Application of Image Processing Techniques in Rice Crops for Disease Identification

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Abstract: Image processing has always proved to be the efficient apparatus for inspection in various fields and applications. Agriculture sectors where the frameworks like shade, product yield were the key features as of farmer's opinion. Most of the times expert's advice may not be economical and their services may take excess time. Image processing along with possibility of network for communication can change the situation of getting the advice from expert within some time and at fair cost. Many farmers are not in a situation to use optimal quantity of inputs for their crops that are essential for expanding the production. They may not be aware of the quantity of fertilizers that are required for crops and thus it may guide to biased use of fertilizers and they may also not know which pesticide/insecticide should be used for the infected crops. Hence the yield gets altered. The farmer clicks the image of the rice crops and sends it to the system. The image is then handled using the Image Processing techniques and the disease is identified. The particulars of the disease and the affected area along with the quantity of pesticide/insecticide will be sent to the farmers and the farmers can view the details in their application. This may provide benefits in observing wide fields of crops, and thus detects the signs of diseases as soon as they appear on rice plant leaves.

Keywords: Rice crops, Image acquisition, Image processing, Image segmentation, Feature extraction, Disease classification.

1. Introduction

Diseases in plant life are one of the reasons for the reduction of pleasant and quantity of agricultural plant life. Reduction in both capabilities can immediately or no longer without delay affect the overall production of the plant life in a country. The main trouble is a want of non-stop searching at the plants. Sometimes novice farmers are not aware of the illnesses and its happening period. Generally, diseases can arise on any plant and in any time. However, a continuous observing may stop sickness infection. Image processing strategies can be implied on external features of infected plants. However, the signs of illnesses range for unique plants. Each ailment has its own particular characteristics. Diseases vary in form, size, and coloration of disorder symptoms. Sometimes farmers get anxious and will not be able to take correct selections for choosing the pesticides.

Capturing the photographs of infected leaves from vegetation and assemble the facts about the sickness is a way to put off loss of crops due to infection. These photographs are then sent to device for inspection of illnesses. The device can become aware about the disease and offer information of the sickness and pesticide to be used. The system first erases the background in an image and then by using K-means clustering algorithm, it extracts the sickness quantities from the leaf. After the application of K-means clustering, a few undesirable green location is erased from diseased portion by the usage of thresholding technique. Support Vector Machine (SVM) model is used to distinguish the ailment.

2. Types of Rice Diseases

The disease that occurs in rice crops can lower grains quality. It can occur due to bacteria, viruses, or fungi. The extremity of the plant disease has different symptoms as described below:

A. Bacterial Leaf Blight

Bacterial blight is due to *Xanthomonas oryzae* pv. *oryzae*. It gives rise to drooping of seedlings, yellowing and drying of leaves. This disease most likely occurs in areas that have weeds and stubbles of diagnosed plants. It can also appear in tropical as well as temperate environments, especially in irrigated and rain-fed plain areas.

Fig. 1. Bacterial leaf blight

B. Brown Spot

Brown spot occurs at all stages of crop production, but the problem is most crucial during the maturation process of the rice crops. The most recognizable harm is the number of large spots on the leaves which can destroy the whole leaf. When bug occurs in the seed, unfilled seeds or rusted grains are

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formed. The infection can spread in regions with high humidity of 86−100% and temperature between 16 and 36°C. It is common in uninundated and nutrition less soil, or in soils that has chemical particles.

Fig. 2. Brown spot

C. Leaf Smut

Leaf smut occurs due to fungus Entyloma oryzae. The fungus produces slightly erected, pointed, black spots on both sides of leaves. The fungus is spread by floating germs. Leaf smut occurs in the growing season and causes small amount of loss. The disease is preferred by high nitrogen rates.

Fig. 3. Leaf Smut

3. Proposed System

In the proposed system at the beginning, the image is captured via farmer through the Android Application advanced for the farmer. The pictures are then uploaded by using farmer to the application. Then photograph is processed by means of the MATLAB for additional evaluation. The image-processing methods are carried out to the captured photo to extract features which might be required for in additional processing. Then, many analytical methods are implemented to distinguish the photos in keeping with the specific trouble at hand. The disorder kind is diagnosed and published by way of the MATLAB. The affected area is likewise displayed to understand the seriousness of the disease. The pesticides for the recognized disease and the amount of it to be carried out to plant can be regarded by farmer inside the app.

4. Methodology

A. Image Acquisition

The photographs of rice leaves can be harmed by exceptional illness like brown spot, bacterial leaf blight and leaf smut. Those images are taken by using digital camera or mobile phones with larger resolution. Three special types of rice leaves

were accrued to become aware of the sickness. The gathered samples of Bacterial Leaf Blight, Brown Spot and Leaf Smut were taken from rice plant leaf for in additional process.

B. Image Processing and Segmentation

Some of the photos are having weaknesses together with dim or susceptible contrast. The pictures are intensified by means of mapping the pixel of low and top threshold value to new pixel value to enhance the quality. Pixel intensity may be advanced for destiny processing and evaluation to regulate the visible impact. Next, intensity value is received by using the neighbouring pixels. The RGB photo is transformed into HSV color model. The background is eliminated in image and has best leaf element having ailment spots in it. K-means clustering algorithm is used for picture segmentation. Three clusters are acquired for a leaf photograph that is background of image, diseased portion, and green part of photograph. Image segmentation is the commonly used technique to get infected portion of the leaves. Thresholding is used to do away with the unwanted region in the diseased cluster that is obtained due to K-means clustering.

C. Feature Extraction and Classification

Factors in leaf have a first-rate role in classifying disorder to disorder. Choice of various capabilities need higher knowledge and evaluation of function values. Three various functions used are: coloration, composition, and form. SVM is an approach used for ailment distinction. It is also a supervised learning proposal. It now do not get hurt from the trouble that happens due to random weight assignments in Neural Network. It distinguishes the training data on the basis of classes that is the training class labels. Linearly separable classes can be located by using the hyperplane. The data points that are not linearly separable may be adjusted by the usage of right kernel function.

5. Result Analysis

The system is used to perceive and differ three rice illnesses like Bacterial leaf blight, Brown spot, and Leaf smut. At first the pictures are obtained from the farmer after which uploaded by means of the farmer with the aid of choosing the precise photograph of the leaf. On importing a photograph, the farmer gets a ID which has to be used later with the aid of them to test the end result for the image that has been uploaded. The photo is then processed using image-processing techniques and the sort of disorder present in rice crops is diagnosed. A software for figuring out the rice plant illnesses and obtaining the vital suggestions for preventing the ailment is implemented. By this approach, the rice plant illnesses may be detected at the beginning stage itself.

6. Conclusion

Control, quick and precise disorder finding plays a first-rate position in sickness recognition of rice crops. Most of the present image segmentation technique may not have

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computerized rice crop ailment recognition. So recently observed segmentation algorithm, that is k-means clustering, is used to vary the spotted location from background of image. The result says that an algorithm has made characteristic evaluation easier. In Future, there have to be a new method to draw out the shade through feature evaluation using various strategies and then to distinguish the sickness kinds from photograph classification.

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