

# A Review Paper on Detection of Leaf Diseases using Digital Image Processing

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DOI: <http://doi.org/10.5281/zenodo.2529164>

## Abstract

Image processing plays important role to analysis images in agriculture Field. Crops can be automatically analysed which gives best results and it will save cost and time .This analysis may helpful for the farmers to get expert knowledge and advice which is not readily available.Mechanical advances inside the improvement of accuracy agribusiness apparatus and programming framework would then be able to end up being less expensive and quicker than on-ground human mediation and data gathering. Many algorithms are available for the detection of plant leaf diseases. The objective of this paper is to give a brief review about the diseases which occurred in pants. Various image processing techniques like Pre-processing, Segmentation, Feature Extraction, Classification can be used to analyse plant disease.

**Keywords:** Leaf disease- Segmentation-Clustering- SVM- ANN

## INTRODUCTION

Digital image processing along with computer based methods are used to perform processing on digital images effectively. It consists of various methods with the help of computer Aided Diagnosis tool in order to avoid factors such as noise and distorted signal in entire process. Image processing is an important factors in agriculture which is used to analyse the plant disease with greater accuracy. In order to find out plant diseases at early stage which is extremely effective to do Identification and Recognition.

Plants are fundamental wellspring of energy and just an essential asset to the issue of a worldwide temperature alteration. The harm caused by developing, re-rising and far reaching species is critical in plant frameworks and prompts potential misfortune monetarily.

The infections are spreading overall making harm the ordinary working of the plant and furthermore harming the money

related condition by fundamentally diminishing the amount of plants .Farmers gauge the sicknesses by their experience yet this isn't appropriate way. The fundamental methodology received by and by for location and ID of plant maladies is stripped eye perception of specialists. The basic leadership ability of a specialist likewise relies upon his/her physical condition, for example, weariness and visual perception, work weight, working conditions, for example, ill-advised lighting, atmosphere and so on. That is the reason this is certainly not a legitimate way and furthermore tedious. It may be costly as ceaseless checking of specialists in substantial homesteads. In this way, we require a quick way and remote detecting structure to shield the harvest from infection.

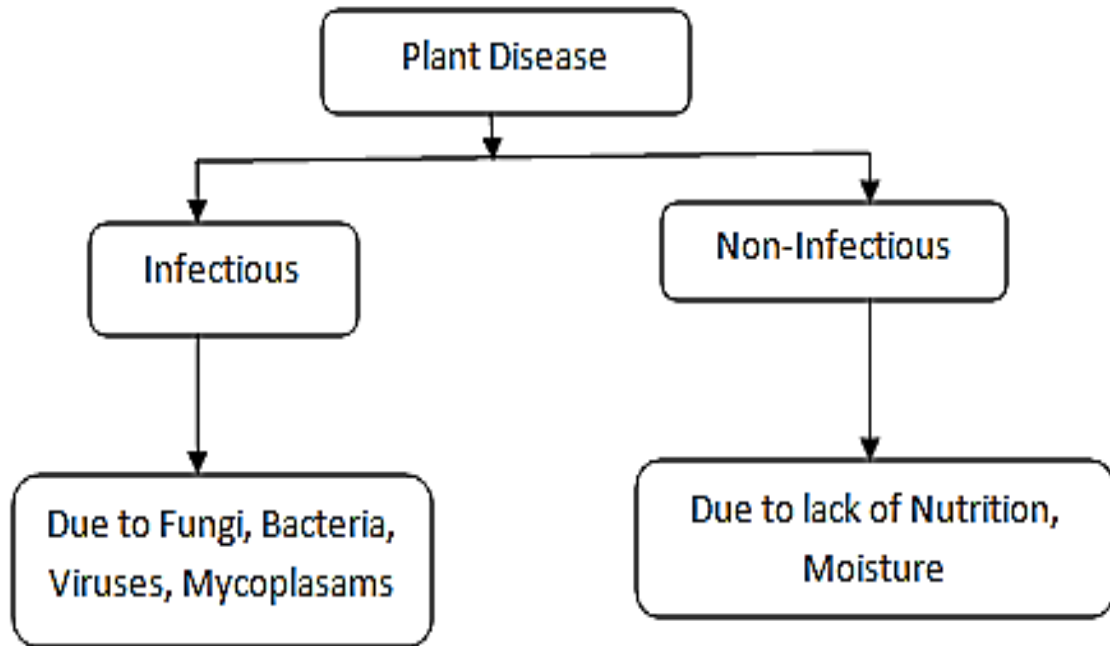
The diseases are for the most part on leaves, stem and products of plant. The ailments are viral, bacterial, contagious, maladies because of creepy crawlies, rust and so forth on plant. This can be valuable for the agriculturists to recognize the

infections in plants at beginning times.

The basic steps followed to find the disease in plants

1. Identification of Plants
2. Detection of Affection portion
- 3.

Cropping the regions 4 .Desired Features can be extracted 5. Analyse the plant disease. Fig.1. shows that types of plant disease.



*Fig.1: Types of Plant Disease*

**LITERATURE REVIEW**

R Anand, S. Veni, J.Aravinth [1] proposed a strategy to decide brinjal leaf ailment utilizing picture preparing and ANN. To distinguish brinjal leaf malady which is a most essential sickness happened in plants. This will decrease production of brinjal. Around 80% to 90% of disease which occurred in brinjal leaf .This paper tell about the disease occurred in the brinjal leaf not with plant. This paper also has clustering algorithm. This paper works with Artificial Neural Network to find out the disease in plants.

SantanuPhadikar and Jaya Sil [2] proposed a method to detect brinjal leaf disease which has software based system and which also used median filtering

method for image growing and segmentation of image.The paper [3] tells proposed amethod on image based detection on rice plants. Images can be obtained using digital camera. Pre-processing steps were done to find out the infected parts on rice plant. Using neural network infected rice plant has been classified. The methods evolved in this system are soft computing technique to find out the infected rice plant.

The paper [4] point out the ways used to predict diseases in leaves. The picture is portioned by K-implies bunching procedure and conceal the green pixels esteem and expel the green veiled pixels and acquired the limit estimation of

protest by Otsu's technique. The RGB pictures are sets the zero an incentive for changing over shading co-event system. After that tainted groups was changed over into Hue Saturation Value (HSV) and for surface investigation utilize the SGDM lattice for each picture arrangement. At last the perceive the procedure was execute the arrangement by Neural Network.

The paper [5] proposed a statistical algorithm to find out leaf diseases .First color image (RGB) is converted into HSV pixels. Thresholding level can be computed .Segmentation can be followed for 32x32 pixel size image. By using Color co-occurrence Matrix (CCM) desired segments can be obtained. At last texture parameters can be compared with normal leaf parametersthe proposed [6] system has four stages; the first is the enhancement which has HIS transform, intensity adjustment and histogram analysis. The second is by means of c-means technique. Third one is Feature extraction which is used to find out three features namely shape, size and color. Then fourth is classification which has Back Propagation Neural Networks (BPN). The paper [7] will advise about different division strategies accessible to discover plant ailment. Programmed location of malady can prompt quick and best outcomes to the agriculturist to yield more items.

A method has been proposed [8] to detect plant disease at early stage and accurately which use diverse Image processing techniques like Gobar Filtering and ANN. The work starts with Image capturing. At that point it is pursued with separated and fragmented utilizing Gobar channel calculation. Surface and shading highlights can be extricated from the above fragmented picture. ANN is

prepared by picking highlight esteems that is useful to separate the uninfected and infected examples fittingly. Experimental results proved that 91% of better accuracy is obtained by ANN while it is used for classification.

In the proposed paper [9] Support vector Machine (SVM) and k-implies grouping based order strategies to distinguish sickness in plants at beginning period.

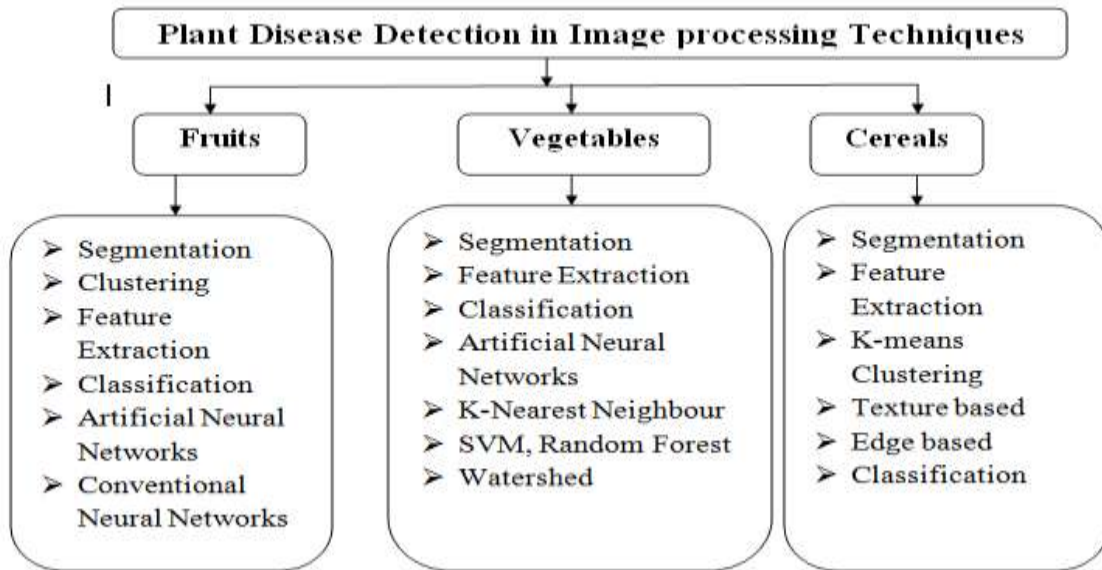
The paper [10] various lesion areas were separated using segmentation techniques, scaling done based on percentage of damaged area and to label the affected part of fruits, Artificial Neural Network is used. Fruits classification can be done by using two phases 1.segmentation 2.Run length Matrix(RLM)

The paper [11] proposed a method which is to approximate the disease caused in stem, leaf because an eye on a scale based reading will affect the value.

In this paper [12] the symptoms of disease in plants will prove that it is infected with different areas of plants. Leaves are most widely infected area in plants.

In this paper [13] using Otsu method leaf portion was segmented.HSI color system, H part was chosen to section unwellness spot to scale back the disturbance of illumination changes and also the vein. Then, unwellness spot regions were divided by exploitation Sobel operator to look at unwellness spot edge.

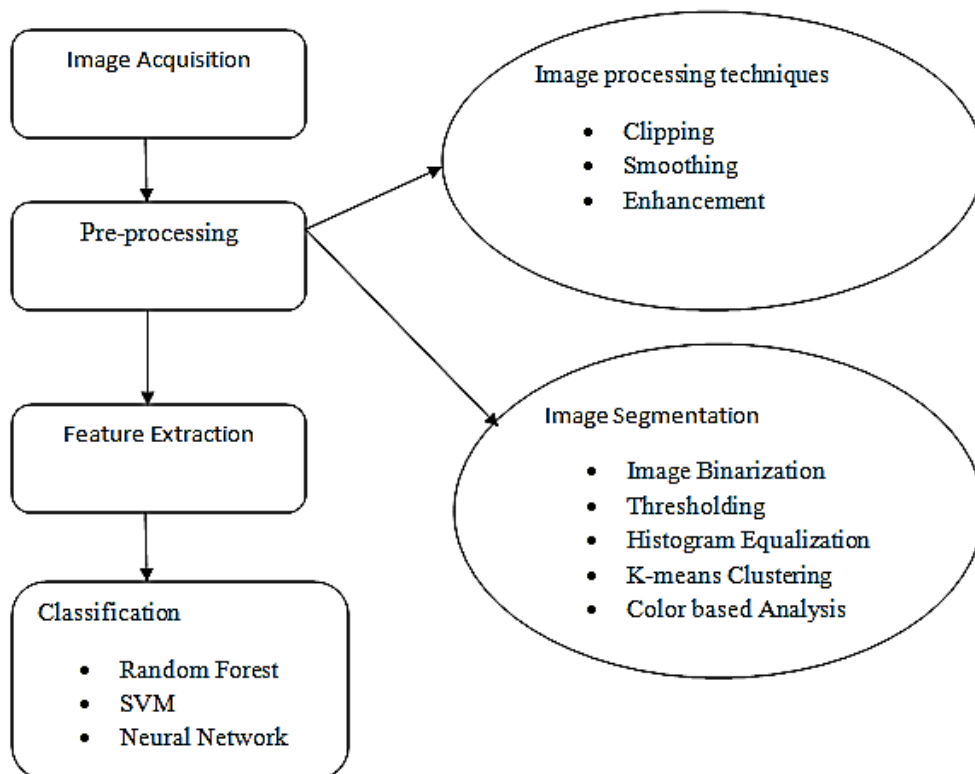
The Paper [14] proposed Carbon copy was collected and processes them with various algorithms that produce best results. This will helpful in geographical growth. The aim of this paper is to help and develop new techniques which are helpful for farming growth.



**Fig.2:** Plant Disease Detection in Image processing

The Fig.2 demonstrates that the distinctive sorts of plants infections and the picture preparing strategies anticipated by different creators to distinguish leaf ailments in plants. Plant disease detection using image processing techniques can be done on areas related with fruits,

vegetables and cererals. Some of the techniques used to detect plant disease are Segmentation, clustering, Feature extraction, Artificial Neural Networks, Edge based , SVM,Random Forest, Watershed algorithm, Conventional Neural Networks and Texture Based.



**Fig.3:** Various Image Processing methods

The above fig.3 demonstrates the different picture handling techniques used to recognize leaf infections in plants.

At first image acquisition can be done in which image will be captured. Then followed by Binarization the image which

converts the image to binary image. Using histogram equalization smoothening can be done. Then Region of Interest Selection must be carried out to find the infected area. Feature extraction is followed. Last step is to do classification by using classifiers.

**Table.1:** Various algorithms used in the review paper

Reference paper	Performance Measure(Algorithm used)
1	Clustering method, Artificial Neural Network
2	Median filtering for Image growing and segmentation
3	Neural Network
4	Otsu technique, HSV method
5	Statistical algorithm, Color co-occurrence Matrix(CCM) for segmentation
6	c- means technique, Intensity adjustment, Back Propagation Neural Network(BPN)
7	Different division strategies followed
8	Gobar Filtering, Artificial Neural Network
9	Support vector Machine, K-means clustering
10	segmentation ,Run length Matrix(RLM) , Artificial Neural Network
11	K-means Clustering
12	Support vector machine
13	Otsu method, HSI color system
14	Median Filtering

Table 1 Demonstrates various algorithms used to find out the plant, leaf disease used in the review papers. By using those algorithms efficient results are obtained. This is helpful for the farmers to predict plant diseases at earlier stage itself.

**CONCLUSION**

This paper presents different strategies utilizing in Digital Image Processing to identify ailment in plants. In the referred to papers over the creators used to state diverse calculations to distinguish infections in plants correctly. The critical job of picture handling procedure in plants is that the leaf malady is recognized at its beginning time. To improve the acknowledgment rate utilize Artificial Neural Networks. The techniques which expressed in above papers will spare time and delivered great outcomes. This will be increasingly useful for the ranchers to recognize their harvests at beginning periods.

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***Cite this article as:*** V.Ramya, & R.Devi. (2018). A Review Paper on Detection of Leaf Diseases using Digital Image Processing. Journal of Image Processing and Artificial Intelligence, 5(1), 1–6. <http://doi.org/10.5281/zenodo.2529164>