PLANTS DISEASE DETECTION USING CNN

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***Abstract*— Yield development assumes a fundamental part in the agricultural field. By and by, the deficiency of food is for the most part because of tainted harvests, which reflexively decreases the creation rate. To distinguish the plant infections at an inconvenient stage isn't yet investigated. The primary test is to diminish the utilization of pesticides in the rural field and to expand the quality and amount of the creation rate. Proposed framework investigate the leaf sickness expectation at an inauspicious activity. The upgraded CNN calculation to foresee the contaminated space of the leaves. A shading based division model is characterized to portion the contaminated district and setting it to its pertinent classes. Test examinations were done on examples pictures as far as time intricacy and the space of tainted area. Plant disease can be distinguished by picture handling procedure. Illness recognition includes steps like Image Acquisition, Image preprocessing, Image Segmentation, Feature extraction and characterization**.

Keywords— Infected crops, CNN algorithm, Image processing, Image acquisition, Image segmentation, Feature extraction

I.INTRODUCTION

The essential occupation in India is agriculture. India positions second in the agricultural yield around the world. Here in India, ranchers develop an incredible variety of yields. Different factors like climatic conditions, soil conditions, different sickness, and so on influence the creation of the harvests.

The current framework can just distinguish the kind of infections which influences the leaf. It's not productive. Result will be given inside part of seconds and directed all through the undertaking.

In recent years, the fast improvement of computerized reasoning has made life more helpful, and AI has become a notable innovation. For instance, AlphaGo crushed the best on the planet of Go. Siri and Alexa as voice colleagues of Apple and Amazon are altogether utilizations of man-made consciousness innovation addressed by profound learning in different fields. As the key exploration object of PC vision and computerized reasoning, picture acknowledgment has been enormously evolved lately. In agricultural applications, the objective of picture acknowledgment is to recognize and group various kinds of pictures, and break down the sorts of yields, disease types, seriousness, etc. Then, at that point we can form relating countermeasures to take care of different issues in farming creation in a convenient and effective way. In order to additionally guarantee and work on the yield of harvests and help the better advancement of agriculture.

With the fast advancement of profound learning, particularly in picture acknowledgment, discourse investigation, normal language preparing and different fields, it shows the uniqueness and productivity of profound learning. Contrasted and the conventional techniques, profound learning is more effective in the conclusion of harvest disease in the field of rural creation .The profound learning model can screen, analyze and forestall the development of yields on schedule. Picture acknowledgment of harvest sicknesses and bug

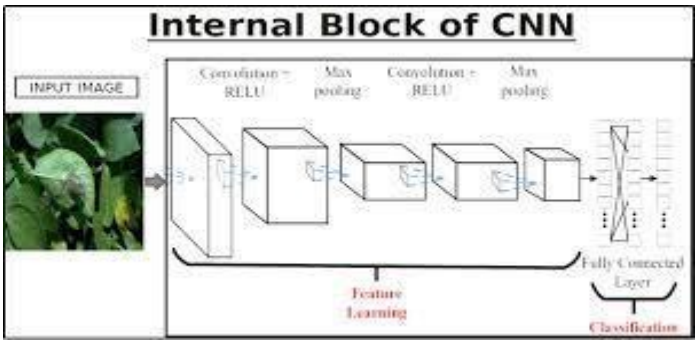
vermin can diminish the reliance on plant insurance experts in agrarian creation, with the goal that ranchers can take care of the issue on schedule. Contrasted and counterfeit distinguishing proof, the speed of keen organization ID is a lot quicker than that of manual location. Furthermore, the acknowledgment precision is getting ever more elevated in the consistent turn of events. The foundation of a sound rural organization and the blend of Internet and horticultural industry can't just take care of the issues identified with crop yield influenced by infections and creepy crawly bugs, yet additionally be helpful for the advancement of farming informatization.

II RELATED WORKS

The identification and prevention of crop diseases and insectpests is a continuous research topic. With the development of technology, many sensor networks and automatic monitoring systems have been proposed. A method of detection of specific disease in grapes is proposed. Downy mildew pest/disease can be detected by the real time system with weather data. The central sever provide forecast service of weather condition and disease. Another kind of solution related of monitoring traps which are used to capture pest is with the help of image sensors. The authors designed and implemented a low power consumed system which is based on wireless image sensors and powered by battery. The frequency of capturing and transferring trap images of sensors can be set and remote adjusted by trapping application. Acoustic sensors are also used in monitoring system. The authors give a solution to detect red palm we evil (abbr. RPW) with them. With the help of acoustic device sensor, the pest's noise can be captured automatically. When the noise level of pest increases to some threshold, the system will notify the client that the infestation is occurring in the specific area. It helped farmers to be economical of time and energy to check every part of cropland by themselves and increase the labor efficiency. All acoustic sensors will be connected to base stations and each one will report the noise level if the predefined threshold value is surpassed.
Machine learning also had been applied in the agricultural field, such as investigation of plant disease and pests and soon. Plenty of techniques of machine learning had been widely used to solve the problem of plant disease diagnosis. A Neural Network based method of estimating the health of potato with leaf image datasets is proposed. Additionally, the experimental research was carried out, which aimed to implement a system of recognizing plant disease with images. In order to distinguish wheat stripe rust from wheat leaf rust and grape downy mildew from powdery mildew, four different types of neural networks were trained based on color, shape and texture features extracted from disease image dataset. The work showed that neural network based on image processing can increase the effectively of diagnosing plant disease What's more, scab disease of potato could be also detected by the image processing methods. Firstly, the images from various potato fields were collected. After image enhancement, image segmentation was carried out to acquire target region. At last, a histogram-based approach to analyses the target region was applied, so that the phase of the disease could be found.

III CONVOLUTIONAL NEURALNETWORKS

Convolutional neural network is gradually applied to the identification of crop diseases and insect pests. Convolutional neural network is designed by imitating the structure of biological neural network.



Convolutional neural network mainly solves the following two problems

1) **Problem of too many parameters:** It is assumed that the size of the input picture is $50 * 50 * 3$. If placed in a fully connected feed forward network, there are 7500 mutually independent links to the hidden

layer. And each link also corresponds to its unique weight parameter. With the increase of the number of layers, the size of the parameters also increases significantly. On the one hand, it will easily lead to the occurrence of over-fitting phenomenon. On the other hand, the neural network is too complex, which will seriously affect the training efficiency. In convolutional neural networks, the parameter sharing mechanism makes the same parameters used in multiple functions of a model, and each element of the convolutional kernel will Acton a specific position of each local input. The neural network only needs to learn a set of parameters, and does not need to optimize learning for each parameter of each position.

2)**Image stability:** Image stability is the local invariant feature, which means that the natural image will not be affected by the scaling, translation and rotation of the image size. Because in deep learning, data enhancement is generally needed to improve performance, and fully connected feed forward neural is difficult to ensure the local invariance of the image. This problem can be solved by convolution operation in convolutional neural network.

At present, the typical convolutional neural networks widely used are as follows.

1)LeNet-5: Although proposed very early, but LeNet-5 is a complete and successful neural network, especially in handwritten numeral recognition system applications. The LeNet-5 network has seven layers, including two convolution layers, two convergence layers (also called pooling layers), and three full connection layers. The **input image size is 32 ∗ 32, and the output** corresponds to 10 categories.

2)Alex Net: Alex Net consists of five convolution layers, three convergence layers and three full connection layers. Alex Net absorbs the idea and principle of LeNet-5 network, and also makes many innovations. These include using the ReLU function instead of the sigmoid function to solve the gradient dispersion problem. Dropout is used at the fully connected level to avoid over fitting.

3)Inception Network: Inception is different from the general convolution neural network in that it contains multiple convolution kernels of different sizes in its convolution layer, and the output of Inception is the depth stitching of the feature map. Google Net, the winner of the 2014 Image Net Image Classification Competition, is the earliest version of Inception v1 used

4)Residual network: The core idea of residual network is to make a non-linear element composed of neural networks infinitely approximate the original objective function or residual function by using the general approximation theorem. Many nonlinear elements form a very deep network, which is called residual network.

VII PROPOSED SYSTEM

Plant diseases are detected and the solutions to recover from the leaf diseases will be provided. The affected part of the leaf is shown by image processing technique. The database is preprocessed such as Image reshaping, resizing and conversion to an array form. Similar processing is also done on the test image. The train database is used to train the model (CNN) so that it can identify the test image and the disease it has .CNN has different layers that are Dense, Dropout, Activation, Flatten, Convolution2D, and MaxPooling2D. After the model is trained successfully, the software can identify the disease if the plant species is contained in the database. After successful training and preprocessing, comparison of the test

MODULE 1: IMAGE ACQUISITION

The underlying cycle is to gather the information from the public storehouse. It accepts the picture as contribution for further preparing. Well known picture spaces are taken so that any organizations can be given as contribution to the interaction (.bmp, .jpg, .gif).The primary objective is to distinguish and perceive the class infection in the picture. To adjust it with various element extractors that identifies infections in the picture.

MODULE2: IMAGE PRE PROCESSING

As the images are acquired from the real field it may contain dust, spores and water spots as noise. The purpose of data preprocessing is to eliminate the noise in the image, so as to adjust the pixel values. It enhances the quality of the image.

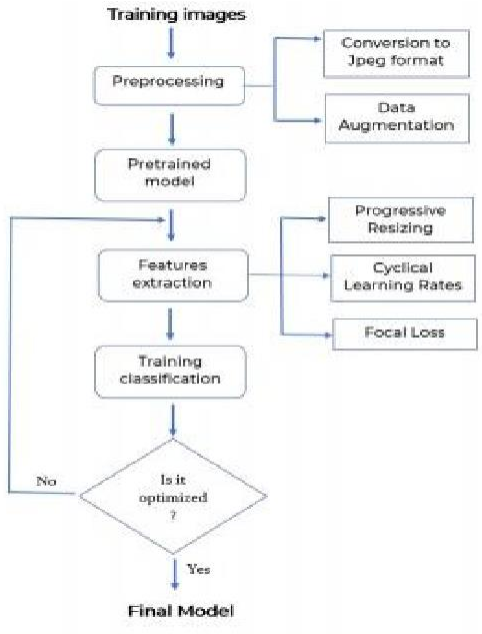
MODULE 3: IMAGE SEGMENTATION

Image segmentation is the third step in the proposed method. The segmented images are clustered into different sectors using Otsu classifier and k-mean clustering algorithm. Before clustering the images, the RGB color model is transformed into Lab color model. The advent of Lab color model is to easily cluster the segmented images**.**

MODULE 4: FEATURE EXTRACTION

Feature extraction is is the significant part to smoothly anticipate the tainted area. Here shape and textural include extraction is finished. The shape arranged component extraction like Area, Color pivot length, whimsy, strength and border are determined. Additionally the surface situated element extraction like differentiation, connection, energy, homogeneity and mean is caught and handled to decide the wellbeing of each plant. There are a few conditions that ought to be thought about while picking a Feature Extractor, like the sort of layers, as a higher number of boundaries builds the intricacy of the framework and straightforwardly impacts the speed, and consequences of the framework. Albeit each organization has been planned with explicit qualities, all offer a similar objective, which is to expand exactness while lessening computational intricacy. In this framework each article identifier to be converged with a portion of the element extractorgracefully predict the infected region. Here shape and textural feature extraction is done. The shape oriented feature extraction is done.

FLOW DIAGRAM



CONCLUSION

In this paper, 38 Categories of plant disease were examined. The VGG 16 model is built by utilizing profound learning hypothesis and convolution neural organization innovation. Analyses show that the model can successfully recognize the informational collection, and the general acknowledgment precision is just about as high as 95%. It tends to be successfully applied to the distinguishing proof and recognition of plant disease.

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