Plant Disease Detection using Ai Techniques

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Abstract— Agricultural productivity is something on which economically highly depends. This is the one of the reasons that detection of disease on the plants plays a major role in agriculture field. The identification of disease on the plant is a very important key to prevent a heavy loss of yield and the quantity of agriculture product. The symptoms can be observed on the parts of the plant such as leaf, stems, lesion and fruits. The leaf shows the symptoms by changing the original color, showing the spots on it. The disease detection is done by manual observation and pathogen detection which can consume more time and may prove costly. The aim of the project is to identify and classify the disease accurately from the leaf images and provide the solution for it. The steps required in the process are pre-processing, training, identification and solution providing.

Keywords: Pathogen, Features, Preprocessing, Training

I. INTRODUCTION

The primary occupation in India is agriculture. India ranks second in the agricultural output worldwide. Here in India, farmers cultivate a great diversity of crops. Various factors such as climatic conditions soil conditions, various disease, etc affect the production of the crops. The existing method for plants disease detection is simply an eye observation which requires more man labor, properly equipped laboratories, expensive devices, etc. And improper disease detection may leads to inexperienced pesticide usage that can cause development of long term resistance of the pathogens, reducing the ability of the crop to fight back.

The plant disease detection can be done by observing the spot on the leaves of the affected plant. The method we are adopting to detect plant diseases is image processing using Convolution neural network (CNN).

The user is to select a particular diseased region in a leaf and the cropped image is sent for processing. This paper intends to study about the prediction of the plant diseases, at an early phase using k-mean clustering algorithm. Specifically, we concentrate on predicting the disease. It will be useful for identifying different diseases on crops. Back Propagation concept is used for weight adjustment at the time of training our dataset. The aim of our project is to identify and classify the diseases accurately from the leaf images and provide the solution for it. The steps required in the process are preprocessing, training, identification and solution providing.

II. OBJECTIVES

The main objective is to identify the plant diseases using convolutional neural networks. It also identifies the insects and pests responsible for epidemic. The budget of the model is quite low for low scale farming purposes but will be value for money in large scale farming. It completes each of the process and hence achieving each of the output.

Thus the main objectives are:

1) The project is to detecting the plant disease in an Agriculture field.
2) To create a platform that will enable the end users to know and prevent the plants from their diseases.
3) To provide remedy for the disease that is detected.

A. Purpose and Scope

The farmer has to just take a snap of the leaf, upload it to the cloud where the back end processing will do predict/detect analysis and give corrective measures for preventing and eliminating external hosts. This can be done using Tensor Flow library function in Python IDE with high processors. The end product would be accurately predicting disease attacks along with identifying them. Larger set of data would be provided for training network. Existing System Plant diseases are considered one of the main factors influencing food production and to minimize losses in production, it is essential that crop diseases have a fast detection and recognition. Nowadays, recent studies use deep learning techniques to diagnose plant diseases in an attempt to solve the main problem: a fast, low-cost and efficient methodology to diagnose plant diseases. In this previous work, they proposed the use of classical convolutional neural network (CNN) models trained from scratch and a Faster R-CNN (R-CNN) approach to train and evaluate the Plant Village dataset, containing several plant diseases. In both proposed approaches, their results achieved better accuracies than the state- of-the-art, with faster convergence and without the use of transfer learning techniques.

1) Disadvantages

1) Less Accuracy in Classification
2) Poor discriminatory power

B. Proposed System

The aim of our project is to identify and classify the disease accurately from the leaf images. A color based segmentation model is used to segment the infected region and placing it to its relevant classes. The steps required in the process are image acquisition, image pre-processing, image segmentation, feature extraction and classification. It detects the affected part of the leaf and provides the remedy for that. We use an enhanced k-mean clustering algorithm to predict the infected area of the leaves. It provides the accurate solution for the plant diseases.

1) Advantages

1) More accuracy in classification
2) ii. Easily find out the plant disease
3) iii. Reduce the man power

III. METHODOLOGY

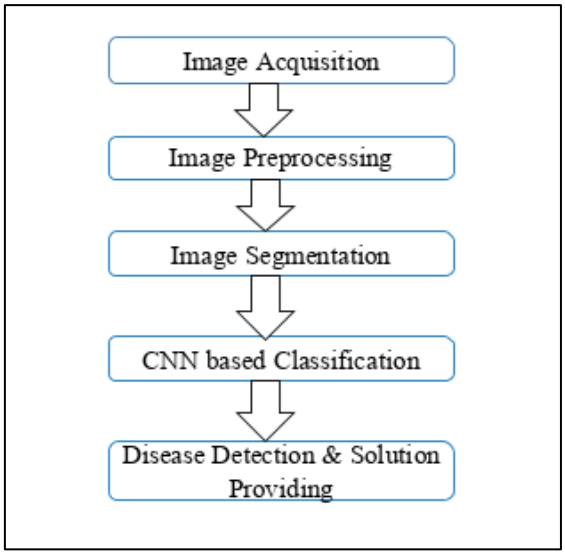

Fig. 1: Methodology

This project is carried out by implementing the following steps:

1) Image Acquisition
2) Image Pre-processing
3) Image Segmentation
4) CNN Classification

A. Image Acquisition

In acquisition, the leaf images can be collected from different public repository. We are collecting both healthy and unhealthy leaves.

B. Image Pre-processing

In Image pre-processing, the leaf image that is selected will be converted from RGB to Grayscale. Image Smoothing is the method that is used to reduce noise within an image by blurring it. It improves the pixel value.

C. Image Segmentation

Image Segmentation is the process of dividing the image into groups of pixels based on some criteria. A Region Of Interest (ROI) is the samples within a data set that are identified for a particular purpose. Here we extract the ROI of leaf diseases and stores it in the dataset.

D. Image Classification

In classification, The images can be classified into two types that are healthy leaves and unhealthy leaves. It was done by using CNN model. Then it detects the disease and also provides the solution for it.

IV. SYSTEM ARCHITECTURE

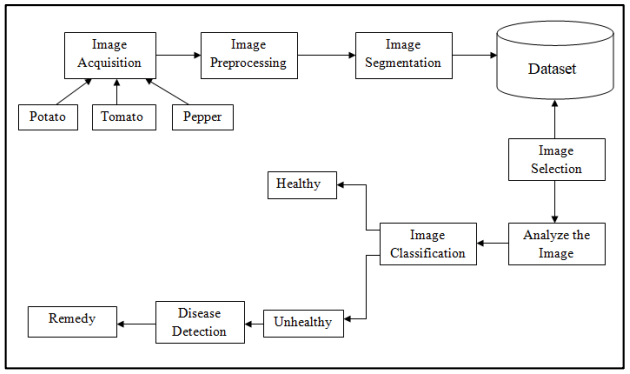

Fig. 2: System Architecture

1) The first step is to collect the data from different public repository. In our project, we are collecting three different plant leaf images such as potato, Pepper and Tomato.
2) Image preprocessing, we eliminate the noise from the image for that RGB color image to Grey scale image conversion takes place. Then these images are converted into array format.
3) In image segmentation, the images can be segmented into different regions by using region based segmentation method.
4) At the time of project execution, the leaf image can be taken from our dataset.
5) In Image Analyzation, the train and test images can be compared.
6) Then, the images can be classified by using CNN model whether it is healthy or unhealthy.
7) If the image is Healthy, it shows the status of healthy.
8) Otherwise it shows the status of Unhealthy and detects the disease as well as provides the solution for that.

V. DATA FLOW DIAGRAM

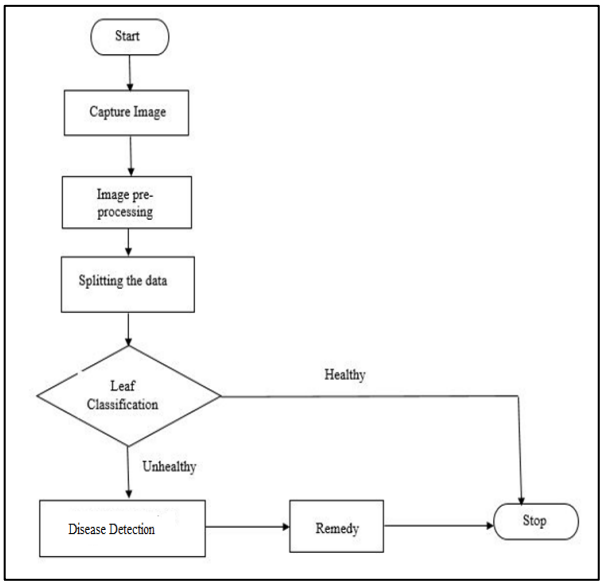

Fig. 3: Data Flow Diagram

Step 1: The images can be selected from the dataset.
Step 2: Preprocessing the image.
Step 3: Splitting the images into train and test images.
Step 4: Images can be classified using CNN model.

Step 5: it detects the disease and also provides the remedy for it.

VI. CONCLUSION

In this project, specialized deep learning models were developed, based on specific convolutional neural networks architectures. It can be achieved for the identification of plant diseases through simple leaves images of healthy or diseased plants.

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