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A Web-based Plant Health Classification System

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Abstract- Identification of the plant diseases is the key to preventing the losses in the yield and quantity of the agricultural product. Monitoring and detection of plant disease is very critical for sustainable agriculture. It is very difficult to monitor the plant diseases manually. It requires tremendous amount of work, expertise in the plant diseases, and require the excessive processing time. Detection of plant disease involves the steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. Plant disease identification by visual way is a tedious task and less accurate and can be done only in limited areas. If automatic detection technique is used it will take less efforts, time and gets more accurate. In plants, some general diseases seen are brown and yellow spots, early and late scorch, and others are fungal, viral and bacterial diseases. Convolutional Neural Network (CNN) model used for apple leaf disease detection and classification. The dataset used in proposed system consist of 3642 images of apple leaves. Proposed system includes splitting the dataset into test data and training dataset. Conv2d neural network applied to train the CNN model. Model Achieved 90.2% accuracy with 30 epochs.

Keywords- Plant Leaf Diseases, Deep Learning, CNN.

I. INTRODUCTION

Plant disease classification [PDC] by visual way is more laborious task and at the same time, less accurate and can be done only in limited areas. Whereas if automatic detection technique is used it will take less efforts, less time and become more accurate.

Some of the plant diseases include brown and yellow spots, and others are fungal, viral and bacterial diseases. For Plant disease classification Convolutional Neural Network [CNN] are used.

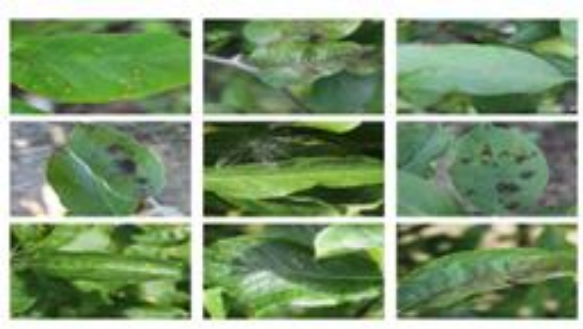

Fig 1. Disease plant leaf.

II. RELATED WORKS

Lili Li, Shujuan Zhang, Bin Wang in [1] proposed a image classification algorithm. When sufficient data is available for training, deep learning techniques are capable of recognizing plant leaf diseases with high accuracy.

Punam Bedi, Pushkar Gole in [2] used CAE to reduce the training parameters of the hybrid model. This model got 99.35% training accuracy and 98.38% testing accuracy.9914 images were used.

In [3] the author **Muhammad E.H. Chowdhury** and et al conclude that CNN models do an excellent work of classifying diseases from plant leaf images. DenseNet201 performed better at extracting discriminative features from images.

Nikhil Patil,Rajab and et al in [4] paper conclude that Comparing with traditional crop disease detection system, the described system gives the accuracy rate of 89% which implies correct detection of 9 crop images from set of 10.

Tanakorn Tiay and et al in [5] proposed a system, the original flower image is resized for faster processing. To get only flower in the specified image, Some algorithms like the graph cut algorithm and RGB to grayscale conversion is used.

In [6] **Shima Ramesh and et al** concluded using Random forest classifier, the model was trained using 160 images of papaya leaves.The model could classify with approximate 70 percent accuracy.

Sharada P. Mohanty, David P. Hughes, and Marcel Salathé in [7] study focus on two popular architectures, namely AlexNet, and GoogLeNet, which were designed in the context of the "Large Scale Visual Recognition Challenge" for the ImageNet dataset

Xiaoling Xia; Cui Xu; Bing Nan in [8] used Oxford-I7 and Oxford-I02 flower dataset. The back propagation neural network (BPNN) is used to train the last layer. The Classification accuracy is 95% on Oxford-I7 flower dataset and 94% on Oxford102 flower dataset is achieved.

III. EXISTING SYSTEM

Leaf shape description is that the key downside in leaf identification. Up to now, several form options are extracted to explain the leaf form. However, there's no correct application to classify the leaf once capturing its image and identifying its attributes, however. In plant leaf classification leaf is classed supported its completely different morphological options.

A number of the classification techniques used areFuzzy logic, Principal component Analysis and k-Nearest Neighbors Classifier

IV. PROPOSED SYSTEM

The proposed system detects the diseases of plant leaves by using Convolutional neural network (CNN), a deep 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.

In the proposed system, we use the CNN algorithm to detect disease in plant leaves because with the help of CNN the maximum accuracy can be achieved if the data is good.The basic steps of the system are summarized as: Y

Fig 2. Proposed system.

1. CNN:
Convolutional neural network (CNN/ CONV2D) is a class of deep neural networks, most applied to analyse visual imagery. Whenever someone thinks of a neural network, they think about matrix multiplications but that is not the case with CONV2D. It uses a special technique called Convolution.

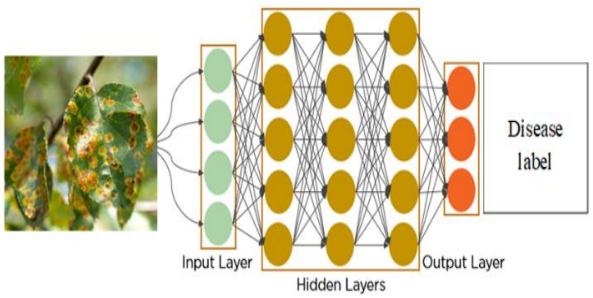

Fig 3. Working of CNN.

2. Advantages:
The advantages of proposed algorithm are as follows:

- The detection accuracy is enhanced with proposed algorithm.
- Proposed method is fully automatic while existing methods require user input to select the best segmentation of input image.
- It also provides environment friendly recovery measures of the identified disease.

There are two modules in the proposed system. Each module has its functionalities. The first module where the user is provided with the information regarding different health conditions of plant leaves. User will have option to upload image of the plant leaves and they will be provided the information regarding their plant's health. This module will have following web pages

Fig 4. Homepage.

This is the homepage of web application. It contains some information about the app and diseases.

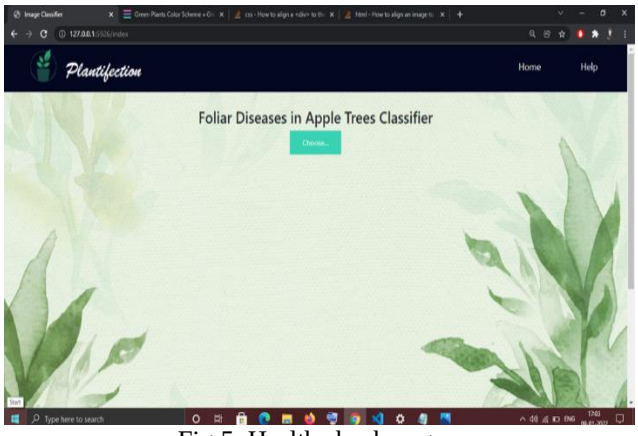

Fig 5. Health check page.

This is health check page of web application where user have to upload input image.

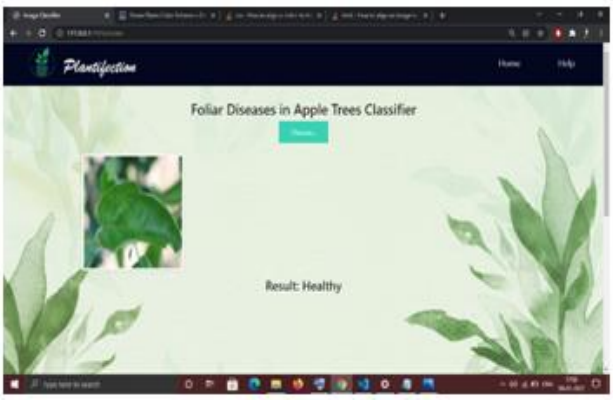

Fig 6. Result page.

After selecting image user will get the predict button bellow the image. After clicking on predict page user will get the disease label.

The second module is the analysis of the model. For the analysis of the models, we have used ReLu activation function with 30 epochs. The below images contain the graphical representation of the epochs and accuracy achieved by the model and the figure 6.5 gives the graphical representation of epochs and loss.

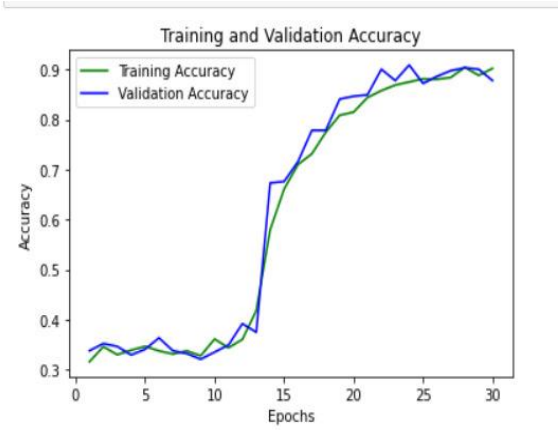

Fig 7. Training and validation accuracy.

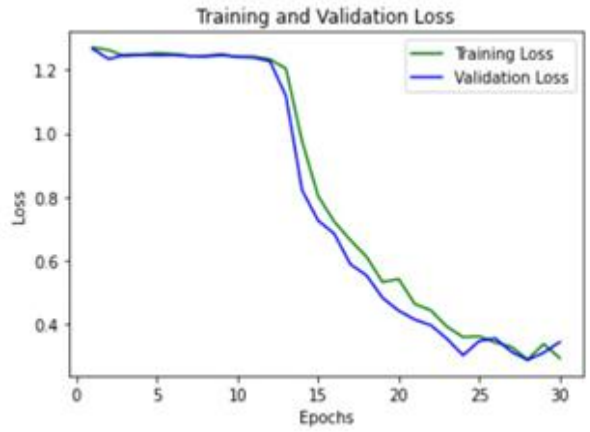

Fig 8. Training and validation loss.

V. CONCLUSION

Protecting crops in organic farming is not an easy task. This depends on a thorough knowledge of the crop being grown and possible pests, pathogens and weeds. In our system, a special deep learning model has been developed based on a special architectural convolution network to detect plant diseases through images of healthy or diseased plant leaves. The system described above can be upgraded to a real-time video entry system that allows unattended plant care. Another aspect that can be added to certain systems is an intelligent system that cures identified ailments

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