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Detection of Plant Illness Using Machine Learning Algorithm

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Abstract **- The identification of the plant disease is crucial to obtain a good crop yield along with a good quantity of agricultural products. Detection of plant illness includes the research work of many farm-related factors such as organic farming, constant plant monitoring, and recognition of all diseases. In farms that contain entirely different crops, plant diseases cannot be tracked manually. This requires an enormous amount of work, plant disease expertise, and also a substantial amount of time. The image processing along with k-means clustering and convoluted neural networking algorithms could be used for the accurate prediction of the disease. The detection of the disease includes methods including image segregation, pre-processing data, fragmentation of the image, detection, and recognition of characteristics. This paper also examines the binding segmentation and retrieval functions of two different plant diseases.**

Index Terms**: — image processing, plant disease detection, k-means clustering algorithm, Convoluted Neural Network etc.**

1. INTRODUCTION

Farming accounts for approximately 17%of total GDP [1], providing more than 60 % of the population with employment. The recognition of plant diseases plays an important role throughout the agricultural climate. Indian farming involves plants such as maize, wheat, and so on. With its root and leaf energies, each of these plants is cultivated.

For research in plants with visually recognizable trends, the plant disease experiments apply. The control of plant health and diseases plays an important part in the effective cultivation of plants. In the early times, the person with experience in this field was assigned responsibility to track and examine plant disease manually. This requires a lot of work and considerable time for processing. Image processing methods can be used to diagnose plant disease, and algorithms can be used to predict two different plant diseases. The plant disease experiments apply to research on the plants with visibly identifiable trends. In this article, we have performed a survey on various diseases of plants and specific specialized techniques to diagnose these conditions.

In India about 70% of the populace relies on agriculture. Identification of the plant diseases is important in order to prevent the losses within the yield. It's terribly troublesome to observe the plant diseases manually. It needs tremendous quantity of labor, expertize within the plant diseases, and conjointly need the excessive time interval. Hence, image processing and machine learning models can be employed for the detection of plant diseases. In this project, we have described the technique for the detection of plant diseases with the help of their leaves pictures. Image processing is a branch of signal processing which can extract the image properties or useful information from the image. Machine learning is a sub part of artificial intelligence which works automatically or give instructions to do a particular task. The main aim of machine learning is to understand the training data and fit that training data into models that should be useful to the people. So it can assist in good decisions making and predicting the correct output using the large amount of training data. The color of leaves, amount of damage to leaves, area of the leaf, texture parameters are used for classification. In this project we have analyzed different image parameters or features to identifying different plant leaves diseases to achieve the best accuracy. Previously plant disease detection is done by visual inspection of the leaves or some chemical processes by experts. For doing so, a large team of experts as well as continuous observation of plant is needed, which costs high when we do with large farms. In such conditions, the recommended system proves to be helpful in monitoring large fields of crops. Automatic detection of the diseases by simply seeing the symptoms on the plant leaves makes it easier as well as cheaper. The proposed solution for plant disease detection is computationally less expensive and requires less time for prediction than other deep learning based approaches since it use s statistical machine learning and image processing algorithm.

The whole paper is organized as explained Literature Survey in section II, Section III discusses the types of diseases detection,. Section IV shows the methodology of

the project, Section V shows the Simulation Results The conclusion has been given of the discussed in Section VI.

2. LITERATURE SURVEY

In the past few years, various developments within the declining agriculture field have arisen and that fetched an honest supply of financial gain for the farmers. And one in every one of them will be an image process with machine learning algorithms. Pomegranate (Punica granatum) may be a deciduous tree fully grown in arid and semi-arid regions [2].

It develops well in areas of 25-35 degrees temperature and 500-800 millimeter annual downfall. Diseases have resulted in Brobdingnagian in developed pomegranate in recent years. Microorganisms like fungi, microbes, and viruses are sometimes liable for these diseases. Microorganism blight, seed stain, plant red, and leaf plot are the diseases [3].

Potato plants are straightforward to grow. they've fully grown virtually all told elements of the planet however many diseases have an effect on potato plants, however, the foremost common diseases are a blight, fungus wilt, and Rhizoctonia canker. These diseases are simply known and if treated early enough, the plants could also be saved. If the diseases don't seem to be caught early enough, the complete plant ought to be removed. These diseases are contagious and that they unfold from plant to plant simply. The diseases inflicting substantial yield loss in potato are Phytophthora infestans (late blight) and Alternaria solani (early blight). Early detection of those diseases will permit preventive measures and mitigate economic and production losses [4].

Over the last decades, the foremost practiced approach for detection and identification of disease is the optic observation by consultants. However, in several cases, this approach proves impracticable to the excessive time interval and inaccessibility of consultants at farms settled in remote areas [5].

Dhakate M & Ingole A. B. (2015). Used neural networks for the identification of the pomegranate plant diseases. Observation of plant diseases exploitation machine learning is associated with the Nursing rising field and has gained a huge impact in precise farming within the last decade. It will be used in the event of measurements of upper quality combined with advanced algorithms and therefore the improved chance of mixing many image sources into datasets [6]. The photos are sometimes delivered via satellite imagination, sensors, or digital cameras put in in fields or mounted on drones. During this case, segmentation may be a crucial part that primarily includes 2 stages: the primary stage includes separating the leaf (foreground) from different images related to sections (background). The second part, additionally referred to as the realm of interest or ROI segmentation, includes distinctive symptom region(s) from the leaf [6].

Islam, M. AnhDinh, Wahid, K., & Bhowmik, P. (2017). Detection of potato diseases exploitation image segmentation and multiclass support vector machines. He performed segmentations on the leaf of a potato plant to extract the latent characteristics by masking out the background and therefore the inexperienced region of leaves and thereby he extracted the Region of Interest (ROI). And by coaching the multiclass Support Vector Machine (SVM) the author can find the diseases of the plants [4].

Anand Singh Jalal et al. [8] used complete native Binary Pattern (CLBP) for illness detection in apple fruit. His projected approach consists of the k-means cluster rule for feature extraction and pictures were classified as an exploitation of the Multiclass support vector machine [7].

Gittaly Dhingra describes the application of agriculture exploitation laptop vision technology to spot and classify the illness of the plant leaf. The paper deals with the correlation between illness symptoms and therefore the impact on product yield. It additionally deals with increasing the amount of coaching information and testing to get smart accuracy [8].

3. TYPES OF DISEASES IN CLASSIFICATION

A. Early Blight Potato Leaf

Figure 1: Potato early blight leaf

Early Blight in potato plants- The illness chiefly affects leaves and stems, however below weather conditions, and if left unrestrained, it will contribute to important defoliation and increase the prospect of infection with the tuber.[10]

B. Late Blight Potato Leaf

Figure 2:late blight leaf

Late Blight in potato plants-Late blight is evoked by Phytophthora infestans, a fungus-like oomycete microorganism. This doubtless serious illness can infect foliage of potatoes and tubers at any purpose of growing crops [11].

C. Alternaria Of Pomegranate Leaf

Figure 3: Alternaria of pomegranate leaf

Alternaria: little achromatic circular spots seem on the leaves.

D. Anthracnose Of Pomegranate Leaf

Figure 4: Anthracnose of pomegranate leaf.

Anthracnose: seems like a little regular or irregular boring violet or black leaf spot with yellow halos. Leaves flip yellow and fall out.

E. Bacterial Blight

Figure 5: Bacterial Blight of pomegranate leaf.

Bacterial blight: look of 1 to many little water-soaked, dark-colored irregular spots on leaves.

4. METHODOLOGY

This section contains a machine learning and image processing framework for leaf disease detection. In this framework, a leaf image is used as the input. First of all, leaf images are preprocessed to remove noise. Noise removal is performed using the mean filter. Image enhancement is achieved by histogram equalization. Image segmentation divides a single image into multiple parts or segments. It helps in identification of image boundaries. Image segmentation is achieved by the Machine learning algorithm. Feature extraction is performed by principal component analysis. Then, image classification is performed by Machine learning algorithms. The block diagram is shown in Figure 1.

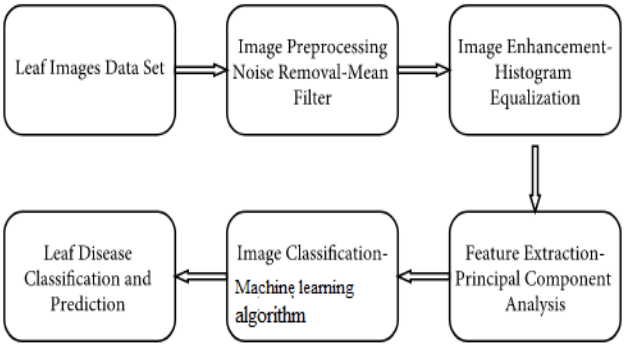

Figure 7: Block diagram of leaf disease detection by image processing and machine learning.

5. SIMULATION RESULTS

1. Detection of Anthracnose Disease

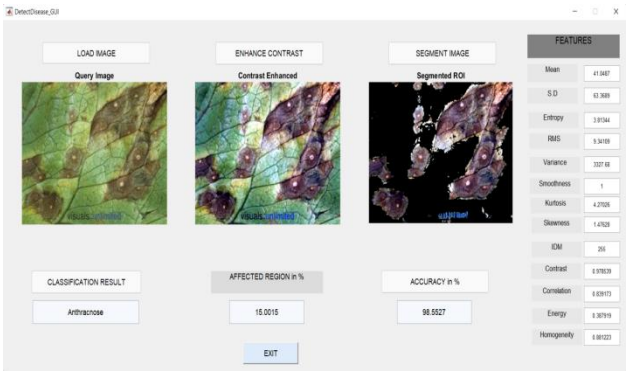

Figure 8: Anthracnose detection image

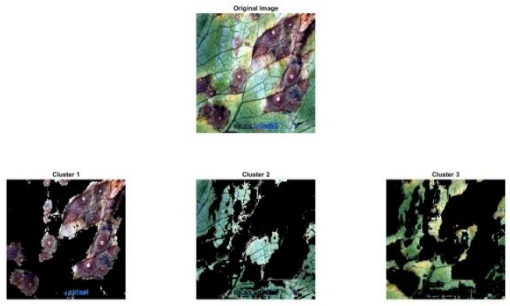

Figure 9: Segmentation of Anthracnose

2. Detection of Bacterial Blight Disease

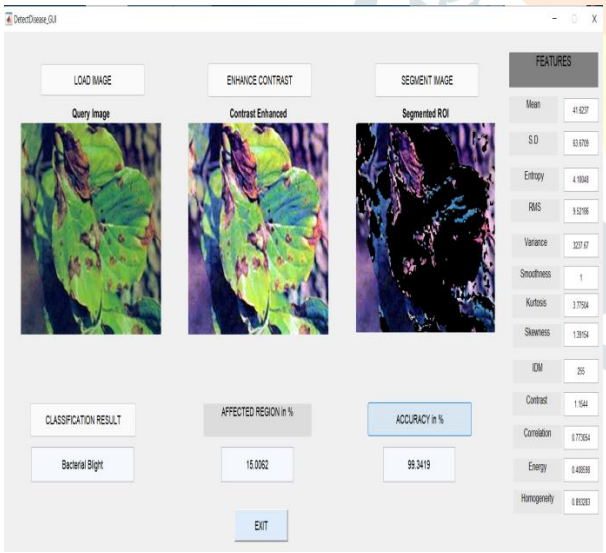

Figure.10: Bacterial blight disease image

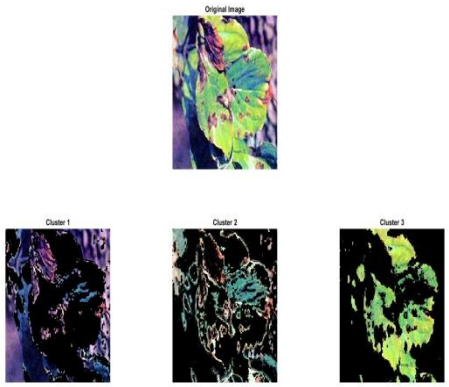

Figure.11 Segmentation of Bacterial blight image disease

3. Detection of Healthy Image

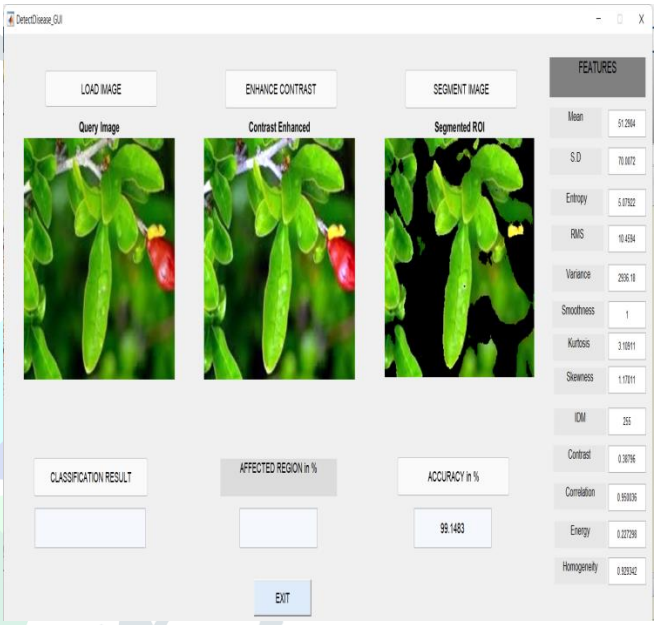

Figure.12: Healthy leaf image

Figure.13: Healthy leaf image segmentation

6. CONCLUSION

An automated disease detection system gives the farmer a quick and accurate diagnosis of the plant disease, allowing the diagnostic process to be sped up, so the farmer can get more crops out of his fields. As a result, it is very important

to make the disease detection system automated in order to speed up crop diagnosis. This paper talks about how to use machine learning and image processing to figure out if leaves are sick. As a starting point, this framework can be used with a picture of a leaf. To start with, leaf photos are cleaned up to remove any noise from them. In order to get rid of noise, the mean filter is used Segmentation is the act of breaking up a single picture into parts or segments. It can help you figure out how big the picture. In the next step, images are classified based on their content with help from algorithms performs better in accurate leaf disease detection.

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