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LEAF DISEASE DETECTION USING IMAGE PROCESSING

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Abstract - *About 70 percent of the India economy depends on agriculture .Indian agriculture is diverse ranging from impoverished farm villages to developed farms utilizing modern agricultural technologies. Promoting application of modern information technology in agriculture will solve a series of problems facing by farmers like rainfall, temperature, the crop yield gets affected severely. Lack of exact information and communication leads to the loss in production. Our paper is designed to overcome these problems. This system provides an intelligent monitoring platform framework and system structure for facility agriculture ecosystem based on Remote Sensing. Development of automatic leaf disease detection system using advanced computer technology such as image processing help farmers in the identification of diseases at an early or initial stage and provide useful information for its control. It involves image processing like, image acquisition, image pre-processing, image segmentation, feature extraction and classification. The Indian population has tripled, but food grain production more than quadrupled there has thus been a substantial increase in available food grain per ca-pita. Latest agriculture practices have a great assurance for the economic development of a nation. So we have brought-in an innovative project for the welfare of farmers and also for the farms. There are no day or night restrictions. This is helpful at any time.*

Keywords: Image Processing, Morphisms, Feature Extraction and Deletion of Noise, Remote Network systems, Distributed applications, Smart Farming, IOT.

1. INTRODUCTION

Smart Agriculture developing model is a real time monitoring system It is use to monitor the soil properties like temperature, humidity of soil moisture using the moisture and temperature sensor. It is possible to control many operations of thefield remotely from anywhere, anytime by Remote Sensing, It offers an efficient use of energy. It applied in all areas of farming, including smart agriculture, health-care transportation and many more.
Development of automatic detection system using advanced computer technology such as image processing help to support the farmers in the identification of diseases at an early or initial stage when they scan there targeted leaf and provide useful information about solution for its control .Detection of leaf spot disease using following techniques such as image acquisition ,feature extraction, disease spot segmentation, image pre-processing , and disease classification were carried out by various workers . Proposed methodology like K-mean clustering, texture and colour analysis for plant disease detection in leaf. Algorithms were used for the detection of disease. Also explained the importance of pattern classification for disease identification.

2. LITURATURE SURVEY

2.1 Soil moisture determination using remote sensing data for the property protection and increase of agriculture production.

To provide geospatial data that enables generation of adequate information related to floods and droughts, we applied the remote sensing method that relies on the use of soil-moisture index (SMI) which in its algorithm uses the data obtained from satellite sensors. As presented by Hunt, the index is based on the actual content of water (), water capacity and wilting point. Multispectral satellite images from visible (red band) and infrared bands (near infrared and thermal bands) are essential for the calculation of the index.

2.2 A Brief Review on Plant Disease Detection using in Image Processing

Digital image process is the use of computer algorithms to perform image process on digital pictures. It permits a far wider vary of algorithms to be applied to the computer file and might avoid issues like the build-up of noise and signal distortion throughout process. Digital image process has terribly important role in agriculture field. It's widely accustomed observe the crop disease with high accuracy.

2.3An IoT Based Soil Moisture Monitoring on Losant Platform

The Internet of Things (IoT) is converting the agriculture industry and solving the immense problems or the major challenges faced by the farmers today in the field. India is one of the 13th countries in the world having scarcity of water resources. Due to ever increasing of world population, we are facing difficulties in the shortage of water resources, limited availability of land, difficult to manage the costs while meeting the demands of increasing consumption needs of a global population that is expected to grow by 70 percent by the year 2050.

2.4 Smart Farming: IoT Based Smart Sensors Agriculture Stick for Live Temperature and Moisture Monitoring using Arduino, Cloud Computing and Solar Technology.

The Agriculture stick being proposed via this paper is integrated with Arduino Technology, Breadboard mixed with

various sensors and live data feed can be obtained online from Thingsspeak.com. The product being proposed is tested on Live Agriculture Fields giving high accuracy over98 percent in data feeds.

3. METHODOLOGY

3.1 Image Processing

Doing study on the disease severity or harshness of leaf using image processing techniques. They used feature extraction methods such as threshold and triangular threshold methods. Identification of diseased leaf of brown and blast spot of leaf image processing techniques were carried out by. They used zooming algorithm, SOM neural network for disease detection.

The authors made investigation on diseases (for e.g. Early scorch, Ashen mould, Late scorch, Cottony mold and Ting whiteness diseases) of plants using K- Means clustering, Back propagation algorithm. Made study on diseases using image processing techniques which involves morphological processing, colour clustering. Leaf disease detection of orchid leaf (for e.g.) such as Black leaf spot and Sun scorch was carried out by. They applied pattern classification and border segmentation techniques for detection of diseased on leaf. The present work has been carried out for the automatic disease detection of plant leaf and provide solution about the diseases that solution can be provided using the deep study about the diseases and the soil moisture level detection and also the temperature level detection whether that crop get affected by which reason exactly to determined solutions.

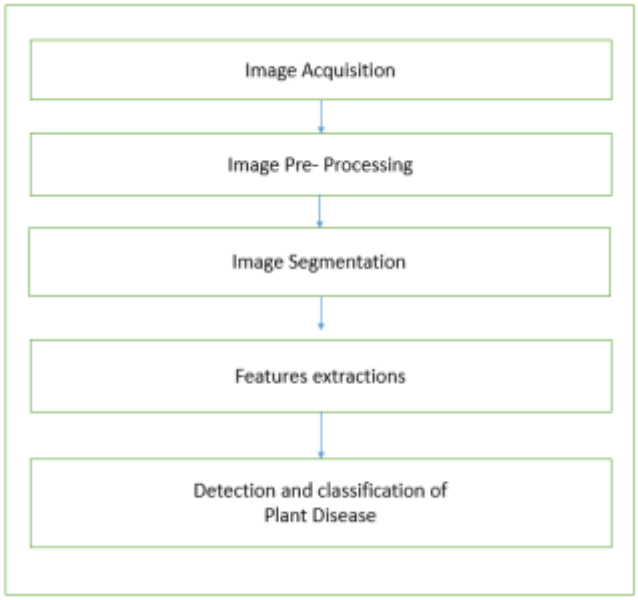

Figure 1: Image Processing

3.1.1Image acquisition

Image acquisition process is use to capturing the images with the help of digital camera. Our study focused on the diseased images of leaf which were stored in digital media for further MATLAB operations.

3.1.2 Image Pre- processing

Image Pre- processing is carried out to improve the quality of the image and remove the unwanted noise in image followed by clipping and smoothing of the image. The RGB images can be converted into grey scale images using colour conversion by the following formula. The image enhancement is carried out to increase the contrast. (x) = 0.2989*R + 0.5870*B + 0.114*B Then histogram equalization is applied in which the intensity of the image is distributed using cumulative distribution function.

3.1.3Image Segmentation

This method is used for the conversion of digital image into various segments having some similarity. Image segmentation helps in the detection of objects and boundary line of the image. In our study K- mean clustering is done for classification of objects based on a set of features into K number of classes. The classification is done by minimizing sum of squares of distance between data objects and corresponding cluster.

3.1.4 Feature Extraction

In feature extraction method features such as colour, texture, morphology and structure are used in plant disease detection. Colour co-occurrence method is used in which the texture and colour of the image are considered. The methods used in colour co-occurrence are firstly the RGB image of the leaves are converted into HIS colour space representation. For generation of colour co-occurrence matrix each pixel map is applied which results into three colour co-occurrence matrix one for each of H, S, I [1]. X = 0.5 (R-G) + (R-G) Y = (R-G)2 + (R-B) (G-B) = aces() H = if B¡G 360- B¿G S = 1- * [min (R,G,B)] I = (R+G+B)

3.1.5Classification

Classification is used in the interpretation of the extracted diseased region in an image which helps in the identification of the type of disease infection in leaves. In our analysis back propagation neural network (BPNN) is used which build association between known pattern of input and specific output. The input layer analyses the diseased region while the output layer specifies the disease outcome of the affected region. A hidden layer occurs in between the input and output layer which provides connecting link between the input and output images. It is applied to obtain least error in the classification of disease of the affected region.

3.2 Architectural Design

The smart agriculture model main aim to provide solution about leaf disease using sensors. It is low cost and efficient system is shown below. It includes Controller,Arduino, sensors like soil moisture and Temperature sensor.

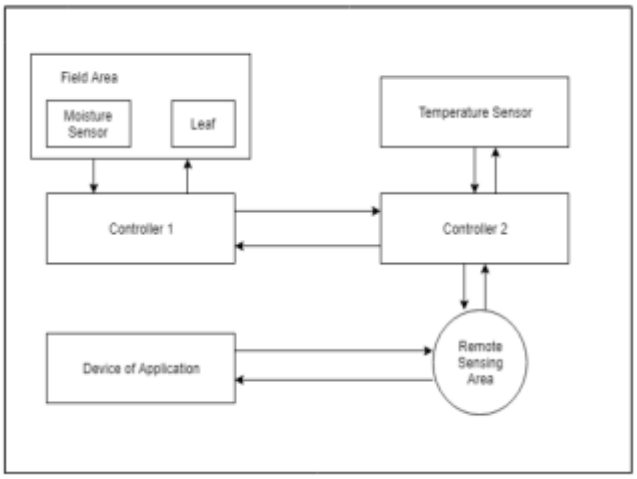

Figure 2: Architecture diagram

3.2.1Techniques on image processing

Diseases in plants cause major production and economic losses in agricultural trade worldwide. observation of health and detection of diseases in plants and trees is vital for property agriculture. To the most effective of our data, there's no device commercially accessible for period assessment of health conditions in trees. The classification strategies are often seen as extensions of the detection strategies, however rather than attempting to observe just one specific sickness totally different conditions and symptoms, these ones attempt to determine and label whichever pathology has effects on the plant.

3.2.3Neural Networks

This is the strategy to segmentation of the photographs into leaf and background within the following variety of size and colour options are extracted from each the RGB and HSI representations of the image. Those parameters are finally fed to neural networks and applied mathematics classifiers that are accustomed confirm the plant condition

4. CONCLUSIONS

The present study deals with automatic disease detection of plant leaf using image processing techniques. It involves image acquisition, image pre-processing, image segmentation, feature extraction and classification. Development of automatic detection system using advanced computer technology such as image processing help to support the farmers in the identification of diseases at an early or initial stage and provide useful information for its control.

The smart agriculture using controller has been experimentally proven to work satisfactorily by monitoring the values of humidity and temperature successfully. Through the controller control the motor in the field. It also stores the sensor parameters in the timely manner. This will help the user to analyze the conditions of various parameters in the field anytime anywhere. Then control or maintain the parameters of field properly. Finally, we conclude that automatic disease detection system is more efficient than traditional detection process.

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