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Plant Disease and Pests Detection for Precision Agriculture using Deep Learning

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ABSTRACT: India is an agriculture country and above seventy percent of our population depends on the agriculture. One-third of our national income comes from agriculture. Agriculturalist are facing loss due to various crop disease and it becomes tedious to cultivators to monitor the crop regularly when the cultivated area is huge(acres).So the plant disease detection plays an very important role in agriculture field. Timely and accurate disease detection is important for the loss caused due to crop diseases which affects adversely on crop quality and yield. Early diagnosis and intervention can reduce the loss of plant disease and reduce the unnecessary drug usage. Earlier, automatic detection of plant disease was performed by image processing. For disease detection and classification we are using machine learning mechanisms and image processing tools. Crop disease will be detected through various stages of image processing such as image acquisition, image pre-processing, image feature extraction & feature classification. For image feature extraction we will be use image global feature extraction technique.

KEYWORDS: Image Processing, Machine Learning, Feature Extraction, Image Global Features, Classification.

I. INTRODUCTION

Farmer's economic growth relies on the quality of the product that they grow, which is directly dependent on the plants growth and yield they get. Plants are attacked by the different disease which target different parts of plant body such as leaf, stem, seed, and fruit and so on. To solve this problem machine learning seems to be a better option various machine learning technique are recently proposed for identification and classification of plant disease from plant images. Many crops most important cash crops of India and plays a dominant role in the industrial and Agriculture Economy of the country. India provides direct livelihood to 6 million farmers and about 40-50 million people.

Various image processing concepts such as image filtering, segmentation, image feature extraction have emerged to detect the leaf diseases. There are various image segmentation methods available such as k-means clustering, Canny and Sobel segmentation, and Otsu thresholding. Techniques such as Support Vector Machine (SVM), Neural Network (NN), and Homogeneous Pixel Counting technique for Cotton Diseases Detection (HPCCDD) can be used for classification. Features play an important role in the classification process. Previous proposed works for detecting disease has some limitations such as low resulting accuracy and less number of images used to detect disease. The main source for the disease is the leaves of the plant. About 80 to 90 % of disease on the plant is on its leaf. So four study of interest is the leaf of the tree rather than whole plant the leaves is mainly suffered from diseases like insecticide(tudtude, mawa) fungus, Foliar leaf on leaf , Alternaria leaf spot. The machine vision system now a day is normally consists of computer, digital camera and application software.

Various types of algorithms are integrated in the application. Image processing is one important method that helps segment image into objects and background image. One of the key steps in image analysis is feature detection. Image recognition has attracted many researchers in the area of pattern recognition, similar flow of concept are applied to the field of pattern recognition of plant leaf, that is used in diagnosing the leaves diseases. There are numerous methods have been proposed in the last two decades which are not fully solved. However this is challenging problems. The critical issue is how to extract the discriminative and stable feature for classification.

II. RELATED WORK

Wan MohdFadzil et al. [1], discussed a disease detection method for orchid plant leaves. The orchid plant leaflet images are received the usage of digital camera. The algorithm makes use of an aggregate of various strategies

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inclusive of border segmentation method, morphological processing and filtering technique used for categorizing input images into two disease class as black leaf spot and solar scorch.

Aditya Parikh et al [2] authors' primary focus of this work is to detect disease and estimate its stage for a cotton plant using images. Most disease symptoms are reflected on the cotton leaf. The proposed work uses two cascaded classifiers, so using local statistical features, first classifier segments leaf from the background. Then using hue and luminance from HSV color space another classifier is trained to detect disease and find its stage. The developed algorithm is a generalized as it can be applied for any disease.

BhumikaS.Prajapati et al [3], this work presents a survey on detection and classification of cotton leaf diseases. It is difficult for human eyes to identify the exact type of leaf disease which occurs on the leaf of plant. Thus, in order to identify the cotton leaf diseases accurately, the use of image processes and, machine learning techniques can be helpful. The images used for this work were acquired from the cotton field using digital camera. In pre-processing step, background removal technique is applied on the image in order to remove background from the image. Then, the background removed images are further processed for image segmentation using otsuthresholding technique.

P. R. Rothe et al [4], Leaf diseases on cotton plant must be identified early and accurately as it can prove detrimental to the yield. The presented work presents a pattern recognition system for identification and classification of three cotton leaf diseases i.e. Bacterial Blight, Myrothecium and Alternaria. The images required for this work are captured from the fields at Central Institute of Cotton Research Nagpur, and the cotton fields in Buldana and Wardha district. Active contour model is used for image segmentation and Hu's moments are extracted as features for the training of adaptive neuro-fuzzy inference system.

MelikeSardogan et al [5], this paper presents a Convolutional Neural Network (CNN) algorithm and Learning Vector Quantization (LVQ) algorithm based method for tomato leaf disease detection and classification. The dataset contains 500 images of tomato leaves with four symptoms of diseases. They have modeled a CNN for automatic feature extraction and classification.

NorfarahinMohdYusoff et al [6], this paper proposes a real-time edge detection technique for identifying Hevea leaves diseases (rubber tree leaves) in images and its hardware implementation. Three major Hevea leaves diseases which are Corynespora Leaf Spot, Bird's Eye Leaf Spot and Collectotrichum Leaf Disease used in this study for image comparison. The disease on the leaves can be detected through edge detection by using Sobel edge detection algorithm. The real-time edge detection result generated by FPGA Cyclone IV E which is displayed through a monitor is compared to Sobel edge detection algorithm that is generated with MATLAB.

Indumathi.R et al [7], this system finds the area of leaf that has been affected and also the disease that attacked the leaf. This is achieved by using Image Processing; there are systems that predict the diseases in the leaf. Our system uses K-Medoid clustering and Random Forest algorithm to produce more accuracy in the detection of disease in the leaf. The image is first pre-processed and then the clustering method is applied to find the affected area of the leaf.

GayatriKuricheti et al [8], This paper develops an algorithm for detecting and preventing the spreading of diseases to the whole crop and results in high quality crop production. The data base of different leaf images was created and processed using k-Means image segmentation and leaf images textural analysis was carried out using GLCM. SVM classifier is used to classify the feature extracted images after ranking their attributes using an information gain algorithm.

ChaowalitKhitthuk et al [9], this paper presents plant leaf disease diagnosis system from color imagery using unsupervised neural network. Images are processed using both color and texture features. The system is mainly composed of two processes: disease feature extraction and disease classification. The process of disease feature extraction analyzes feature appearance using statistic-based gray level co-occurrence matrix and texture feature equations. The disease classification process deploys the unsupervised simplified fuzzy ARTMAP neural network to categorize types of disease. Four types of grape leaf disease images are used to test the system's classification performance which are rust, scab, downy mildew and no disease.

PENG JIANG et al [10], In this paper, the apple leaf disease dataset (ALDD), which is composed of laboratory images and complex images under real field conditions, is first constructed via data augmentation and image annotation

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technologies. Based on this, a new apple leaf disease detection model that uses deep-CNNs is proposed by introducing the Google Net Inception structure and Rainbow concatenation. Finally, under the hold-out testing dataset, using a dataset of 26,377 images of diseased apple leaves, the proposed INAR-SSD (SSD with Inception module and Rainbow concatenation) model is trained to detect these five common apple leaf diseases.

III. PROPOSED APPROACHES

The methodology for diagnosing leaf diseases involves several tasks, such as Image acquisition, image pre-processing, image feature extraction and leaf diseases classification based on image feature that is colour features, shape features and texture features. The first phase is the image acquisition phase. In this step, image is uploaded from the images of the various leaves dataset. In the second phase image pre-processing is completed. In the third phase, image feature extraction for the infected part of the leaf is completed based on specific properties among pixels in the image or their texture. After this step, certain statistical analysis tasks are completed to classify the features that represent the given image using machine learning to compare image features. Finally, classification result shows the identified leaf disease.

Conclusion

In this paper, addressed how the disease analysis is possible for the leaf diseases detection, the analysis of the various diseases present on the leaves can be effectively detected in the early stage before it will damage the whole plant. Here the technique presented can able to detect the disease more accurately, we can say that, we can archive good productivity by preventing the various diseases present on the leaves of plant using weather dataset and image processing. The usage of classification and feature extraction processes has enhanced the performance of the system which provides better results.

REFERENCES

[1] Wan MohdFadzil, Shah Rizam, Jailani R, Nooritawati M.T, "Orchid leaf disease detection using Border Segmentation technique," IEEE Conference on Systems, Process and Control (ICSPC), Vol.1, pp.168- 179, December 2014.

[2] Aditya Parikh, Mehul S. Raval, ChandrasinhParmar, Sanjay Chaudhary, "Disease Detection and Severity Estimation in Cotton Plant from Unconstrained Images", 2016 IEEE International Conference on Data Science and Advanced Analytics.

[3] BhumikaS.PrajapatiVipulK.DabhiHarshadkumarB.Prajapati, "A Survey on Detection and Classification of Cotton Leaf Diseases", International Conference on Electrical, Electronics, and Optimization Techniques (ICEEOT) 2016.

[4] P. R. Rothe, R. V. Kshirsagar, "Cotton Leaf Disease Identification using Pattern Recognition Techniques". International Conference on Pervasive Computing (ICPC).

[5] MelikeSardogan, AdemTuncer, YunusOzen," Plant Leaf Disease Detection and Classification based on CNN with LVQ Algorithm" International conference on compuer sciences 2018.

[6] NorfarahinMohdYusoff, Ili Shairah Abdul Halim, Noor Ezan Abdullah, A'zraaAfhzan Ab. Rahim," Real-time Hevea Leaves Diseases Identification using Sobel Edge Algorithm on FPGA: A Preliminary Study" ICSGRC 2018.

[7] Indumathi.R, Saagari.N, Thejuswini.V, Swarnareka.R," LEAF DISEASE DETECTION AND FERTILIZER SUGGESTION"ICSCAN 2019.

[8] GayatriKuricheti, Supriya P "Computer Vision Based Turmeric Leaf Disease Detection and Classification" ICOEI 2019.

[9] ChaowalitKhitthuk*, ArthitSrikaew, KittiAttakitmongcol and PrayothKumsawat," Plant Leaf Disease Diagnosis from Color Imagery Using Co-Occurrence Matrix and Artificial Intelligence System" IEECON 2018.

[10] PENG JIANG, YUEHAN CHEN, BIN LIu, DONGJIAN HE, AND CHUNQUAN LIANG" Real-Time Detection of Apple Leaf Diseases Using Deep Learning Approach Based on Improved Convolutional Neural Networks" IEEE Access 2019.

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