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Plant Disease Detection and Classification Using Image Processing Techniques

Minal Bari [1], Prajakta More [2]

U.G. Student, Department of E&TC Engineering, Zeal College of Engineering & Research, Narhe, Pune, India

Associate Professor, Department of E&TC Engineering, Zeal College of Engineering & Research, Narhe, Pune, India

ABSTRACT: India's agriculture is composed of many crops and according to survey nearly 70% population is depends on agriculture. Most of Indian farmers are adopting manual cultivation due to lagging of technical knowledge. Farmers are not aware of what kind of crops that grows well on their land. When plants are affected by heterogeneous diseases through their leaves that will effects on production of agriculture and profitable loss. Also effect on both quality and amount of agricultural production. Leaves are important for fast growing of plant and to increase production of crops. Identifying diseases in plants leave is challenging for farmers also for researchers. Currently farmers are spraying pesticides to the plants but it effects human directly or indirectly by health or also economically. To detect these plant diseases many fast techniques need to be adopt. we have done survey on different plants disease and various advance techniques to detect these diseases. In the agribusiness field, there are a few sorts of the infection that can attack and appear through the leaf. Leaf plant disease can be identified and classified utilizing advanced image processing. Leaves of the plant are utilized to decide the type of diseases that contaminates the crops. Farmers can make early choices which are they can analyze the leaf plant infection. Advanced Image processing could be a quick technique, consistent and more exact procedure for leaf plant malady discovery.

KEYWORDS: Image processing, Crops, Cultivation, pesticides, Plant diseases.

I. INTRODUCTION

Indian economy is dependent of agricultural productivity. Over 70% of rural homes depend on agriculture. Agriculture pays about 17% to the total GDP [1] and provides employment to over 60% of the population. Therefore detection of plant diseases plays a vital key role in the arena of agriculture. Indian agriculture is composed of many crops like rice, wheat. Indian farmers also grow sugarcane, oilseeds, potatoes and non-food items like coffee, tea, cotton, rubber. All these crops grow based on strength of leaves and roots.

There are things that lead to different disease for the plant leaves, which spoiled crops and finally it will effect on economy of the country. These big losses can be avoided by early identification of plant diseases. Accurate detection of plant disease is needed to strengthen the field of agriculture and economy of our country. Various types of Disease kill leaves in a plant. Farmers get more difficulties in identifying these diseases, they are unable to take precaution on those plants due to lack of knowledge on those diseases.

Biomedical is one of the fields to detect plant diseases. In current day among this field, the image processing methods are suitable, efficient and reliable field for disease detection with help of plant leaf images. Farmers need fast and efficient techniques to detect all types of diseases of plants that can save time. These systems that can reduce efforts and use of pesticides. For measurement of yields in agriculture different ideas are proposed by scientists with the help of laboratory and systems for efficient identification of plant leaf diseases.

II. RELATED WORK

The related work will be carried out with Image acquisition is that the very beginning that needs capturing a picture with the assistance of a photographic camera. Pre-processing of input image to enhance the standard of image and to remove the undesired distortion from the image. Clipping of the leaf image is performed to urge the interested image region and so image smoothing is completed victimization the smoothing filter to extend the distinction Image improvement is additionally done.

Mostly inexperienced coloured pixels, during this step, are masked. In this, we tend to computed a threshold worth that's used for these pixels. Then within the following manner largely inexperienced elements square measure masked: if pixel intensity of the inexperienced part is a smaller amount than the pre-computed threshold price, then zero value is appointed to the red, inexperienced and blue parts of the this element. In the infected clusters, within the boundaries, take away the covert cells. Obtain the helpful segments to classify the leaf diseases. phase the parts victimization.

III. METHODOLOGY

- **Digital camera image:**

    In this process, we obtain the Leaf images. The RGB color digital images are clicked by using a digital camera. The digitized images are of equal size each. It consists of diseases. Images are saved and stored. Here, in this algorithm we are taking ten different leaves having different diseases.

- **Image Pre-Processing and Segmentation:**

    This is the main task in which pre-processing and segmentation of the image is done before the image is used for the next process. The main aim of this procedure is to obtain the Binary image with noise free.

- **Image pre-processing**: this method is also known as image restoring. It enhances the feature of image. It is done to convert the image in appropriate form for testing. This method is also used to separate the foreground and background image.

    Image pre-processing includes many processes:-

    1. Filter image: By using any filter such as high pass filter, low pass filter and/or median filter.
    2. Crop image: This is done to make the image more clean and free from unwanted big background.
    3. Resize image: This task is for resizing the images that it can be fit easily100% on the screen

- **Image segmentation**: segmentation is the method by which we divide Leaf into the parts for further studies. The subdivision can be continued until we get the desired result.
- **Feature extraction:** Its main purpose is to take the extracted feature, for the meaning of image. It includes color, shape, edge, region and texture. Texture is the most important feature as per the researcher, targeting plant Leaf structure. Shape is the visual feature which is classified as Boundary based or Region based representation. Color tells us about brightness and intensity, its degree of purity. Region is considered as which part of an image is affected like here the ROI (Region of interest) is the defected part of Leaf which is not containing the green pixels and contains brown, yellow, Black or red shaded pixels. Also the edge detection is very important in this methodology to differentiate the Disease part and the normal part of the Leaf. The edge detection is done by many kind of values as sobel, canny, prewitt, Roberts and log. Here, in this algorithm we use the sobel and done the Binary gradient mask and Dilated gradient mask.
- **Disease detection:** This process the Disease of Leaf is detected and also we can classify Disease by it's Percentage in slight Disease, moderate Disease and heavy Disease.

IV. EXPERIMENTAL RESULTS

All the experiments are performed in MATLAB. For input data disease, samples of plant leaves like rose with bacterial disease, beans leaf with bacterial disease, lemon leaf with Sun burn disease, banana leaf with early scorch disease and fungal disease in beans leaf are considered. Fig. 1 shows the original images which are followed by output segmented images. Segmented image can be classified into different plant diseases.
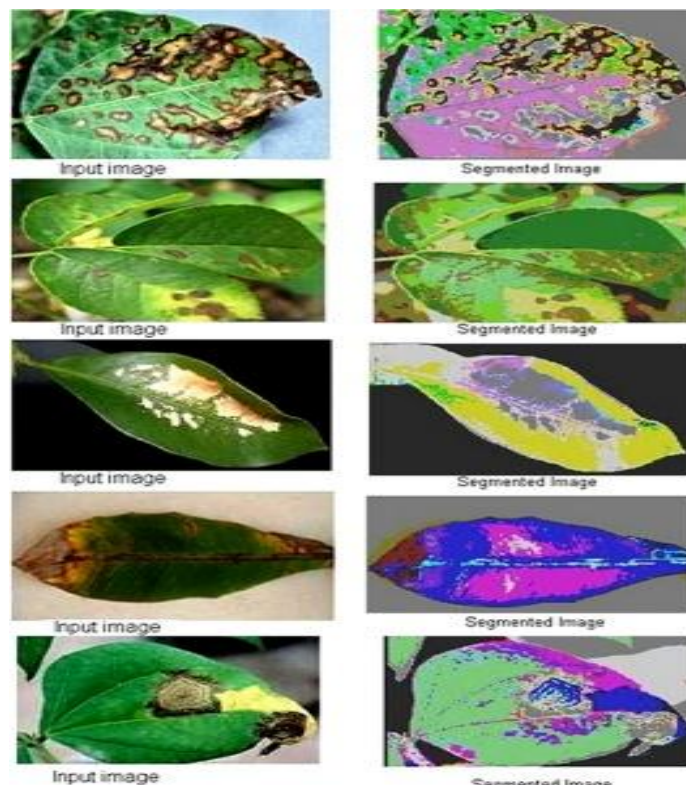
Fig.1 shows the input and output images of Different leaf's

V. CONCLUSION

In this project, we have introduced the basic knowledge of image processing. It is been concluded that the plant disease detection is the technique which detect infected part of plant.

There are two steps for plant detection which are used first one is image segmentation and another is feature extraction and classification is applied which will classify diseases and normal portion in the image. This system is very useful for farmers with minimum efforts. Farmers have require to capture the image of the plant leaf the usage of mobile camera and forward it to the DSS, without any additional inputs.

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