**IOSR Journal of Engineering (IOSR JEN)** **www.iosrjen.org**
ISSN (e): 2250-3021, ISSN (p): 2278-8719
PP 26-28

# Plants' Leaf Diseases Detection Using Digital Image Processing

Atharva Jadhav[1], Nihal Joshi[2], Satyendra Maurya[3], Aasif Sudiwala[4] , Prof. Disha Bhosle[5]

[1]*(Department of Electronics, Atharva College of Engineering, Malad-West, Mumbai-400095,*
[2]*(Department of Electronics, Atharva College of Engineering, Malad-West, Mumbai-400095,*
[3]*(Department of Electronics, Atharva College of Engineering, Malad-West, Mumbai-400095,*
[4]*(Department of Electronics, Atharva College of Engineering, Malad-West, Mumbai-400095,*
[5]*(Department of Electronics, Atharva College of Engineering, Malad-West, Mumbai-400095,*

***Abstract:*** *In agriculture field identification of plant disease is very difficult . If identification is incorrect then there is a huge loss on the production of crop and economical value of market. Leaf disease detection requires huge amount of work, knowledge in the plant diseases, and also require the more processing time. So we can use image processing for identification of leaf disease in MATLAB. Identification of disease follows the steps like loading the image, contrast enhancement, converting RGB to HSI, extracting of features and SVM.*
***Keywords:*** *Digital Image processing, Plants leaf diseases, Matlab.*

## I. Introduction

The agricultural land mass is more than just being a feeding source in today's world. Indian economy is highly dependent on agricultural productivity. Therefore in agricultural field, detection of disease in plants plays an important role. To detect a plant disease in very initial stage, use of automatic disease detection technique is beneficial. For instance a disease named little coconut leaf disease is a hazardous disease found in coconut trees in India. The affected tree has stunted growth. Its impact is found in Maharashtra, Kerela and southern parts of India. In such situations early detection could have been fruitful.

The existing method for plant disease detection is naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of plant is required, which very expensive when we do with large farms. At the same time, in some countries, farmers do not have proper facilities or even idea that they can contact to experts. Due to which consulting experts also cost high as well as time consuming too. In conditions like this, the suggested technique proves to be beneficial in monitoring large fields of crops. Automatic detection of the diseases by just seeing the symptoms on the plant leaves makes it easier and cheaper too. This also supports machine vision to provide image based automatic process control, inspection, and robot guidance.

Plant disease identification by naked eye is more laborious task and at the same time, less accurate and has area limitations. Whereas in automatic detection technique it will take less efforts, less time and become more accurate. Some general diseases seen in plants are early and late scorch, brown and yellow spots, and others are fungal, viral and bacterial diseases. To determine the difference in the color of the affected area, image processing method is used.

Image segmentation means separating or grouping of an image into different parts. Currently there are many different ways of performing image segmentation, i.e. the simple thresholding method or an advanced color image segmentation method. These parts normally relate to something that can easily be separated by humans and viewed as individual objects. Computers don't have any means of intelligently recognizing objects, and so many different methods have been developed in order to segment images. The segmentation process is based on various features found in the image. This can be color information, boundaries or segment of an image

## II. Related Works

Various phases of implementation are namely data-set creation, feature extraction, training the classifier and classification. The data-sets which are created of diseased and healthy leaves are trained together under Random Forest to classify the diseased and healthy images. For extracting features of an image Histogram of an Oriented Gradient (HOG) is used. Overall, machine learning is used to train the large data sets which are available publicly, giving us a clear way to detect the disease present in plants in a colossal scale. [1]

In a deep learning approach for on-site plant leaf detection paper, it was proposed that leaf localization method from on-sit wide-angle images with a deep learning approach. Our method achieves a detection performance of 78.0 percent in F1-measure at 2.0 fps. [2]

The main approach used in practice for detection and identification of plant diseases is using naked eye for observation through experts. The capability of making decisions of an expert also depends on his/her physical

condition, such as fatigue and eye sight, work pressure, climate etc. So this method will be time consuming and less efficient. Here, a project is proposed with an idea of detection of plant diseases using image processing. Image processing tool of Matlab is used to measure the affected area of disease and to determine the color of the disease affected area. This concept can be upgraded to detect the symptoms of various types of plant diseases that is affected on different variety of crops. The algorithm is used to classify the leaves and the results are separated using Arduino based conveyor belt system. Thus reducing an important task of monitoring the farms crops at very early stage itself to detect the symptom of diseases appear on plant leaves. [3]

## III. Proposed Methodology

Camera of smartphone or devices like webcams are use to take images of leafs of different types, and then those images are used to identify the affected area in leafs. Then different types of image-processing techniques are applied on them, to process those images, to get different and useful features needed for the purpose of analyzing later.

Given below is the agorithm illustrated which is the step by step approach for the proposed image recognition and segmentation processes:

(1) A camera is used to acquire the image of the leaf.

(2) The input image is preprocessed to improve the quality of image and thus removing the undesired distortion from the image. Clipping of the leaf image is performed to get the required image region and then image smoothing is done using the smoothing filter. Image enhancement is also done to increase the contrast.

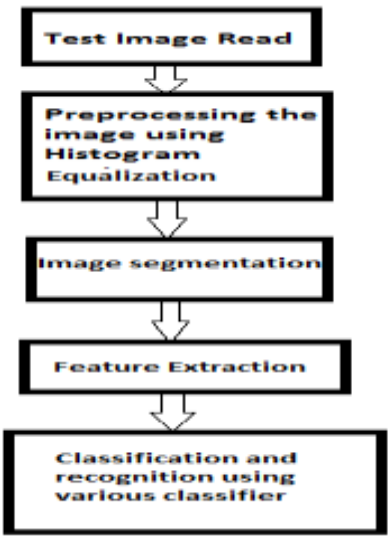


**Fig. 1** Block diagram

(3) Green colored pixels, in this step, are mostly masked. In this, a threshold value is computed that is used for these pixels. Then in the following way mostly green pixels are masked: if pixel intensity of the green component is less than the pre-computed threshold value, then zero value is assigned to the green, red and the blue components of the pixel.

(4) In the infected clusters, the masked cells are removed inside the boundaries.

(5) The useful segments are obtained to classify the leaf diseases. Segment the components using genetic algorithm

For doing the clustering process appropriately, the search capability of GAs can be used, to set the unlabeled points in N-dimension into K clusters. On image data,the same idea has been applied in our proposed scheme. A color image of size m × n is taken and every pixel has Red, Green and Blue components. Every chromosome gives a solution, which is a sequence of K cluster centers. Initialization of population in various rounds is randomly done and from existing chromosome the best chromosome survives in each round for the next round processing.

## IV. Advantages And Limitations

- **Advantages:**

1. Proposed method is fully automatic.
2. Due to availability of database large number of diseases can be detected.
3. The detection accuracy is enhanced with proposed algorithm as compared to traditional method.
4. It can give precise information about treatment.
5. It is economical.

- **Limitations:**

1. Database extension is needed in order to reach more accuracy.
2. Image quality shoul be appropriate.

## V. Conclusion

This concludes that the older method of detecting diseases in leaves is irrational. Thus stating that new methods are required for detection. One of this methods is image processing. Image processing is a lot quicker, easier method. The given paper reviews and summarizes image processing techniques for several plant species that are used for recognizing plant diseases. The major techniques for detection of plant diseases are: K-means clustering, SVM etc. The review suggests that this disease detection technique shows a good potential with a power to detect plant leaf diseases. Therefore, there is scope of improvement in the current research. Future changes and developments in algorithms, devices can lead to even better performances.

## References

[1]. Shima Maniyath, Vinod PV, Nivedita N, Pooja R, Prasad Bhat N, Shashank N et al., "Plant's diseases detection using machine learning", 2018 International Conference on Design Innovations for 3Cs Compute Communicate Control (ICDI3C), 16th August 2018, DOI: 10.1109/ICDI3C.2018.00017

[2]. Leaf Diseases and Auto Medicine" , 2018 32nd International Conference on Advanced Information Networking and Applications Workshops (WAINA), 23rd Channamallikarjuna Mattihalli, Edemialem Gedefaye, Fasil Endalamaw, Adugna Necho, "Real Time Automation of Agriculture Land, by automatically Detecting Plant July 2018, DOI: 10.1109/WAINA.2018.00106

[3]. Sa'ed Abed , Anwar Ali Esmaeel, " A novel approach to classify and detect bean disease based on image processing", 2018 IEEE Symposium on Computer Applications & Industrial Electronics (ISCAIE),9th July 2018, DOI: 10.1109\ ISCAIE.2018.84054

.