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Paddy Plant Disease Detection and Controlling Using Python Software

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Abstract

Nowadays, it is essential to observe plant growth step by step and providing pesticides accordingly. Observing the environmental parameters such as moisture, humidity, and temperature, it is also important to find the plant diseases. This will increase the amount of agriculture product and prevents losses in the yield. This paper is all about developing a digital image processing technique to identify the diseases in the paddy plant. The digital image processing technique is used as it provides more accurate results. This proposed system uses python software.

Keywords: *Diseases, paddy plants, Arduino, python software, pesticides, Image processing.*

1. Introduction

The agricultural sector performs a critical role in monetary improvement by presenting an employment to the rural peoples. Monitoring of paddy plants from first step to final step is important that results increase of the yield. Paddy is the India's most important product and it also a very healthy food. They are different types of diseases that occur in the paddy plant and these diseases also occur in Wheat and Rye. Due to these diseases, 70 million people around the world are affected. This work focuses on recognizing paddy plant disease namely rice blast viral disease, Late blight and bacterial blight. For applying pesticides accurate detection and recognition has to be done. If the diseases are not detected at the early stage then there will be a huge loss in the production. The main intention of the proposed work is to detect as early as possible and prevent the disease to spread all over the field and also increase the production of the field.

2. Literature Review

In this paper [1] the author has proposed about tomato leaf disorder detection and type method are presented primarily based on a convolutional neural community with the gaining knowledge of vector quantization algorithm. The dataset encompass 500 tomato leaves images. Three special enter matrices have been obtained for R, G and B channels to start convolution for each image within the dataset. The bacterial spot, late blight, septoria leaf spot, and yellow curved leaf diseases have an effect on the crop high-quality of tomatoes. Automatic techniques for the category of plant diseases also assist taking motion after detecting the signs of leaf illnesses

In this paper [2] the author described the system, which uses a canny part detection approach for detection of the disease affected areas in the fruit after the segmentation of the image the usage of grab reduces segmentation. After segmentation, the edges of the affected fruit area are calculated in terms of pixels. Based on the range of pixel counts, the proportion of contamination in fruits is decided and based on the disorder with which the fruit is affected, the preventive measures; organic and chemical solutions are provided. This specifically discusses the pomegranate plant diseases.

In this paper [3] the author explains an overview of plants which can be laid low with heterogeneous diseases through their leaves and that will affect the manufacturing of agriculture and profitable loss. It also causes a decrease in each the quality and amount of agricultural manufacturing. For the increase of production crops leaves are very important. Identification of diseases in plants leaves is a very difficult task for farmers and also for researchers. Farmer's health is affected while spraying

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the pesticides on to the plants and that will reduce the life span of farmers.

In this paper [4] the author proposes an automatic detection of plant diseases by using digital image processing and machine learning methods. Timely and correct detection of plant illnesses is vital for crop exceptional and yield. Early analysis and intervention can lessen the price of plant illnesses and decrease the useless drug use. Leaf photos of various plant species have been accumulated and feature extraction was achieved from the pictures the use of the transfer studying method.

In this paper [5] the author describes unsupervised feature learning algorithm the usage of the convolutional autoencoder for the detection of plant diseases. The output of the autoencoders is then used as entering for SVM classifiers. The experiments confirm that using convolutional layers is more effective than the usage of fully connected networks for this task. There are advantages of using convolutional autoencoder i.e., no labelling of the data is required. In this paper [6] the author explains the KNN classifier which is a replacement of SVM classifier. K Nearest Neighbour (KNN) will increase the performance than the SVM classifier and this work is mainly focused on groundnut crop diseases. The main four diseases in the groundnut crop diseases are leaf spot, late leaf spot, and rust, bud necrosis. Nearest Neighbour (KNN) classifier mainly useful for the early detection of diseases in the crops. In this paper [7] the author proposes a work that uses image analysis and convolutional neural networks. Mainly it works on Android-based detection and classification system. The detected disease is sent as a message to the farmer. The contribution of information and communications technology (ICT) in agriculture provides more knowledge and helpful to young farmers to increase productivity.

In this paper [8] the author explains the proposed system which is designed as a mobile application and this work is mainly of capturing an image of plant leaf with all the required information and then sending information to the server. Digital image processing is done at the server-side and the infected image is obtained. This also includes field information. The camera which is used must be more than 10 megapixels.

In this paper [9] the author presents a drone-based IoT architecture that uses real-time records such as statistics acquisition and statistics analysis. Using the digital photo processing approach ailment detection is identified. By using a GPS sensor the position of the plant can be detected. This will display the analytic results in the field.

In this paper [10] the author proposes a light a neural network model for disorder detection and implementing it to the mobile application. All the process is done in the mobile application automatically. The classifier model is more used for accurate results. The smaller set data is used for the classifier model.

In this paper [11] the author explains the wireless sensor networks (WSNs) and also how to restrict power consumption. This residual energy of the sensors is used to construct. In this paper [12] the author describes the Face recognition technique. This technique is used to reduce errors in the manual system. Without human interface it is used and no chance for proxy attendance. In this paper [13] the author explains about optimization using a grey wolf algorithm. It is mainly for twitter sentiment analysis on demonetization. The TSA was mainly calculated by using gray wolf optimization calculations.

3. Proposed Method

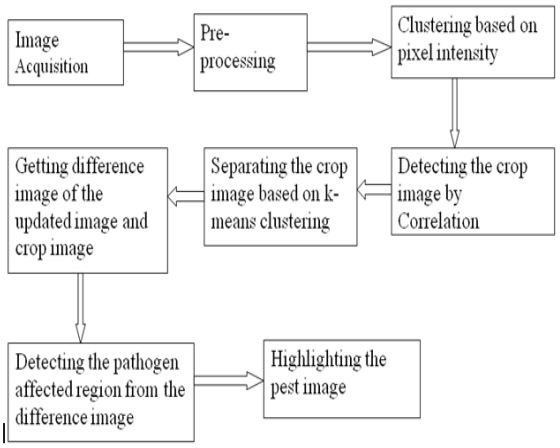

Figure 1: Block diagram of image processing

The disease affected leave is captured by using an IP webcam. To find the exact disease which is affected, the RGB of the collected image is required and should be clearly visible. This is the main process of image acquisition. In this proposed system all water motors are connected to their own networks are called WPAN. Both water motor and pesticide motor are connected to the microcontroller by using pump and these provide water and pesticides according to the input. Image is been checked up daily. If the input photograph is a good leaf photo water pump will get ON and if the input photograph is an infected leaf image the drugs pump receives ON. The process that divides image into segments and gets accurate values is called as image segmentation. Then the image is separated in simple to detect infected image easily. The input image is transformed into a binary code and accordingly the medicine pump will ON.

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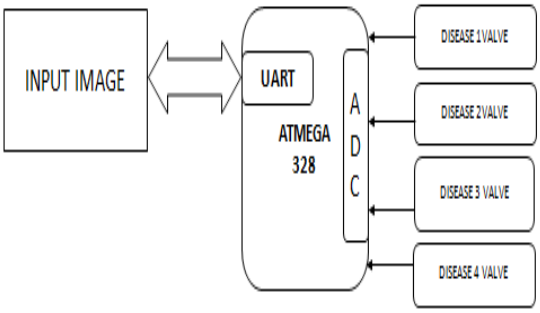

Figure 2: Hardware block diagram

There are different types of diseases in paddy plants such as
a)Viral diseases,
b) Leaf blast,
c) Bacterial blight

These are the main diseases that affect the paddy plant leaves. This can be controlled by providing proper pesticides in early stage. This is very useful to the farmers and increases the quality and quantity of the agriculture field.

4. Results

By using IP webcam paddy plants are scanned.

Figure 3: Scanning healthy paddy plant.

When healthy paddy plant is scanned no motor will on.

Figure 4: Scanning viral disease paddy plant.

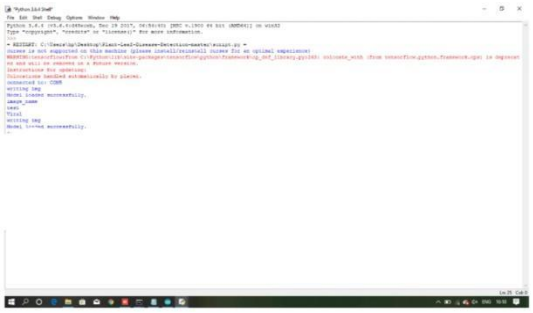

Figure 5: Identifying viral disease in paddy.

Figure 6: Scanning Late blight disease.

Figure 7: Identifying the Late blight disease type.

5. Conclusion

The proposed method is that detection of paddy plant leave diseases and controlling them by providing proper pesticides in the early stage. This is very useful to the farmers and increases the quality and quantity of the agriculture field. This eliminates the manpower in the field and also protects the life of farmers from pesticides. Paddy is most cultivated in India. This system detects the disease at an early stage. Mainly four types of diseases are discussed in this paper. In the future, the pesticides to the plant should be specified.

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