REVIEW ON IDENTIFICATION OF LEAF DISEASE AND DIAGNOSIS

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Abstract

In India, agriculture provides a living for half of the population. Food security is significantly threatened by microbial infections; however, due to inadequate infrastructure, it is still difficult to identify them quickly. With AI, deep learning and transfer learning may be used to automatically diagnose plant illnesses from raw photos. Utilising a collection of 8,438 photos of healthy and sick leaves from the Plant Village dataset that was locally acquired, this study intends to identify and categorise grape and mango leaf illnesses. To recognise diseases or their absence, the deep convolutional neural network (CNN) is trained. AlexNet is a CNN architecture that has already been trained to automatically extract and classify features. The system, which was created using MATLAB, detects leaves accurately in 99% of cases for grape leaves and 89% of cases for mango leaves, respectively. For Android smartphones, a programme called "JIT CropFix" has been created to implement the same concept.

I. INTRODUCTION

About 70% of the population in India is dependent on agriculture. For the purpose of preventing crop losses, it is crucial to identify plant diseases. Manually observing the plant diseases is really difficult. It requires a significant amount of labour, knowledge of plant diseases, and a significant amount of time. In order to identify plant diseases, image processing and machine learning models can be used. In this study, we have described a method for identifying plant illnesses using images of the leaves. A subfield of signal processing called "image analysis" can extract relevant information or image attributes.

Consequently, it can help in making wise selections and forecasting the right output using the vast training data. For classification, factors like leaf colour, leaf damage severity, leaf area, and leaf texture are taken into account. In order to diagnose various plant leaf diseases with the greatest accuracy, we have examined many picture metrics, or features. In the past, professionals used chemical techniques or visual inspection of the leaves to identify plant diseases. This requires a sizable team of experts and ongoing plant monitoring, both of which are expensive when done with large farms. The suggested technique works well in these circumstances for keeping an eye on vast fields of crops. It is easier and less expensive to automatically identify illnesses by simply seeing the signs on plant leaves. Since the suggested approach combines statistical machine learning and image processing algorithms, it is computationally less expensive and takes less time to predict than other deep learning-based systems. Crop output and growth are crucial factors that have an impact on farmers' economic, social, and other elements of their lives. Therefore, careful observation at various phases of crop growth is required in order to detect illnesses early. However, showing humans in their natural state might not be enough, and sometimes false assumptions might be made. In this regard, accurate identification depends on the automatic recognition and classification of various illnesses affecting a certain crop.

II. RELATED WORK

Sunayana Arya *et al.* [1] proposed CNN and Alex Net architecture for constructing a classifier, and the SGD algorithm is used in both networks to defeat the restrictions of vanishing gradient. Whereas Alex Net architecture achieves a higher accuracy of 98.33%. The finer results can be obtained through AlexNet architecture to identify the unhealthy leaves. The Convolutional Neural Networks have various pre-trained architecture like ResNet, VGGNet, Google Net, etc, that compares the accuracy between these different architectures.

Jayamala k Patil, Rajkumar [2] To retrieve the related images the search is done in Two Steps, first step is matches the images by comparing the standard deviations for three colour components the second step is weighted version of the Euclidean distance between the feature coefficients of an image selected in the first step, this reported following important image processing method first one image clipping separating the leaf with spots from the complex background. Noise resolution to filters simple filter and median filter work compared and at last median filter was chosen. Thresholding to segment or partition image into the spot background fourth one segmentation they used OSTU's method. K-means clustering and back propagation feed-forward neural network for clustering and classification. There are two main characteristics of plant disease detection using machine learning method that must be achieved their speed and accuracy hence innovative efficient and fast interpreting algorithms which will help plants scientists in detecting disease work proposed by the researcher can be extended for development of hybrid algorithms such as genetic algorithms and neural networks in order to increase the recognition rate of the final classification process.

Amar Kumar deya [3] This paper deals with leaf rot disease detection for betel vine based on image processing. The proposed methodology has three vital stages the initial stage was the image acquisition stage through which the real world sample is recorded in the digital form using flatbed digital scanner next stage is image processing segmentation classification and leaf area calculation. Here 21*30 sq. cm image is Canon under flatbed scanner during test phase it acquired a series of 12 color images using scanner and then the color images were digitalized at a resolution of 300 DPI to produce RGB digital color images. The digital version of the leaf sample consists of a about 30% of leaf area and rest 70% is background in order to achieve fast processing digital image of leaf cropped into a smaller dimension of size after this is a state the digital version of the sample leaf image consist about 70% of leaf area part and rest 30% as background color feature are used to identify the affected area. RGB, hsv, ycbcr color models are used to color identification these three channels result in 12 individual image then the queue is responsible for masking and approximated threshold value is applied to affected leaf was calculated.

Mr. Sanjay Mirchandani, Mihir pendse, Prathamesh Rane, Ashwini Vedula[4] researchers proposed detection and classification of plant disease using image processing and artificial neural networks in this paper a software solution for fast accurate and automatic detection and classification of plant disease through image processing identification of disease is key to preventing losses in the quality and quantity of the agricultural product this paper discussed the detection and classification of plant diseases is divided into three steps such as identification of infected object extraction of feature set of the infected leaf images and detection and classification the type of disease using ANN. Different techniques are adopted for detection and diagnosis the disease but the better way is by image processing the author suggested a method in which initially the infected region is found then different features are extracted such as colour texture and shape finally parameter classification technique is used for detecting the diseases. 2.7 Savita N Ghaiwat,

Md. Rasel Mia *et al.* [5] reported that the identification of mango leaf diseases happens through the neural network ensemble (NNE) that was used in the model that recognized an accuracy of 87.5% for healthy leaves.

Smita Naikwadi *etal.* [6] cited that plant diseases are detected using the histogram matching technique. This histogram specification is formed on the frequency of occurrence of each color and identification of edges. The layer segregation approach symbolizes the layers as red, green, blue pixels that are incorporated in the sample images along with that the contour identification will take place in the procedure.

Prakash M. Mainkar *et al.* [7] reported that software solutions can spontaneously identify and label plant leaf diseases. Here, for the rapid identification of the diseases visualization technique is incorporated. The beneficial approach and the major techniques that can be used are K- means clustering, GLCM, and BPNN which will considerably identify the plant diseases with more accuracy in less computing period

Sammy V. Militante *et al.* [8] model comprised more than 30,000 images that were categorized into a variety of classes as tomato grape, corn, apple, sugarcane diseases. The CNN model was implemented through an application program interface (API) that was well-suited with Python and its neural network applications.

III. METHODOLOGY

The main purpose of proposed system is to detect the diseases of plant leaves by using feature extraction methods where features such as shape, color, and texture are taken into consideration. Convolutional neural network (CNN), a machine learning technique is used in classifying the plant leaves into healthy or diseased and if it is a diseased plant leaf, CNN will give the name of that particular disease. Suggesting remedies for particular disease is made which will help in growing healthy plants and improve the productivity. First the images of various leaves are acquired using high resolution camera so as to get the better results & efficiency. Then image processing techniques are applied to these images to extract useful features which will be required for further analysis.

Registration module

In this module farmer need to register in the system for using the module. While registering in the module farmer need to submit some credentials using Name, Mobile Number, Address, City and State etc.
The farmer can register through any one portal such as android or web application to gain access into the system.

Login module

The farmer needs to Login into the system using the credentials from which he created his account.
The Login is required in both android and web application to access the system.

Leaf image uploader

Image uploader module is used to upload the image from web application and system apply deep learning method to predict leaf disease.

Redirect To E-Commerce Site

After showing the information of the disease we added a new feature in the system that show the medicine name with the medicine link and after clicking on the link it will redirect to online store for purchasing the medicine.

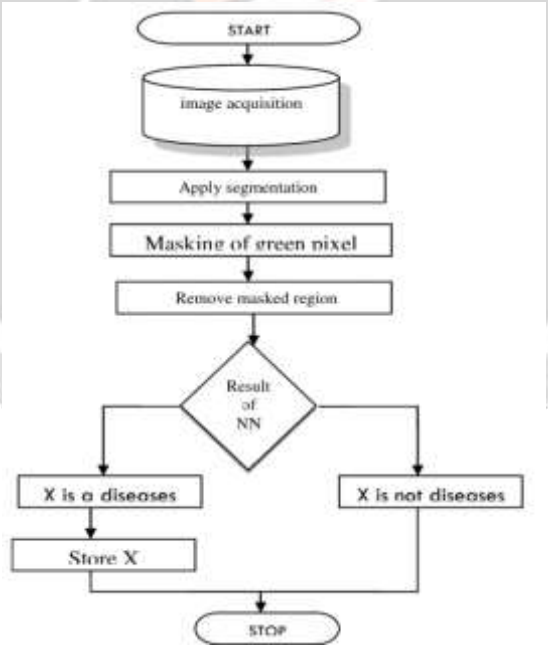

Fig 1 Overview of proposed system

CONCLUSION

Since agriculture is vital to the expansion of the economy and accounts for a substantial portion of the population in India, it is crucial to identify and diagnose the leaf diseases that cause losses. The identification, detection, and recognition of 13 different plant leaf diseases are all accomplished by this deep learning research, dubbed CNN. This method used a minimal number of layers to identify the diseases in seven classifications. The Plant Village dataset is used to train the neural network. For this system, a graphical user interface is created. The user can select photographs from the dataset using this GUI. Users can choose any image from the

collection, and after the image has loaded, the user interface will display the disease prediction. A convolutional neural network that has been trained to recognise and predict plant leaf illness was able to accurately categorise and predict the diseases for virtually all of the photos with only a few anomalies, achieving an accuracy of more than 90%.

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