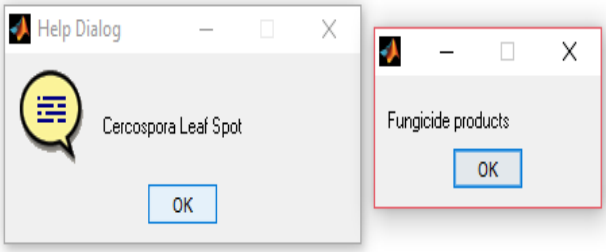



***Fig 5. Result of the Process***

This system identifies the diseased leaf and classifies the disease.

ISSN (Online) 2394-6849

International Journal of Engineering Research in Electronics and Communication Engineering (IJERECE)
Vol 4, Issue 2, February 2017

## V. CONCLUSION

The identification of disease through this method increases the accuracy and speed. Hence, the fast interpreting algorithm helps the plant maintainer to identify the diseases. In future, the work can be developed as hybrid algorithm such as genetic algorithm and neural networks in order to improve the classification process.

## REFERENCES

[1] J.D. Pujari, R. Yakkundimath, and A.S. Byadgi, "**Image Processing Based Detection of Fungal Diseases in Plants**," in Proc. International Conference on Information and Communication Technologies, India, 2015, pp. 1802–1808.

[2] S.K. Pilli, B. Nallathambi, S.J. George, and V. Diwanji, "**eAGROBOTA Robot for Early Crop Disease Detection using Image Processing**," in Proc. IEEE International Conference on Electronics and Communication Systems, India, 2014.

[3] R. Oberti, M. Marchi, P. Tirelli, A. Calcante, M. Iriti, and A.N. Borghese, "Automatic detection of Powdery mildew on grapevine leaves by image analysis: Optimal view-angle range to increase the sensitivity," Computers and Electronics in Agriculture, vol. 104, pp. 1-8, June 2014.

[4] T. Rumpf, A.K. Mahlein, U. Steiner, E.C. Oerke, H.W. Dehne, and L. Plümer, "**Early detection and classification of plant diseases with Support Vector Machines based on hyperspectral reflectance**," Computers and Electronics in Agriculture, vol. 74, no. 1, pp. 91-99, Oct. 2010.

[5] N.Otsu, "A **Threshold Selection Method from Gray-Level Histograms**," IEEE Transactions on Systems, Man, and Cybernetics, vol. 9, No. 1, pp. 62-66, Jan. 1979.

[6] Surender Kumar, Rupinder Kaur, **"Plant disease detection using Image processing- Review"**, International Journal of Computer Applications(0975-8887), Volume 124- No.16, August 2015.

[7] Sanjay B. Dhaygude, Nitin P. Kumbhar, **"Agricultural plant leaf disease setection using Image processing"**, International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering(ISSN: 2278- 8875), Vol. 2, Issue 1, January 2013.

[8] V. Surenderbabu, C.P. Sumathi, E. Umapathy**, "Detection of Rice Leaf Diseases Using Chaos and Fractal Dimension in Image Processing**", International Journal on Computer Science and Engineering (IJCSE), ISSN : 0975-3397 Vol. 6 No. 01 Jan 2014.

[9] Khushal Khairnar, Rahul Dagade, **"Disease detection and diagnosis on plant using image processing – A Review"** , International Journal of Computer Applications (0975 – 8887) Volume 108 – No. 13, December 2014.

[10] Y.Sanjana, AshwathSivasamy, SriJayanth, **"Plant Disease Detection Using Image Processing Techniques"**, International Journal of Innovative Research in Science, Engineering and Technology (An ISO 3297: 2007 Certified Organization) Vol. 4, Special Issue 6, May 2015.