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A Review On: Plant Disease Detection Using Image Classification

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ABSTRACT

Crop cultivation plays a very important role in agriculture. The earth population is growing day by day. So, it has become important to grow a sufficient number of crops to feed such a huge population. Presently, Food is one of the basic needs of human being, the loss of food is principal because of infected crops, that reflexively reduce the assembly rate, productivity per unit space and reduction in quality of economic part of the crops, as a result of the 70-80 percent backout in yield of crops is because of diseases caused by varied micro-organisms like bacterium, virus and fungi. In this paper focus on image acquisition, image pre-processing, image segmentation, image clustering. We reviewed techniques used to detect plant diseases and provide solutions to recover from the disease different disease classification techniques that can be used for plant leaf disease detection by using image processing using K-means clustering algorithm.

Keywords: Disease Detection, Production Rate, Image processing, Infection Region.

I. INTRODUCTION

Agriculture is understood as the backbone of our country which means most of the folks square measure engaged towards agriculture trade in India. The agriculture trade acts as a major role within the economic sectors. Most of the plants square measure infected by variant plant and microorganism diseases because of the exponential inclination of population, the climate conjointly causes the disease. The key challenges of property development square measure to scale back the usage of pesticides, value to avoid wasting the surroundings and to extend the standard. The precise, correct and early designation could cut back the usage of pesticides. Nowadays, a brand-new idea of good farming has been introduced wherever the sphere conditions square measure controlled and monitored victimization the self in operation systems. The self-recognition of the disease is predicated on the identification of the symptoms of disease so that info regarding the disease prevalence can be quickly and accurately provided to the farmers, specialists, and researchers. This successively reduces the observation of an enormous field by the individual. The prevalence of the disease on the plant could end in the important loss in each quality yet because of the amount of agricultural product. In plants, some general diseases are brownish and yellow spots, or beginning and late scorch, and different fungal, viral and bacterial diseases.

Image processing is the method which is used for measuring the affected area of disease, and to determine the difference in the color of the affected area [7]. In paper texture and other characteristics are also used from a quantitative point of view.

II. LITERATURE SURVEY

The plant diseases Detection Journey Started in 1765, In 1767 Giovanni Targioni Tozzetti, who investigated the cause of famine in central Italy and discovered Puccinia graminis, the agent of the "rust" of wheat. At the Botanical Garden of Florence, the identification of dozens of cryptogamic parasites on other plants started in 1765.

In order to know about the previous research done in this direction, several studies dedicated to the topic were referred. The literature survey is done in chronological order from the year 2009 to 2019.

Ying, Gang, Li Miao, Yuan Yuan, and Hu Zelin. published paper on paper named as "A study on the method of image pre-processing for recognition of crop diseases" in 2009. this paper they studied about the strategies of image process. For that purpose, they used cucumber powdery mildew, speckle and downy mildews as study samples and to relate the main points of impact of straightforward and medium filter [8].

Gurjar, Ajay A., and Viraj A. Gulhane. published paper on paper named as "Disease detection on cotton leaves by eigenfeature regularization and extraction technique" in 2012. this paper they research about the regularization and extraction technology and describe the Eigen options of this technology and this technology offers additional accuracy than alternative detection feature technology [1].

Calderón R, Navas-Cortés JA, Lucena C, Zarco-Tejada PJ (2013) published paper on paper named as "High-resolution airborne hyperspectral and thermal imagery for early detection of Verticillium wilt of olive using fluorescence, temperature and narrow-band spectral indices". In 2013, in this paper they research about computerizes thermal imagery processing with the help of Verticillium wilt of olive using fluorescence [9].

Y. Q. Xia, Y. Li, and C. Li, published paper on paper named as "Intelligent Diagnose System of Wheat Diseases Based on Android Phone Dec. 2015. In this paper they obtain images of wheat diseases using Android phones and send images crossed the network to the server for disease analysis. After getting disease images, the server performs image segmentation by converting the images from RGB colour space to HSI colour space [4].

V. Singh, A.K. Misra, published paper on paper named as "Detection of plant leaf diseases using image segmentation and soft computing techniques" in 2017. this paper they research about plant diseases using advance computing and image segmentation [2].

Jyoti, Prince Kumar, published paper on paper named "A Brief Review on Plant Disease Detection Using Image Processing Techniques", this paper they research about Largely the detection and identification of the unwellness is detected once the unwellness advances to severe stage [3].

III. FUNDAMENTALS OF PLANT DISEASES

Different available techniques for plant disease detection can only identify the type of diseases which affect the leaf. Collects the Samples images are collected that comprised of different plant diseases like Alternaria Alternate, Anthracnose, Bacterial Blight, Cercospora leaf spot etc and Healthy Leaves. Diseases in plants cause major production and financial losses in agricultural trade worldwide. Observations of health and detection of diseases in crops is important for property agriculture.

The plant disease is a significant factor that diminishes the eminence and quantity of the plants. The common approach followed in plant diseases is the classification and detection model. Both the

organization and detection model are widely studied by the Engineering and IT fields.

A. Bacterial Diseases

The bacterial disease is generally referred to as the "Bacterial leaf spot". It is initiated as the small, yellow-green lesions on young leaves which usually seen as deformed and twisted, or as dark, water-soaked, oily appearing lesions on older foliage.

B. Viral Diseases

All viral disease displays some degree of reduction in production and the life of virus-infected plants is usually short. The various available symptoms of virus-infected plants frequently appear on the leaves, but some viruses may cause on the leaves, fruits, and roots. The viral infection is very difficult to analyse. Leaves are seen as wrinkled, curled and growth may be miniature due to the virus.

C. Fungal Diseases

Fungal disease can affect the contaminated seed, soil, yield, weeds and spread by wind and water. In the rudimentary organize it shows up on lower or more seasoned clears out as water-soaked, grey-green spots. Afterward, these spots are obscure and at that point, white fungal development spreads on the undersides. In wool build-up yellow to white streak on the upper surfaces of more seasoned clears out happens. It spreads outside on the leaf covering causing it to turn yellow.

IV. Disease Detection Method

In this section, we are study about the leaf disease prediction using the k-means clustering algorithm. This paper includes several steps Image Acquisition, Image Pre-processing, Feature Extraction, and neural network-based distribution [2]. It operates as follows:

- Image Acquisition
- Image Pre-processing
- Image segmentation
- Image Clustering

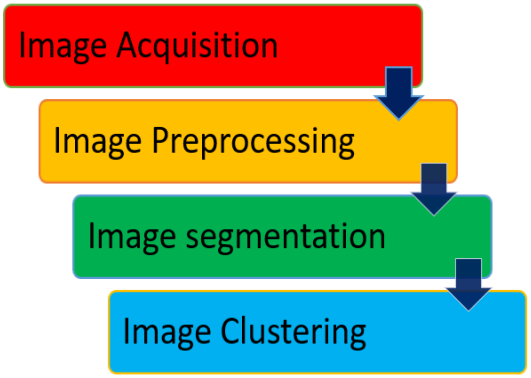

Fig 1. Proposed Methodology

A. Image Acquisition

The fundamental process is to collect data from the public repository. It uses the image as input for further processing. We have taken the most popular image domains so that we can take any formats like .bmp, .jpg, .gif as input to our process.

B. Image Pre-processing

As the images are collected from the real field it may contain dust, spores and water spots as noise. The purpose of data pre-processing is to reduce the noise in the image, so as to adjust the pixel values. It improves the quality of the picture. Images downloaded from the Internet were in multiple formats along with many resolutions and quality. In order to get better feature extraction, final images intended to be used as the dataset for deep neural network classifiers were pre-processed in order to gain consistency. Pre-processing images generally involves removing low-frequency background noise, normalizing the intensity of the specific particles' images, removing reflections, and masking pieces of images.

Image pre-processing is the method of enhancing data Moreover, the procedure of image pre-processing suggested cropping of all the images manually, making the intersection around the leaves, in order to highlight the region of share (plant leaves).

Fig 2. Image pre-processing

C. Image Segmentation

The segmented images are clustered into different sectors using the Otsu classifier and k-means clustering algorithm. Before clustering the images, the RGB colour model is transformed into the lab colour model. The advent of the lab colour model is to easily cluster the segmented images.

D. Image Clustering

In the image processing technique, Otsu's strategy is utilized to perform the clustering-based image Threshold.

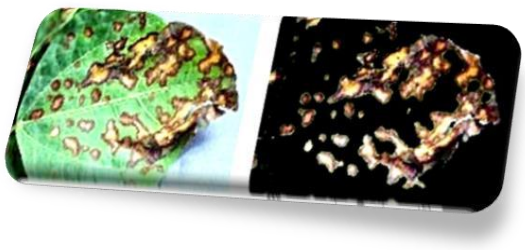

Fig 3. Image clustering

The diminishment of a gray level image into a binary image is created by Nobuyuki Otsu. This algorithm assumes the image contains two classes of pixels. It incorporates a bi-modal histogram (foreground pixels and background pixels). We can determine the optimum threshold by dividing the two classes and their combined range (intra-class variance) is negligible or equivalently.

V. CONCLUSION

Our review states that the detection of plant diseases area unit gaining increasing demand with technological advancement. Basically, the detection and identification of the infection is detected once plants can protect from the unwellness advances to a severe stage. Therefore, the loss in terms of yield, time and money. In this research we are studies about the fundamental's plant diseases like Bacterial Diseases, Viral Diseases, and Fungal Diseases and how to classify plant diseases using step by step processing plant diseases detection method.

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