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PLANT DISEASE PREDICTION USING DEEP LEARNING

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Abstract:For preventing the losses in the yield and quantity of the agricultural product, Classification is performed, if proper analysis is not taken in this approach or classification, then it produce serious effects on plants and due to which respective product quality or productivity is affected. Disease classification on plant is very critical for supportable agriculture. It is very difficult to monitor or treat the plant diseases manually. It requires huge amount of work, and also need the excessive processing time, therefore image processing is used for the detection of plant diseases. It is an innovative approach to automatically detect and grade the diseases on fruits Module identification of this project is Bacterial Blight, fruit spot, Fruit Rot, virus diseases on fruits. Molecular techniques and profiling of plant volatile organic compounds are used for diseases detection its vital functions such as photosynthesis, transpiration, pollination, fertilization, germination, and some fruit disease. Plant disease classification involves the steps like load image, pre-processing, segmentation, feature extraction.

Keywords: *CNN , ResNet ,VGG 16*

I. INTRODUCTION

India is a cultivated country and about 80% of the population depends upon on agriculture. Farmers have large range of difference for selecting various acceptable crops and finding the suitable herbicides and pesticides for plant. Disease on plant leads to the convincing reduction in both the quality and productivity of agricultural products. The studies of plant disease refer to the studies of visually observable patterns on the plants.CNN classification approach are proposed and used in this paper. Health of plant leaf and disease on plant leaf plays an important role in successful cultivate of crops in the farm. In early Days, analysis of plant diseases was done manually by the expertise person in that field only. This requires huge amount of work and also requires excessive processing time.

The image processing techniques can be used in that paper. In most of the cases disease symptoms are seen on the leaves, stem and fruit. Mostly image processing includes regarding images as signals while applying signal processing methods, it is among very quickly growing technologies today, its applications in various aspects of a business. Image Processing is cast core research area within engineering and computer science regulation too. Image processing basically contains the following three steps:

a) Importing the image with ocular scanner or by digital photography. b) Analyzing and handling the image which includes data condensation and image enhancement and spotting patterns that are not to human eyes like satellite photographs. c) Output is the last stage in which result can be changed image or report that is based on image analysis.

II. LITERATURE REVIEW

[1] This paper describes an image processing technique that identifies the visual symptoms of chili plant diseases using an analysis of colored images, Work of software program that recognizes the color and shape of the chili leaf image, to enable a recognition process to determine the chili plant disease through the leaf images, the input image was enhanced to preserve information of the affected pixels before extracting chili leaf image from the background. The color model respectively was used to reduce effect of illumination and distinguish between chili and non-chili leaf color efficiently and the resulting color pixels are clustered to obtain groups of colors in the image.

[2] This paper introduce an innovative approach to automatically detect and grade the diseases on pomegranate fruit Module identification of this paper is Bacterial Blight, Cercospora fruit spot, Fruit Rot, Alternaria fruit Spot diseases on pomegranate fruit. Molecular techniques and profiling of plant volatile organic compounds were used for diseases detection its vital functions such as photosynthesis,

transpiration, pollination, fertilization, germination, and some pomegranate fruit disease.

[3] This paper connected to spectroscopic and imaging based, and volatile profiling based plant disease detection methods, Segmentation of leaf image is important while extracting the feature from that image, Methods of this spectroscopic and imaging techniques are: fluorescence imaging, multispectral or hyper spectral imaging, and infrared spectroscopy. The fluorescence steady at certain frequencies such as 450, 550,690, and 740 nm and provide difference between the fluorescence at 550 and 690nm were higher in the diseased portion of the leaves, while it was very low for healthy regions of the leaves. Quadratic discriminated analysis (QDA) used for analysis, QDA classified healthy and diseased plants with an accuracy of 71% and 96%, respectively.

III. METHODOLOGY

Convolutional Nueral Network (CNN)

The name "convolutional neural network" indicates that the network employs a mathematical operation called convolution. Convolutional networks are a specialized type of neural networks that use convolution in place of general matrix multiplication in at least one of their layers.

Convolutional networks were inspired by biological processes in that the connectivity pattern between neurons resembles the organization of the animal visual cortex. Individual cortical neurons respond to stimuli only in a restricted region of the visual field known as the receptive field. The receptive fields of different neurons partially overlap such that they cover the entire visual field.

CNNs use relatively little pre-processing compared to other image classification algorithms. This means that the network learns to optimize the filters (or kernels) through automated learning, whereas in traditional algorithms these filters are hand-engineered. This independence from prior knowledge and human intervention in feature extraction is a major advantage. Region Based Convolutional Neural Networks have been used for tracking objects from a drone-mounted camera, locating text in an image, and enabling object detection. The features of all region proposals that have an IoU overlap of less than 0.3 with the ground truth bounding box are considered negatives for that class during training. The positives for that class are simply the features from the ground truth bounding boxes itself. In order to improve localization performance, the authors include a bounding-box regression step to learn corrections in the predicted bounding box location and size.

CNNs take a different approach towards regularization: they take advantage of the hierarchical pattern in data and assemble patterns of increasing complexity using smaller and simpler patterns embossed in their filters. Therefore, on a scale of connectivity and complexity, CNNs are on the lower extreme.

Steps:

Step 1 : Dataset Collection.
Step 2 : Data Preprocessing.
Step 3 : Features extraction
Step 4: Train the model.
Step 5: Evaluate the model

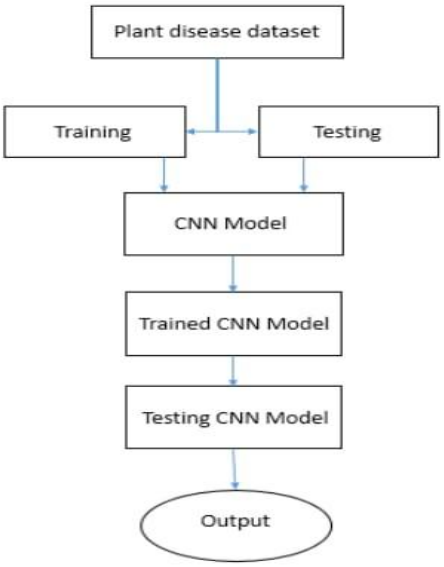

Fig. 1. Methodology

IV. EXPERIMENTAL RESULTS AND DISCUSSION

Dataset Collection:

The images of the plant leaf are captured through the camera, this image is in RGB (Red, Greenand Blue) form, color transformation structure for the leaf image is created, and then an independent color space transformation for the color transformation structure is applied.

Pre-processing:

To remove noise in image or other object removal, pre-processing techniques is considered. Image clipping i.e. cropping of the leaf image to get the interested image region. Image smoothing is done using the smoothing filter. Image enhancement is carried out for increasing the contrast. The RGB images into the grey images using color conversion using equation(x) =0.2989*R + 0.5870*G + 0.114*B Then the histogram equalization which distributes the intensities of the images is applied on the image to enhance the plant disease images. The cumulative distribution function is used to distribute intensity values.

Feature extraction:

Feature extraction plays an important role for classification of an image. In many application feature extraction of image is used. Color, texture, morphology, edges etc. are the features which can be used in plant disease classification, texture means how the color is distributed in the image, the roughness, hardness of the image. In this project considers color, texture and morphology as a feature for disease detection. They have found that morphological result gives better result than the other features. It can use for identify the infected plant leaf of classification plant image.

Train the model:

The labeled datasets are segregated into training and testing data. The feature vector is generated for the training dataset using HoG feature extraction. The generated feature vector is trained under a Random forest classifier. Further the feature vector for the testing data generated through HoG feature extraction.

Image (RGB) load:

The images of the plant leaf are captured through the camera, this image is in RGB (Red, Greenand Blue) form, color transformation structure for the leaf image is created, and then an independent color space transformation for the color transformation structure is applied.

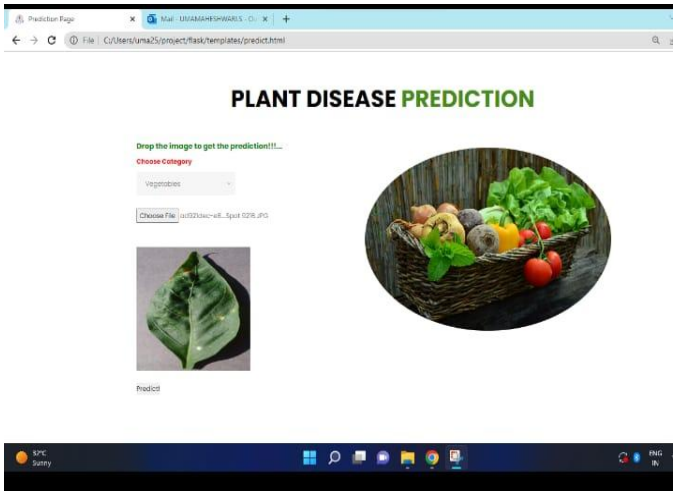

Fig. 2.Load the image

Evaluate the model:

Feature extraction plays an important role for classification of an image. In many application feature extraction of image is used. Color, texture, morphology, edges etc. are the features which can be used in plant disease classification, texture means how the color is distributed in the image, the roughness, hardness of the image. In this project considers color, texture and morphology as a feature for disease detection. They have found that morphological result gives better result than the other features. It can use for identify the infected plant leaf of classification plant image.

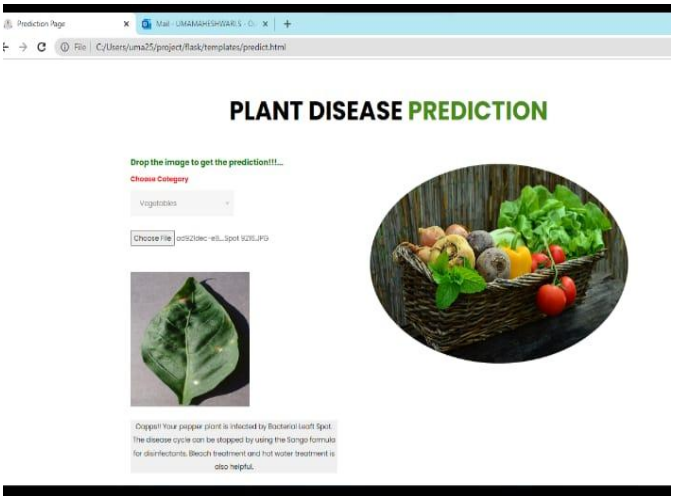

Fig. 3. Analysing the output

V. CONCLUSION

The accurate Disease detection and classification of the plant leaf image is very important for the successful cultivation of cropping and this can be done using image processing. This paper discussed various techniques to segment the disease part of the plant. This paper discussed classification techniques to extract the features of infected leaf and the classification of plant diseases throw CNN classifier. Before the problem of crop disease detection can be solved, the problems of identifying different species of plants need to be addressed. Fortunately, there has been much work already completed in this problem domain. Color features, such as the mean, standard deviation, skewness, and kurtosis are made on the pixel values of the various plant leaves can analyzed in future.

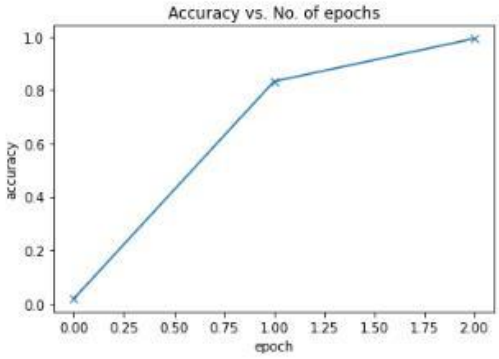

Fig. 4. Graph

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