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Disease Detection of Cotton Leaf

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Abstract: India is the second largest in population and many crops Indian farmers can cultivate and Most of the farmers cultivate cotton in large numbers but the cotton leaf disease is the major problem in the past few decades and that results in a loss of crops, their productivity and money as well. The Cotton leaves are affected by the disease named Cercospora, Bacterial blight, Ascochyta blight, and Target spot. General observation by farmers may be time-consuming, expensive and sometimes inaccurate. The Cotton leaf Disease Detection and identifying the disease at an early stage is a very difficult task for the farmers. If the infection or disease on the crops was not identified by the farmers at the initial level then it will be harmful to the crops as well as for farmers

Keywords **-** Convolution Neural Network, Keras, Tenserflow, MATLAB, Cotton Leaf disease

I. INTRODUCTION

India is an agricultural country as per the Observation in India Most of the people depend upon agriculture. Farmers have a good range of multiplicity to pick suitable crops for his or her farm. However, the cultivation of those crops for optimum yield and quality produce is usually technical. The disease diagnosis is restricted by human visual capabilities because most of the primary symptoms are microscopic. This process is tedious, time-consuming. Nowadays within the area of research, a major concern is an identification of the symptoms of the disease by means of image processing. The farmers are struggling during their lifestyle for a way to affect the disease of the cotton leaf. There a requirement for a disease diagnosis system which will support farmers. This technique focuses on disease identification by processing acquired digital images of leaves of the plant.

The many paper we refer they use different algorithms for disease detection of leaf many of use support vector machine (SVM), artificial neural network (ANN) so these all different approaches use to detect disease. The main part or advantage of our project is we provide solution for disease and give the information which pesticide or insecticides are suitable for that disease. That can help farmers to stop disease from spreading and crops give better results when we give proper treatment of these crops. The following sample images from our dataset.

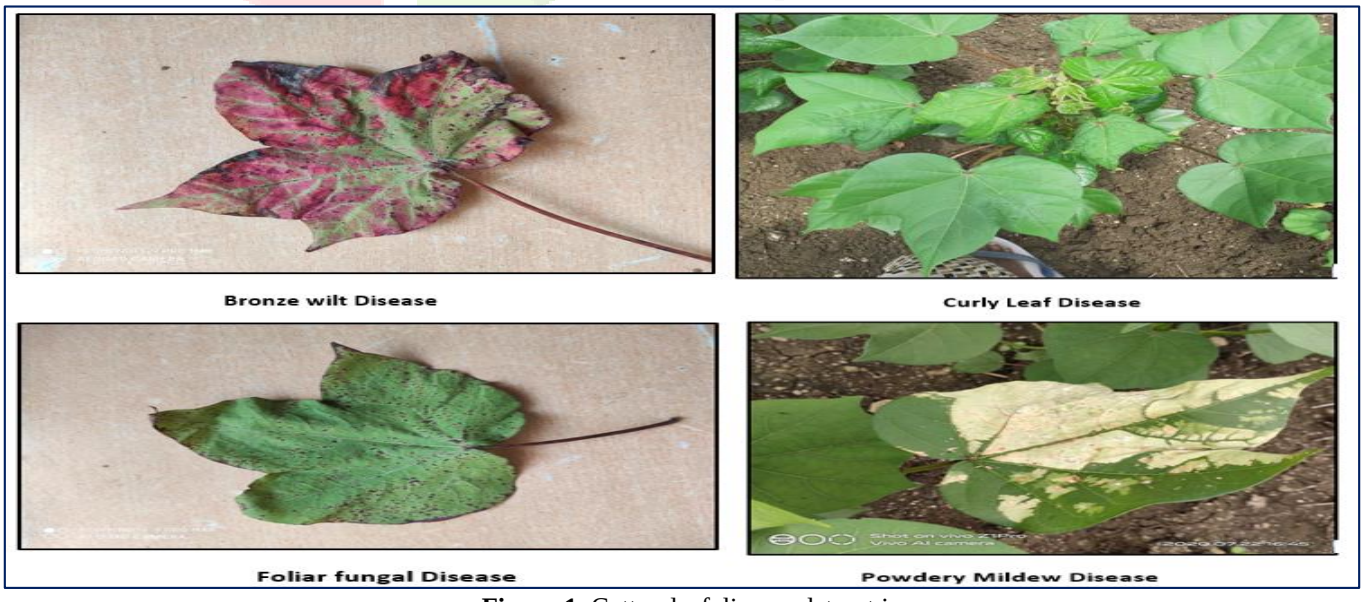

Figure 1. Cotton leaf disease dataset images

II. LITERATURE SURVEY

[1] The paper consists of 4 main phases within the primary phase, we create a colour transformation structure for the RGB leaf image, and then, we apply colour space transformation for the color transformation structure. Then the image is segmented. Within the second phase, the unnecessary part (green area) within the leaf area is removed. Within the third phase, we calculate the feel features for the segmented infected object. Finally, within the fourth phase, the extracted features are skilled a pre-trained neural network. The feature vector of input images is compared with the database. The category with which minimum distance is obtained is identified, class. The classifier utilized in this is often the Euclidean distance classifier. The system is developed to detect cotton disease spots. The system effectively segments the diseased portion of the image of the leaf sample using thresholding-based region extraction (diseased spots).

[2] In this paper they're using Crop Image, Agriculture image Processing, Image segmentation, Histogram Equalization. They divide the diseases within the following three categories: Bacterial disease, fungal diseases, viral disease. The image processing technique is used for detecting diseases on cotton leaf early and accurately. The processing scheme consists of image acquisition through camera or web, image pre-processing includes image enhancement and image segmentation where the affected and useful areas are segmented, feature extraction and classification. Finally the presence of diseases on the plant leaf are going to be identified. For feature extraction, they are using the K-mean clustering algorithm method for classification and Neural-network as recognizer. The step-by-step procedure is shown as below.

1) RGB image acquisition
2) Pre-processing of image using histogram equalization
3) Resize the image
4) K-mean Algorithm for image segmentation
5) Computing features extraction
6) Classification & Recognition using neural networks
7) Statistical analysis.

Study of diseases on the cotton leaf studied by using the image processing toolbox and also the diagnosis Using MATLAB helps to suggest necessary remedies for that disease arising on the leaf of a cotton plant. The accurate recognition for using K- Mean Clustering method the Euclidean distance is 89.56% and the execution time for K-Mean Clustering method using Euclidean distance is 436.95 second and also, thresholding is completed by a dynamical range [0,1] counting on the colour intensity from leaves image. Hence that disease detects using K-mean Clustering method using Euclidean distance and it's excellent methods of disease detection on cotton leaves.

[5] This system consists of two parts: 1) digital image assessment and feature extraction of sample cotton leaf 2) to implement the back propagation artificial neural network in machine learning. This process has the following five steps- Image acquisition, Image Pre-processing, Image enhancement, Image segmentation and Feature extraction. To classify the quality of cotton leaf diseases, the Artificial Neural Network tool of MATLAB is used. This quality identification is done based on the RGB and HSV components of the image. This ANN tool works on neurons, neurons are further connected to hidden layers of neurons. The ANN tool also has a back-propagation process. The prediction of the outcome is taken randomly by the neural network process. The advantage of this method is it can predict the data correctly with minimized error. This method was able to detect cotton leaf with or without defects from the image.

[6] A.Jenifa, Dr.R.Ramalakshmi, V.Ramachandran Developed Multi-Support Vector Machine based classification for cotton leaf disease. The proposed algorithm uses automatic snaps of the crops at every stage, processing them at very early stages to work out their flaws in order for the farmer's loss both in terms of cash and goods to be hence avoided. In the above Multi-SVM algorithm are models that are supervised by human or robot which, when fed with the essential data, makes segmentation and classification of the kinds of illness. This Multi-SVM in comparison over CNN's has several advantages.. While the Multi-SVM is unique and the Convolutional neural network suffers from multiple local minima. The complexity of Multi-SVM doesn't depend upon the size dimensions of the input space while CNN does. The reason why MultiSVM outperforms Convolutional Neural Network is that MultiSVM are less prone to over fits

[7] This system classifies the leaf image using image classification algorithm CNN. It can automatically detect and recognize diseases supported extracted features at each convolution layer. The system used an image processing technique for disease detection. The user must upload the cotton leaf image. The system can pre-process the uploaded image then apply the CNN technique. By using CNN technique system can test the image with the trained dataset and extract the features. This technique is based on the infected images of various plants. Images of the infected plants are captured by a camera and process using segmentation techniques to easily identify the infected area.

1. Image Acquisition: during this phase, the raw image is taken as input from the user and
Converted into an equivalent grayscale image. Also, the image is resized into the size 128*128
2. Convolutional Layers: After the alteration of the captured image, the processed image
Further passes through three different hidden layers during which feature extraction, pooling and
Flattening layer is additionally performed.
3. Disease Prediction: Applying Convolutional Neural Network using Softmax layer the leaf image is predicted with a disease which is gaining absolutely the best probability of occurrence. The goal is to develop a better system which recognizes crop diseases and displays user the results as detected disease, pesticides recommended and price of pesticides recommended, and for that user need to upload a picture then, Image processing starts with the digitized colour image of the diseased leaf. Finally by applying the CNN disease are often predicted.

III. PROPOSE SYSTEM

In a purpose system, we use a real-time dataset that contains various images of cotton disease like bacterial blight, bronze wilt, curly lift, fouler fungal disease. We have given some images for training and some are testing. Initially we take the images from the real time dataset and give it to the model for identifying the cotton disease. As, we give the images to our system, it shows the result in the form of probability. The methodology of cotton disease detection using image processing has the following steps

1) Image pre-processing

In these phases, we require better resolution images and with better quality. All these images are resized with specific manner and resolution. These images we remove noise content and rotate the images using a data augmentation process.

2) Image segmentation

Image segmentation it's a process of dividing a digital image into various sections. Its use to remove the region of the pixel in infected leaf and easily identified the model which part is infected

3) Feature extraction

In this feature extraction process, extract some of the important features of the defected leaf.
It can create colored structure and convert the color value from RGB components of defected parts of cotton leaf image. The feature we can use to train our neural network.

When all processes are done then we give the train and test data to the model and apply the CNN algorithm.
The Following Flowchart you can see how the model is working.

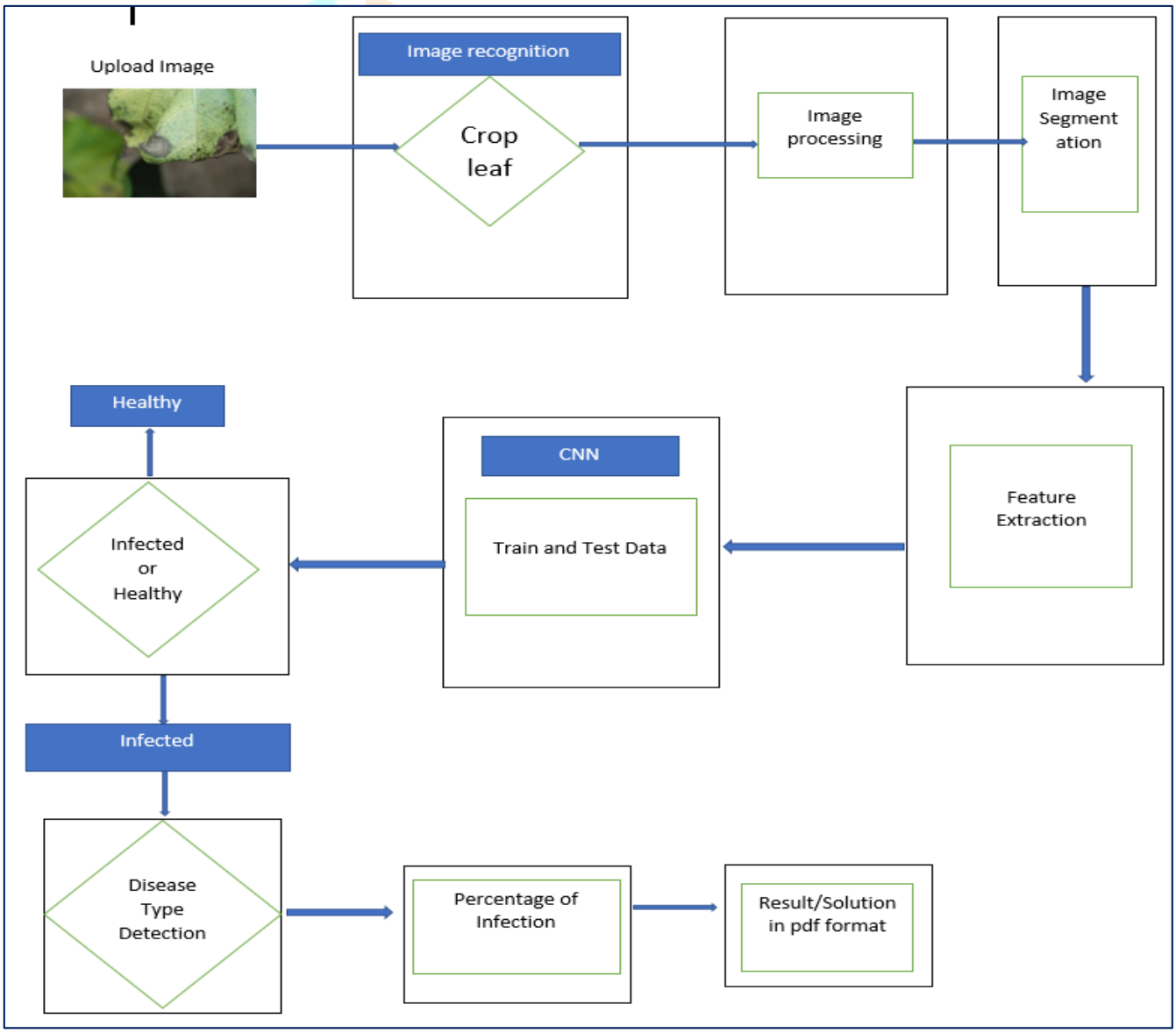

Figure 2. Block Diagram

Data Augmentation

I. MATLAB Tools

There are 4 classes of diseases for which the images were collected. The images were less in number. As deep learning based approaches need more images, we have performed data augmentation using MATLAB. This is one time process which gives 10 rotated versions of original image. Therefore lot of data is generated which is helpful to training model.

II. Google Colab

We have used various data science related libraries like keras, tensorflow, sklearn, opencv, matplotlib, numpy etc. For the purpose of building keras model we have used sequential modelling technique. The architecture of model consists of two conv2D layers. Each conv2D layer is followed by activation layer named 'relu' and maxpooling layer. Maxpolling is that the highest value they can catch and declare. Once the data is available at final maxpooling layer, it is subjected to set of fully connected neuron as they are in ANN. For this purpose flattening is done and dense layers are added. Flatten is convert output to in one dimensional array that work is done by flatter. This creates the architecture of deep learning model which will be trained using the data which was Uploaded earlier

The data is available on the colab server. Path variable will read the images from the path one by one. Each image is read using opencv library. Subsequently, the images are resized with dyadic image processing. The paths of the images also tell about the Class of each image which is extracted and stored in a variable called label.

The data and label lists are converted into numpy arrays for the purpose of training the model. The data train: test split ratio is 75:25. Runtime data augmentation during training is also made available to the optimizer. For building the model, the classifier is notified that the image dimensions are 128*128*3 along with 4 classes. We have used categorical cross-entropy for measuring the losses during training process which are monitored continuously. We have used Adam optimizer which is latest optimizer that SGD. The training process gives a trained model which can further be used for testing purpose. For testing, we have uploaded the .zip file that contained test images. The performance is checked for images from this .zip file after unzipping it.

CNN uses the layers for image processing. If the image having the more than one objects then the CNN recognizes the edges and classify the image accordingly. Pixel is the small portion of the image.. One single image contains number of pixels. These pixels group together it makes entire image. CNN uses feature detector. Feature detector used to detect significant features of image data in order to provide detection. It is the smallest matrix of weights. To reduce the bigger images into smaller images strides are used. Stride is the number of pixel by which we slide our filter matrix over the input matrix. This process is called convolution. By this the shape of the input image is modified feature detection there by detecting the particular feature from the input image and to get the information about that feature. This is called the feature map. Large images takes lot of time. It is easier to process small images in faster manner.

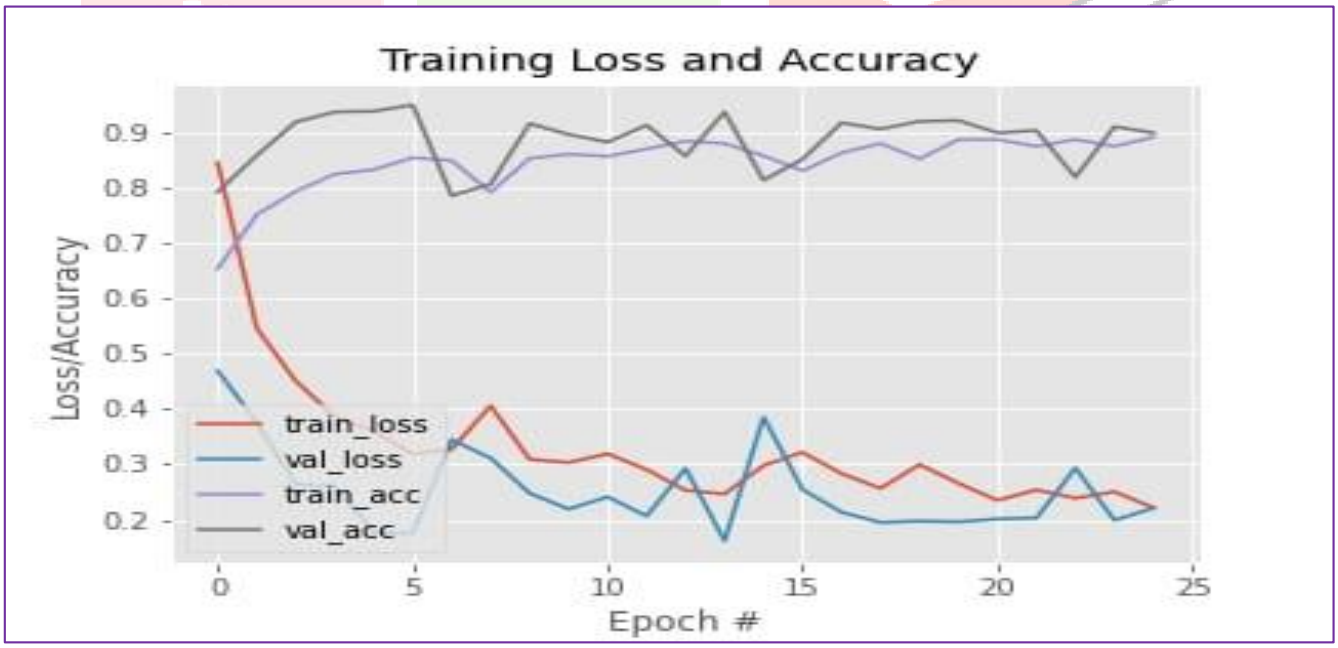

Figure 3. Loss/Accuracy Plot

For the image identification we use tensorflow.Keras layer like input layer, dense layer, convolution 2D layer, Maxpool2D layer, activation layer and Flatten. The keras modelling are different techniques but we use sequential modelling. In these sequential modelling we tell that execute the step by step layer and the all network are made. We use LeNeT class to classify the width, height and depth of the image. Softmax classifier can give us probability to the result whether these image are powdery disease or foliar disease or other disease and out of 100% what the probability of the disease they can give us if the probability is 90% so model is good. We can split the path and set the string through labels. The raw pixel intensities to the range to [0, 1] and in grey scale image maximum value are 255 and minimum value is 0. So we divide 255 to 255 minimum value is 1 so it can be normalized. We take the 25% data to test and 75% data to train.

IV. Conclusion

By survey all the paper we conclude that the cotton leaf disease is the major problem and one thing is small area of land are infected but the farmer can spray pesticides or insecticides in whole farm so we decided to build a model that can detect a disease and also gives the information which type of pesticides or insecticides spray that area and what's the percentage So, farmer can understand and stops the spreading the disease to other crops.

IV. Acknowledgment

References

[1] Pranita P. Gulve, Sharayu S. Tambe, Madhu A. Pandey, Mrs S.S.Kanse, "Leaf Disease Detection of Cotton Plant Using Image Processing Technique", IOSR Journal of Electronics and Communication Engineering (IOSR-JECE) e-ISSN: 2278-2834,p- ISSN: 2278-8735. PP 50-54 ,2015

[2] Vijay S. Bhong, B.V. Pawar,"Study and Analysis of Cotton Leaf Disease Detection Using Image Processing", International Journal of Advanced Research in Science, Engineering and Technology, ISSN: 2350-0328, Vol. 3, Issue 2,February 2016

[3] RakeshChaware, RohitKarpe, PrithviPakhale, Prof.SmitaDesai, "Detection and Recognition of Leaf Disease Using Image Processing", International Journal of Engineering Science and Computing, May 2017

[4] Zhan, W.Huang and C.zhang, "Tree- Channel Convolutional Neural Networks for Vegetable Leaf Disease Recognition", Cognitive Systems Research, 2018

[5] Nikhil Shah, Sarika Jain, "Detection of disease in Cotton leaf using Artificial Neural Network", 978-1-5386-9346-9/19/$31.00 ©2019 IEEE

[6] A.jenifa, R. Ramalakshmi, V. Ramachandran," Classification of cotton leaf Disease using Multi-Support Vector Machine", 978-1-5386-9543-2/19/$31.00 ©2019 IEEE

[7] Shantanu Kumbhar, Amita Nilawar, Shruti Patil, Bodireddy Mahalakshmi, Mansi Nipune, " Farmer Buddy- Web Based Cotton Leaf Disease Detection Using CNN ", International Journal of Applied Engineering Research ISSN 0973-4562 Volume 14, Number 11 (2019) pp. 2662-2666