

Lemon Leaf Disease Detection by employing Machine Learning

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ABSTRACT

The project aims is to detect the disease that occurred in the leaf of the lemon plant. Most of us cannot find the disease at the earlier stage manually. So automatic disease detection is essential to growing plants disease free. Though many previous systems have automatic detection of the diseases none of them suggest the corrective measures to treat the plants at the right stage. Our project lemon leaf disease detection helps to detect the disease automatically and also recommends pesticides to cure the diseased leaf. The CNN algorithm is used in our project for better training and accurate calculation. By capturing and uploading the image on a website, the disease, and treatment will be displayed on the page.

Keywords – Image Analyzation, Separation of Image axis, Minimization of Leaf, Predication of clear Image, Classification .

1. INTRODUCTION

The main problem in the agriculture field is a disease in the plant. It brings more disadvantages and damages the growth of the plant. Diseases present in the leaf can't be found by the naked eye. so, this type of technology is essential to build the agriculture field strongly. Farmers are very affected by plant disease, so this application helps us to minimize the disease and find a cure for it in a very short time. By using CNN in this process, accuracy of the detection of disease through the image processing technique is very high. The image of the leaf gets through various kinds of steps in the process. Because of using various modules such as segmentation, separation, minimization, and prediction can help to get high accuracy of detection and prediction. The Chan-vase algorithm is used in the image segmentation process to get a clear image after the process of segmentation.

2. EXISTING SYSTEM

The plant disease detection of the existing system only focuses on the crops. For example, the rice plant is

noticed as an unhealthy condition by the farmer take the picture of the particular plant and sending it to the respective department near their location. The farmer has to spend their time and money to know the results. The accuracy level is marked as 87.3%. These are the disadvantage of the existing system.

3. PROPOSED SYSTEM

To combat this problem we have designed a system, an Application designed to save the time and money of people. The application is processed as taking the picture of an unhealthy leaf and uploading the picture to the system. It will detect the disease and cure the detected disease. This is achieved in Fig 1.

4. FIGURES AND TABLES

1.Leaf categorization

- 1)Image analysis
- 2)Segmentation of leaf
- 3)Classification

3.1 Image analyzation

Image analysation performs image pre-processing, which is nothing but making use of computer steps to process the digital images. By proper training of the computer with the specific features, we can analyse the image and detect the diseases. This can be done by specific algorithm called RPN (Region Proposal Network). This is used to check the location of the leaf in the image. The main disadvantage here is, it can identify the location only when the image is clear.

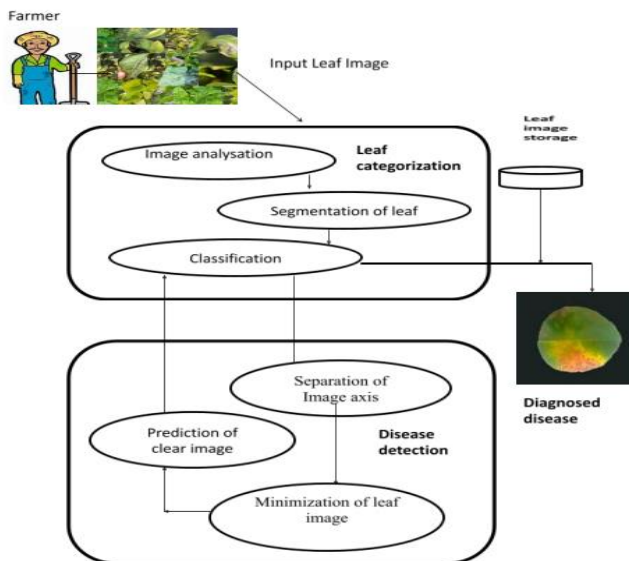


Figure 1 Disease detection Process in Leaf Image

3.2 Segmentation of leaf

This process takes the output of image analyzation as input and performs image enhancement which is nothing but converting the raw images to digital. To improve an image we can also use Histogram Equalization. To remove Noise we can use Filters, Unsharp mask filtering. Chan-vease algorithm is used. It partitions the digital image into multiple segments

2. Disease detection

- 1) Separation of image axis
- 2) Minimization of leaf image
- 3) Prediction of clear image

3.3 Separation of image axis

The main aim of separation of Image Axis is to Extract features from the image. The image is convolved with the Filter during this Transformation. A Filter is a kind of matrix where the image height and width is smaller than the image to be convolved. Separation of image axis is done in two ways. The first one is by extracting the x-axis, where the sharp edges and shapes of the leaf that are covered in x-axis can be detected and the next one is by covering the y-axis to detect the leaf. Finally, both axis are merged and get the idea of the image. The unwanted part in the image or uncleaned images are neglected in the process of separation of image axis. The separation of image axis helps to give a clear idea of the image by merging two ax, that is X and Y axis. After the completion of this process, the detected image goes under the next process called minimization of leaf image. Chan-vease algorithm is used. It partitions the digital image into multiple segments. In this process, the separation of axis is done by this algorithm.

3.4 Minimization of leaf image

Minimization of leaf image is done to reduce the size of the input image to reduce the network computations. By decreasing the size of image the computation process also gets reduced and the time taken to view the results is also reduced. In this minimization process, the input image is taken from the previous steps of separation of image axis. In this process, the disturbance and noise in the background are removed. The image is minimized by removing the excess part in the image of the leaf. The Specific part is taken into account to detect the disease in the leaf. It removes or minimizes the leaf for accuracy, this process is known as the minimization of leaf image. The output of this process is taken as input for the next process.

3.4 Prediction of clear image

Prediction of clear image, also known as linear layers, connects every input neuron to every neuron and is commonly used in neural networks. It connects each input neuron to every hidden neuron to give a clear leaf image. This process involves the steps of connecting the input neuron to the number of the hidden neuron. The input neuron is connected to every hidden layer neuron for the detection of a clear image. The accuracy of the prediction of the clear image is high because of the

connection of the neuron and the output neuron gives a clear image.

5. CONCLUSION

Existing systems have several disadvantages and the proposed system can overcome these drawbacks.

1. Save time and money by introducing an

TABLE

Test Case No	Input image	Quality of image	Condition	Pass/Fail	Expected output	Actual output
1	Diseased leaf image	Clear	Input image== stored image	Pass	Detect the disease and cure	Disease name is display with the treatment
2	Healthy leaf	Clear	Input image== stored image	Pass	It shows as healthy leaf	Healthy leaf and show as no disease found
3	Diseased/ healthy leaf	Not clear	-----	Fail	Not detected	Not detected
4	Diseased leaf	Clear	Input image!= stored image	Pass	Disease can't detected	Disease can't detected

Table 1 Testcase for detection process

application.

2. Disease is detected with a cure for it.

3. Accuracy is high by using CNN with many algorithms in this system.

We have developed the system with one thing in mind making good healthy plants available for all people at their reach allowing them to lead a good and happy life: In the future, we have planned to add some more features such as detecting disease by looking the whole area of

cultivation by introducing the disease detection of CCTV.

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