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LEAF DISEASE DETECTION USING IMAGE PROCESSING AND CNN

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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. The studies of the plant diseases mean the studies of visually observable patterns seen on the plant. Health monitoring and disease detection on plant is very critical for sustainable agriculture. It is very difficult to monitor the plant diseases manually. It requires tremendous amount of work, expertize in the plant diseases, and also require the excessive processing time. Hence, image processing is used for the detection of plant diseases. Disease detection involves the steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification. This paper discussed the methods used for the detection of plant diseases using their leaves images. This paper also discussed some segmentation and feature extraction algorithm used in the plant disease detection
Keywords -- ***Plant Leaf Diseases, Deep Learning, faster R-CNN,***

I. INTRODUCTION

For a long time, the agriculture industry has used modern science to meet the food demands of 7 billion people. However, there are numerous threats that people working in the agriculture industry face that threaten the food security of the human society. Some of the threats as we know include, climate change, livestock grazing, plant diseases, etc, (Food and Agriculture Organization of the United Nations, 2017). Among the many threats, the effect of plant disease is truly momentous as it not only causes huge wastage of plants for human consumption but it also immensely affects the health of the human society and the lives of the farmers whose main source of income is from their production of healthy crops (Al-Sadi, 2017; Somowiyarjo,2011)
During the process of plant harvesting, human experts go through a tedious process of checking and removing mature plants, making sure they aren't affected by any disease and are suitable for human consumption. However, this traditional visual process of identifying the name of the disease a particular plant is suffering from consumes a lot of time and is expensive especially if the farmhouse is big and there are a lot of plants (Gavhale and Gawande, 2014). Furthermore, with the apparent increase of population in the world day by day it is only practical that this process is automated so that the growing
demands of the people can be met.

fig1.Disease plant leaves

The aim of this thesis is to implement two different machine learning models, namely, Convolutional neural

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network (CNN) and K-nearest Neighbor (KNN) on the plant village dataset and also evaluate the aforementioned models based on the following evaluation metrics: Accuracy, Precision, Recall and F1-Score. The study focuses on the disease identification of tomato leaves from the plant village dataset in specific (J and Gopal, 2019). The novelty of this study lies in the fact.

II. LITERATURE SURVEY

Liu, Bin, et al. "Identification of apple leaf diseases based on deep convolutional neural networks. In this paper, Liu proposes a new model of deep convolution networks for accurate prediction and identification in apple leaves. Model Proposed in the Paper can automatically recognize the different character trades with a very high level of accuracy. A total of 13,689 images were created with the help of image processing technologies like PCA oscillation. Apart from this new AlexNet based neural network was also proposed by implementing the NAG Algorithm to optimize the network. In future work to predict the apple leaf disease, other Models of Deep Learning like F-CNN, R-CNN, and SSD can be implemented.

This article [2] suggests a new way to classify leave using the CNN model and builds two models by adjusting network depth using Google Net. We assessed the effectiveness of each model based on discoloration or leaf damage. The recognition rate achieved is more than 94%, even if 30% of the leaves are damaged. In future research, we will seek to identify leaves attached to branches to develop a visual system that can mimic the methods humans use to identify plant species.

This Paper [8] also describes various strategies for Extracting the nature of infected leaves and classifying plants Disease. Here we are using a Convolution Neural Network (CNN), Which consists of various levels that are used for forecasting. That The complete method is described based on the images used for training and pretreatment testing and Image enhancement and then a training method for CNN deep and optimizers. Use these images We can precisely determine the processing method and differentiate between different plant diseases.

III. PROPOSED METHOD

In our proposed model image processing method is used for the construction of system through which leaf disorder is detected if any distorted picture is supplied with in very short time. As a result a farmer without sufficient sense disease detection knowledge, modern techniques and software can be effortlessly applied this system. The dataset which is used as input is mixed of healthy and distorted images and after completing the action of input dataset the system output provides the affected and healthy leaves. A chart is introduced below as the proposed methodology

A. Dataset

We use Plant Village Dataset. The Plant Village dataset consists of 54303 healthy and unhealthy leaf images divided into 38 categories by species and disease. We analyzed more than 50,000 images of plant leaves with distributed labels from 38 classes and we tried to predict the class of diseases. We resize the image to 256 × 256 pixels and perform optimization and model predictions on this compressed image.

Leaf Category	Images
Apple	3171
Cherry	1906
Grape	4062
Peach	2657
Pepper	2475
Potato	2152
Strawberry	1565
Tomato	18170
Total	36148

Table I. DATASET BREAKUP

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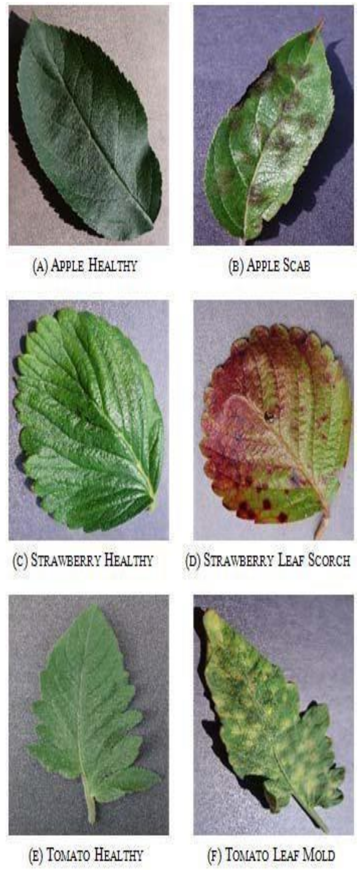

IMAGES FROM THE DATASET

B. Data Processing and Argumention

Image augmentation plays a key role in building an effective image classifier. Though datasets may contain anywhere from hundreds to a couple of thousand training examples, the variety might still not be enough to build an accurate model. Some of the many image augmentation options are flipping the image vertically/horizontally, rotating through various angles and scaling the image. These augmentations help increase the relevant data in a dataset. The size of each image in the Plant Village dataset is found to be 256 x 256 pixels. The data processing and image augmentation are done using the Keras deep-learning framework.

The augmentation options used for training are as follows:

Rotation - To rotate a training image randomly over various angle.

- Brightness - Helps the model to adapt to variation in lighting while feeding images of varying brightness during training
- Shear - Adjust the shearing angle.

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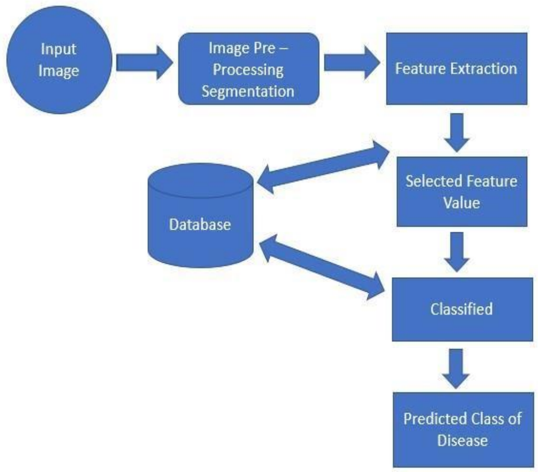
C. System Overview



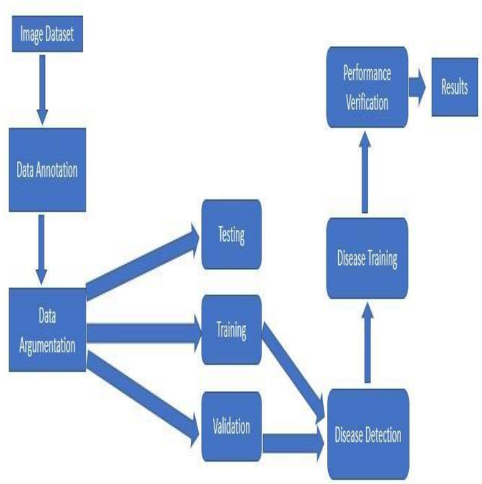
Steps related to image processing to detect plant diseases

The whole process is divided into three stages:

1. Input images are first created by an Android device or uploaded to our web application by users.

2. Segmentation pre-processing includes the process of image segmentation, image enhancement and color space conversion. First, the digital image of the image is enhanced with a filter. Then convert each image into an array. Using the scientific name for Binarizes Diseases, each image name is converted to a binary field.

3. CNN classifiers are trained to identify diseases in each plant class. Level 2 results are used to call up a classifier, which is trained to classify various diseases in that plant. If not present, the leaves are classified as "healthy".



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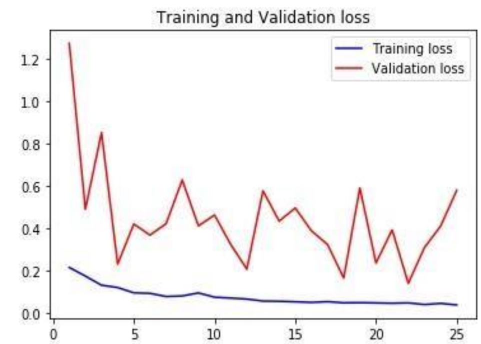
IV. EXPERIMENTION AND RESULT

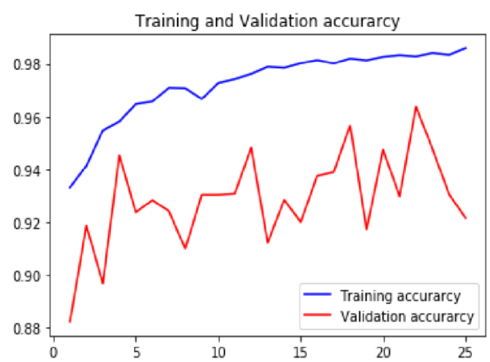
We only selected 400 images from each folder. Each image is converted into an array. In addition, we processed the input file by scaling the info points from [0, 255] (image minimum and most RGB values) to the vary [0, 1]. We then split the dataset into 70% of the training images and 30% for testing. Image generator objects are created which perform random rotations, movements, inversions, cultures and parts of our image set.
In the standard model we use a "last channel" architecture, but we also build backend switches that support "first channel". Then we do **Conv => Relu => Pool** first. Our Conv layer has 36 filters with 3 x 3 core and Relu activation (linear correction module). We apply batch normalization, maximum aggregation, and a 27% reduction (0.26).

Dropout is a control technology used to reduce neural network readjustment by preventing the correction of complex collaborative data for training. This is a very effective method for averaging neural network models.

Then we create two sets **(Conv => Relu) * 2 => Pool** blocks. Then just a series of fully connected layers (fully connected layers) => Relu.

We use Adam's Hard Optimizer for our model. Our network starts where we call model.fit_generator. Our aim is to add data, train - test data and the no.of epochs we want to train. For this project we used a value for epochs of 26.





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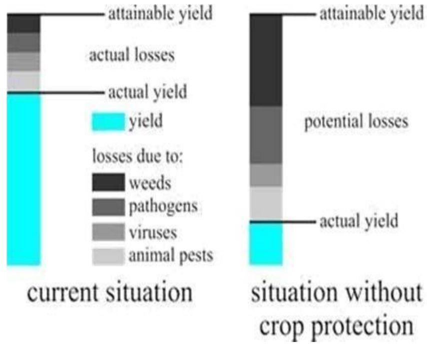
V. CONCLUSION

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. Studies show that managing plant diseases can help increase yields by about 50%.



CROP PROTECTION YIELD ANALYSIS

VI.REFERENCES

1. Liu, Bin, "Identification of apple leaf diseases based on deep convolutional neural networks
2. Jeon, Wang-Su, and Sang-Yong Rhee. "Plant leaf recognition using a convolution neural network." International Journal of Fuzzy Logic and Intelligent Systems 17.1 (2017): 26-34.
3. Amara, Jihen, Bassem Bouaziz, and Alsayed Algergawy. "A Deep Learning-based Approach for Banana Leaf Diseases Classification." BTW (Workshops). 2017.
4. Lee, Sue Han, et al. "How deep learning extracts and learns leaf features for plant classification." Pattern Recognition 71 (2017): 1-13.
5. Sladojevic, Srdjan, et al. "Deep neural networks-based recognition of plant diseases by leaf image classification." Computational intelligence and neuroscience 2016 (2016).
6. Lee, Sue Han, et al. "Plant Identification System based on a Convolutional Neural Network for the LifeClef 2016 Plant Classification Task." CLEF (Working Notes). 2016.
7. He, Kaiming, et al. "Deep residual learning for image recognition." Proceedings of the IEEE conference.
8. K.Padmavathi, and K.Thangadurai,"Implementation of RGB and Gray scale images in plant leaves disease detection –comparative study,"
9. Kiran R. Gavhale, and U. Gawande, "An Overview of the Research on Plant Leaves International Journal of Pure and Applied MathematEng Special Issue 882 Disease detection using Image Processing Techniques," IOSR J. of Compu. Eng.