Classification Of Plant Leaf Disease Using Machine Learning & Pre-Processing Techniques

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Abstract- *Agriculture is the backbone of the Indian economy. In India itself, around 65% of the population is based on agriculture. Due to changes in weather & local conditions, the crops get infected & they get infected by various diseases which results in the bad condition of the crops. Common effects on plants include a detectable change in color, size, or function of the plant. The black spot is a fungal disease that causes a black round spot that forms on the upper layer of leaves, Blight can rapidly spread the infection, The canker spot is usually surrounded by yellow halo/spot & they can be seen on both the upper & lower sides. we are presenting the counterfeit insights based on programmed plant leaf illness location and classification for the fast and simple location of malady and after that classifying it and performing required cures to remedy that infection. This approach is the line with our goal of increasing crop efficiency in horticulture.*

Keywords- Plant Leaf Diseases Detection, Classification,Image Pre-processing, Segmentation, K Means clustering

I. INTRODUCTION

Human Beings have 3 basic needs i.e., food, clothes, and shelter. One of them is Food …but not only humans, animals also need food to survive. As it is important for living beings to survive they should be healthy and clean…Our module helps the farmers to keep the crops healthy with the help of the detection of leaves. CNN algorithm we will use for the automated processing of image recognition & processing due to its ability to recognize patterns of image. The CNN algorithm is designed to suit both healthy leaf and sick leaf. Photos are used to train the model and output is determined by the input leaf.Accuracy and speed are the main factors that will decide the success of automatic plant leaf disease detection & Classification mode.Deep learning gives detectors the chance to quickly and accurately identify crop diseases, which will enhance plant protection accuracy and broaden the application of computer vision in precision agriculture

II. SYSTEM ARCHITECTURE

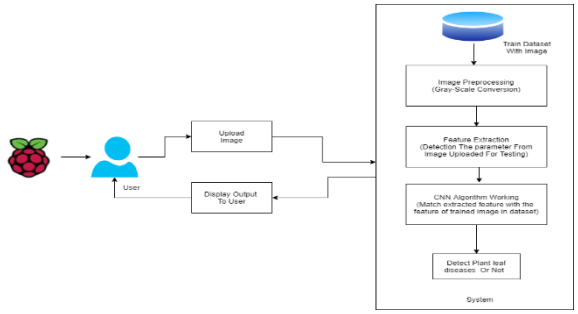

Fig: System Architecture

Step 1 : Start
Step 2 : Prepare Database (Healthy/Unhealthy)
Step 3 : Preprocessing Normalization
Step 4 : Train CNN
Step 5 : Real image from PC
Step 6 : Pre-processing
Step 7 : Test Network
Step 8 : if probability of healthy > probability of unhealthy
Display Healthy Image Otherwise
Display Unhealthy image
Step 9 : End

III. IMPLIMENTATION

In this section , the detailed designed and implementation of the system are presented.

The block diagram of plant disease detection process is given in the figure below.

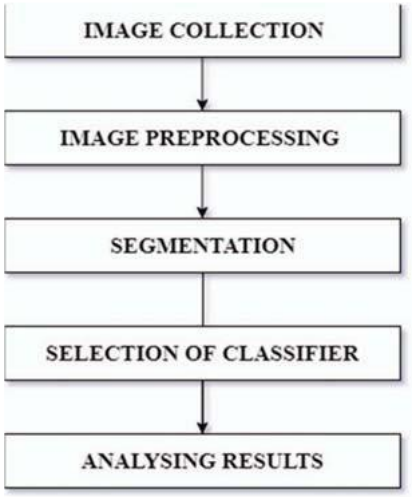

Fig: Block diagram of plant disease detection

3.1Image preprocessing:

In this step images are resized to smaller pixel size in order to speed up the computations. The acquired images contain some noise. This noise is removed using some filtering techniques like Gaussian Blur. After that images are present in RGB format which is not appropriate for further work as RGB format is unable to separate image intensity. Hence it is converted to another color space that is Greyscale image.

Fig.1 Sample Images from Dataset

Fig.2 Images after Preprocessing

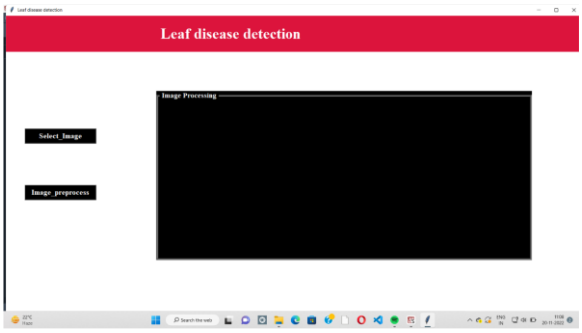

Fig: GUI

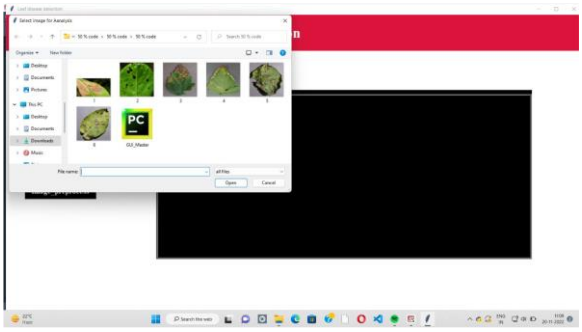

Fig: Select Image

3.2 Segmentation:

In this step, segmentation of images is done in order to separate the leaves from the background. Segmentation is performed using K-means clustering with 2 cluster centers, one for background and one for foreground. K-means clustering is unsupervised learning technique that is used to segregate the datapoints in the predefined number (k) of clusters or groups on the basis of their similarities.

K –Means algorithm works as follows: -

Set of inputs: - number of clusters(k), set of datapoints

1. Put k centroids in random location in space.

2. Repeat the following steps until none of cluster location changes: -

a) For every datapoint x□ -

i. Find nearest centroid c□ by argmax D (x□, c□) where D = ¥ (™(x□-y□))

ii. Assign x□ to the cluster with nearest centroid

b) For every cluster, new centroid is assigned by taking mean of all datapoints assigned to that cluster

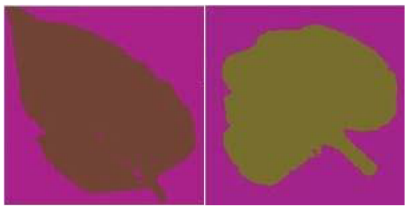

Fig 2: Images after K-means clustering

After finding the two clusters, one with background and other one with leaf part, the clustered image is used to change the pixel value of the background of the leaf to black. By doing so the useless information from the image is eliminated which in turn increases accuracy.

Fig 3: Images after removal of background

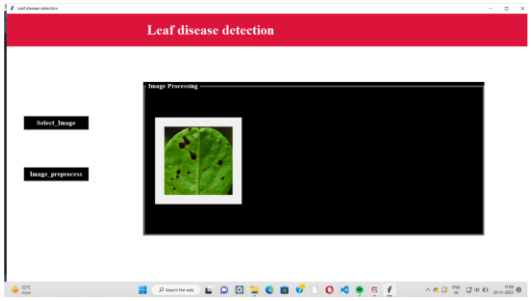

Fig: Image after removal of background

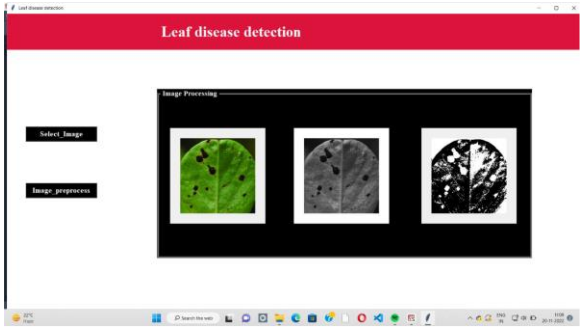

Fig: RGB to Greyscale image conversion

IV. CONCLUSION

The algorithm we have used, helped because it is easy to detect leaf disease & farmers can know which pesticides should be spread on the crops. We've used python language which gives an accuracy of around 94.8% in the detection of leaf diseases. In upcoming future, we also try to increase this percentage of accuracy so that the farmers can easily detect plant disease & a healthy planet.

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