LEAF DISEASE DETECTION USING IMAGE PROCESSING AND DEEP LEARNING

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ABSTRACT

India is a farming country, more than 70% of our people rely on agriculture. A third of our domesticrevenue comes from farming. The farmers face failure because of different cultivable diseases, and farmers are reluctant to keep an eye on their crops when the region isenormous (acres). In agriculture, the diagnosis of plant diseases thus plays an important part. In order to achieveloss caused due to crop diseases which adversely affect crop quality and yield, timely and exact identification of diseases is necessary. Early identification and intervention will mitigate plant disease loss and excessive use of medicinal products. Previously, image recognition automatically detected plant disease. We propose machine learning mechanisms and image recognition methods for the identification and classification of diseases. Crop disease is detected in different processing phases including the collection of images, image pre- processing and the retrieval of images & classification offeatures. We can use global image extraction techniques for the extraction of image features.

Keyword: - *Deep Learning, Global Features, Classification, Image Processing.*

1. INTRODUCTION

Farmer's economic success depends on thenature of the goods they produce, which depends directly on the growth and return of their plants. The disease targets various parts of plants such as the leaf, stem, seed, fruit and so forth. Plants are attacked by multiple diseases.

To solve this dilemma, machine learning appears to be a better choice for identifying and classifying plant diseases from plant videos, numerous machine learning techniques have recently been suggested. Many of India's major crops play a major role in the country's agricultural and industrial economy.

India provides 6 million farmers and about 40- 50 million people with direct livelihoods. To detect leaf disease, many ideas have arisen, such as picture filtering, segmentation, and image function extraction . Selected fragmentation methods are available, such as clustering k-means, segmentation of Canny and Sobel, and thresholding of Otsu. Classification techniques can be used, such as Vector Support Machine (SVM), Neural Network (NN) and Homogeneous Pixel Counting Technique (HPCCDD).

In the classification process, features play an important role. Earlier work on disease detection has several constraints, including poor resulting precision and less photographs used for disease detection. The plant's leaves are the primary cause of the disease.

Roughly 80 to 90% of the disease is on the leaf. Thus four interest studies are carried out on tree leaves rather

than on entire leaves; the feet are predominantly affected by disease such as insecticide . Normally a day's machine vision system consists of CPU, digital camera and applications.

Application includes various kinds of algorithms. Photo editing is a key way to support sections of the image and background images. Function recognition is one of the main stages of image processing. Image identification has drawn many scientists to recognise patterns, and related term flow is used in the field of pattern recognition of plant leafs usedto diagnose leaf diseases.

In the past two decades, there are also approaches that have not been completely resolved. That, though, is difficult. The key question is how the discriminatory and secure classification characteristicscan be extracted.

2. RELATED WORK

[1] Wan MohdFadzil et al., Discussed the orchid plant leaves disease detection process. The optical camera is used for the orchid plant photographs. The algorithmemploys a combination of different techniques including the border segmentation system , morphological processing and filtering technology used to categorise input images as a black leaf and solar scurvy into two disease groups.

[2] Aditya Parikh et al authors' focuses primarily on the detection of disease and its phase with illustrations for a cotton plant. The cotton leaf shows most signs of illness. Two case classifiers were used in the proposed work, hence the first section classifier leaf from the context using local statistical features. Then another classifier is learned to identify diseases and to locate their stage with hue and luminance from the HSV colour space. The algorithm developed for every disease is generalized

[3] BhumikaS.Prajapati et al , this paper provides a survey on cotton leaf disease identification and classification. The precise type of leaf disease on the leaf of the plant is impossible for human eyes to determine. Thus, using picture processes and machine learning methods can be useful to reliably classify the cotton leaf diseases. The pictures for this work were obtained by digital camera from the cotton field . The background removal technique on the image is used in the preprocessing phase to eliminate the background from the picture. In order to segment the images further with thresholding method, the background images removed are then processed.

[4] P. R. Rothe et al , early and reliably, leaf diseases incotton crops should be recognised as counterproductive for yield. The present work provides a method for the pattern recognition of three diseases of the cotton leaf: Bacterial blight, Myrothecium and Alternaria. The photos needed for this project are taken in Buldana and Wardha districts in the fields at the Central Institute of Cotton Research in Nagpur and in the cotton fields. For

the segmenting of images the active contour model is used and the Hu moment is derived as the training function for the neuro-fuzzy adaptive inference scheme.

[5] PENG JIANG et al , in this article, the Apple Leaf Data Collection (ALDD) is first built with image augmentation and picture annotation technology. Thisdata is composed of laboratory images and dynamic images under real-time conditions. Based on this, the introduction of the Google Net Inception structure and Rainbow concatenation would provide a new form of apple leaf disease detection using deep CNNs. Finally, the proposed INAR-SSD (SSD with Inception Module and Rainbow Concatenation) model is trained for the detection of these five popular apple leaf diseases in an outstanding test range using a set of 26,377 photos of diseased apple blades.

3. PROPOSED APPROACHES

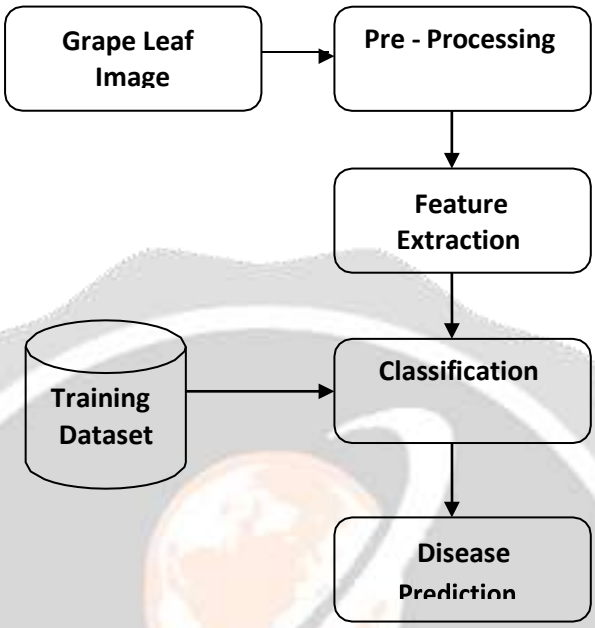


Fig: System Architecture

A number of activities are included in the technique to diagnose leaf diseases, including retrievalof images, image pre-processing, image extraction and leaf disease classification based on image attributes, colours, and form and texture characteristics. Step one is the phase of photo acquisition. The image is loaded from images from the different datasets of the blocks during this process. Pre-processing is finished in the second stepof the image. During the third step, the extraction of images for the contaminated portion of the sheet is done depending on certain properties between the image pixels or their texture. Some research tasks are performed after this stage to identify the features that describe the image in question using machine learning to compare picture characteristics. Finally, the results of theclassification indicate the leaf disease found.

A. Mathematical Model :

The mathematical model for Leaf Disease system is as

S = {I,F,O}

Where,

I = Set of image leaf datasetF = Set of function

O = leaf disease prediction

F = {F1, F2, F3}

F1= Data Collection, F2 = Data Preprocessing,F3 = Feature Selection,

F4 = Classification

F5 = Leaf disease detection .

B . Algorithm :

Convolution Neural Network(CNN) Algorithm:

The structure of CNN algorithm includes two layers. First is the extraction layer of features in which each neuron's input is directly connected to its previous layer's local ready fields and local features are extracted. The spatial relationship between it and other features will be shown once those local features are extracted. The other layer is feature _map layer; Every feature map in this layer is a plane, the weight of the neurons in one plane are same. The feature plans structure make use of the function called sigmoid. This function known as activation function of the CNN, which makes the feature map have shift in difference. In the CNN each convolution layer is come after a computing layer and it's usage is to find the local average as well as the second extract; this extraction of two feature is unique structure which decreases the resolution.

Step 1: Select the dataset.

Step 2: Perform feature selection using information gain and ranking.

Step 3: Apply Classification algorithm CNN.

Step 4: Calculate each Feature fix value of input layer.

Step 5: Calculate bias class of each feature.

Step 6: The feature map is produced and it goes to forward pass input layer.

Step 7: Calculate the convolution cores in a feature pattern.

Step 8: Produce sub sample layer and feature value.

Step 9: Input deviation of the k th neuron in output layer is Back propagated.

Step 10: Finally give the selected feature and classification results.

C. RESULT AND DISCUSSION :

The section shows overall accuracy of CNN classification technique . So this works gives better leaf disease prediction compareto existing method.

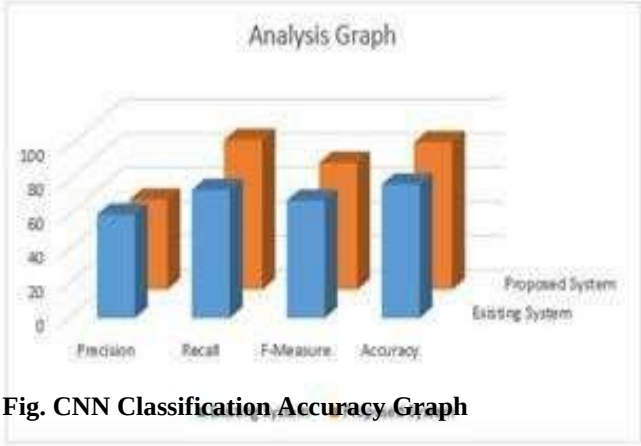


Fig. CNN Classification Accuracy Graph

Table No. 1 Method Comparison :

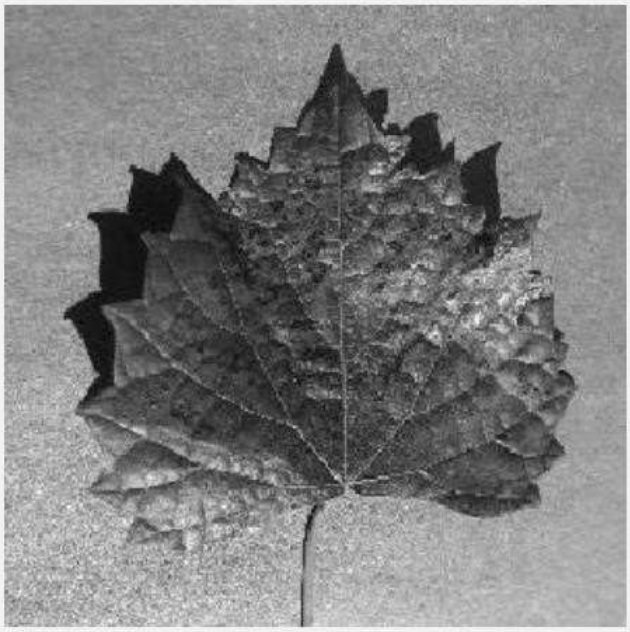
	Existing System	Proposed System(CNN)
Precision	60.6	52.70
Recall	75.1	87.64
F-Measure	68.8	74.31
Accuracy	78.29	86.26

Results:

1. Original Image :

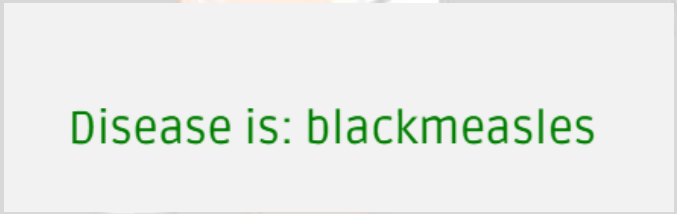
2. Median filter result :

3. Grayscale Conversion:



4. Feature Extraction:

5. Classification:



4. CONCLUSION

In this paper, the study of the different diseases on the sheets can be identified easily at an early stage until the whole plant is damaged, since the analysis of the diseases present in the sheet is possible to identify leaf diseases. Here, the technique shown will diagnose the disease more precisely, such that, using weather data set and image processing, one can archive good efficiency by avoiding different diseases on the plant leaves. The use of classification and extraction methods has improved the machine efficiency which results better.

5. REFERENCES

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