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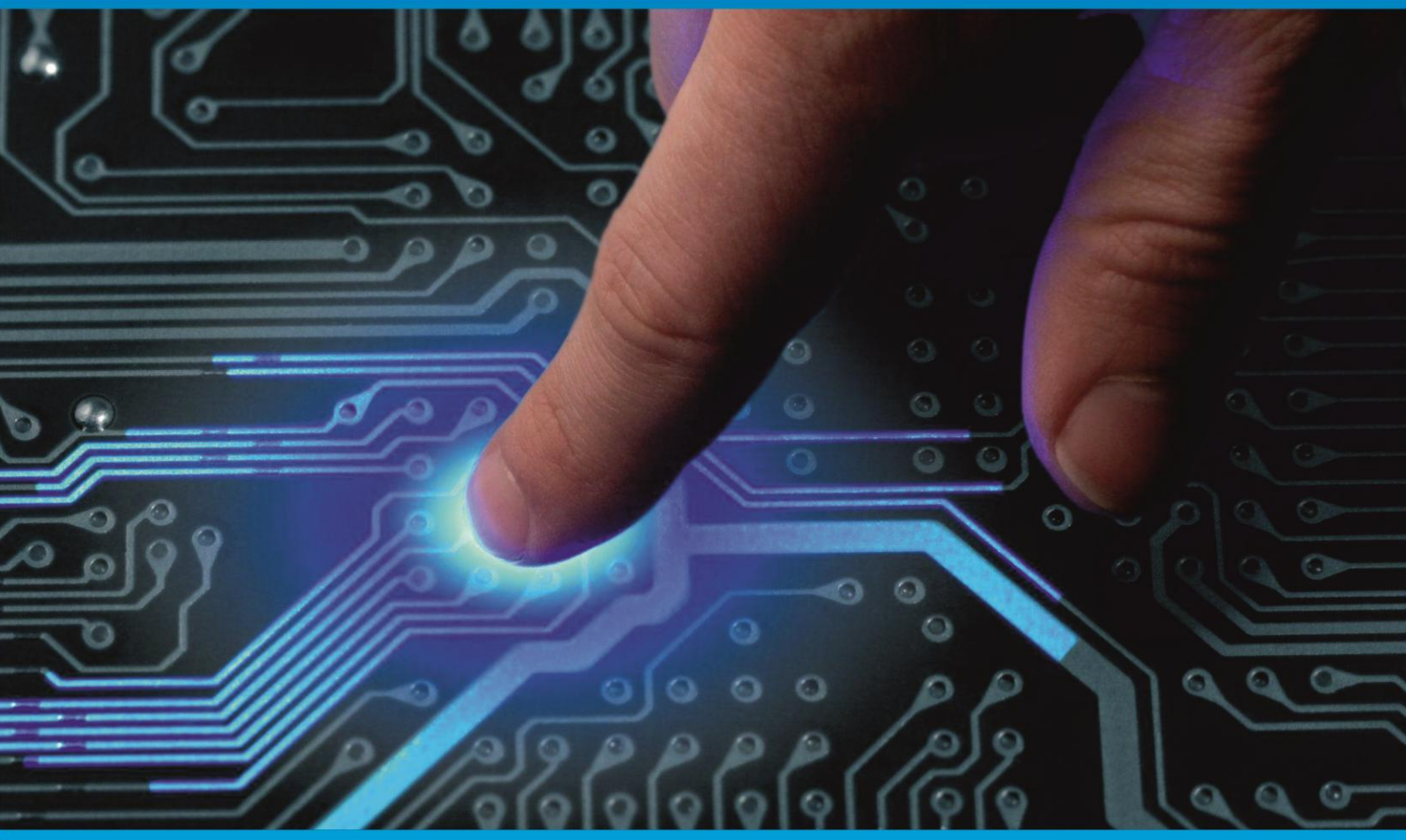

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A Smart Phone Image Processing Application for Plant Disease Diagnosis

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ABSTRACT: Agricultural productivity is that issue on that Indian Economy extremely depends. this is often the one in all the explanations that malady detection in plants plays a very important role in the agriculture field, as having the malady in plants are quite natural. If correct care isn't taken during this space then it causes serious effects on plants and because of that various product quality, amount or productivity is affected. Detection of disease through some automatic technique is helpful because it reduces an oversized work of watching in huge farms of crops, and at terribly early stage itself it detects the symptoms of diseases means that after they seem on plant leaves. This paper presents a neural network algorithmic program for image segmentation technique used for automatic detection still as the classification of plants and survey on completely different diseases classification techniques that may be used for plant leaf disease detection. Image segmentation, that is a very important facet for malady detection in plant disease, is completed by victimization genetic algorithmic program

I. INTRODUCTION

Image Definition Image is a collection of pixels or dots which are stored in rectangular array. Each individual pixel is having certain kind of color. We can measure the size of the image by counting the no of pixels in that particular image. Different types of images are there such as Black and White and Grey scale images. Both types vary from each other .In black and white image each dot or pixel is either black or white, therefore only one bit is needed per pixel. Whereas Grey scale images uses 8 bits per pixel. For color images things gets slightly difficult. In color images number of bits at every dot termed as the height of image. It is also referred as the bit plane. For bit plane consisting of x, 2x color are possible. Different methods are available to store the color information of image. One of the method is RGB image also termed as true color image. For every pixel red, green and blue component is stored in three dimensional arrays.

Identifying Patterns

In order to detect the same kind of pattern different pattern recognition techniques are used in MATLAB. Using these techniques we recognize the similar kind of the pattern in the problem. When same kind of pattern are detected then these can be used to generate outputs or solve the problems more efficiently. In order to recognize the pattern, we need to train the machine. For this first we need to classify the data .The data is classified using the key features .For classifying the data we have different type of learning modules is there such as supervised learning and unsupervised learning modules .Bothe of these modules are used to identify the patterns. In supervised learning module we train the machine by recognizing the patterns in the data set and then results which are generated are applied to the testing data set. We train the machine over the training dataset and test it over the testing data set. In unsupervised learning module, there are no visible pattern the dataset, so with the help of the some algorithm we try to catch the patterns. Clustering algorithm, classification algorithm such as Markov Model (MM) is there. For recognizing the patterns we identify we have different techniques such as preprocessing, Extraction of features and classification. In preprocessing we try to filter out, smooth the data by normalizing in more ordered way. Filtering such as noise filtering is there. Feature extraction is usually done using the software which collect the information from the data. Sensors are also used for this purpose and the final phase is the classification.

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II. LITERATURE SURVEY

Rice Disease detection Pattern Recognition Techniques. The point of this paper is to depict a product model framework for the discovery of malady in rice plant based on different pictures of the rice plants. Pictures of the tainted piece of the rice plant are taken utilizing computerized camera. With the end goal to identify the abandoned piece of the plant different procedures like picture division, picture developing and so forth. By utilizing neural system the tainted piece of the leaf is grouped. Picture preparing and delicate processing procedures are joined on infected plant.
Procedures embraced in paper:

- Preparing & design examination strategies of images
- Binary cutoff methods
- Border layout calculation using eight-availability strategy
- Self-organizing map(SOM)

In this examination paper, the diseased part of the rice plant leaf is identified with the help of the self-organizing map. Testing is done using four different images of the crop. Infected region is extracted using neural networks pattern recognition techniques. By utilizing effective example acknowledgment procedures, the framework will have the capacity to do the opportune finding of the field issue and the proposal will assist the ranchers with taking the suitable measure to build the nature of the harvest .It won't just decrease the improvement cost later on yet in addition spare the earth too.

Remote area farmer can also identify the disease in the pomegranate crop as this algorithm gives user option with and without intent. It let the user to upload the image in the system for further processing. This approach is very affective. Also experimental readings shows that the algorithm has eighty two percent accuracy considering average of both case. In almost every case pomegranate disease is identified. Web base approach is also very fast and there is no distortion occur in communication of images in transition of images in this approach. Pixel values remain maintained and cleared. Paper [1] presents classification and detection techniques that can be used for plant leaf disease classification. Here preprocess is done before feature extraction. RGB images are converted into white and then converted into grey level image to extract the image of vein from each leaf. Then basic Morphological functions are applied on the image. Then the image is converted into binary image. After that if binary pixel value is 0 its converted to corresponding RGB image value. Finally by using pearson correlation and Dominating feature set and Naïve Bayesian classifier disease is detected. In paper [20 there are four steps. Out of them the first one is gathering image from several part of the country for training and testing. Second part is applying Gaussian filter is used to remove all the noise and thresholding is done to get the all green color component. K-means clustering is used for segmentation. All RGB images are converted into HSV for extracting feature.

III.SYSTEM DESIGN

3.1 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.

3.2 PROPOSED SYSTEM

There are many techniques that are presently being utilized to make computer-based vision systems victimization options of plants extracted from pictures as input parameters to varied classifier systems. during this paper, a method to argument already existing techniques of plant leaves identification system is represented. this paper, a brand new classification model involving neural networks (NN) was utilized to develop a pc primarily based vision system for automatic identification of plant species.

BLOCK DIAGRAM

Digital devices such as digital camera or smartphones are used to take photos of the plant leafs and these images are used to separate out and measure the diseased part area. In order to properly identify the affected region we need image without and impurities so contrast enhancement other image processing techniques are applied on every input image. By enhancing the image using the image processing techniques we get different features of the images which are not visible from the human eye. Above is the flowchart depicting the basic architectural flow.

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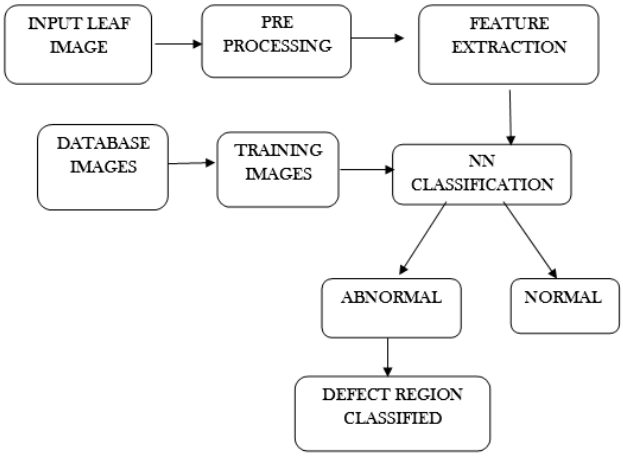

Image acquisition is the first step in the image processing. Any image is taken from the digital devices thereafter image preprocessing and segmentation are done and necessary feature are extracted from image. During classification, with the help classification algorithm different clusters are made. We used k means color based clustering in order to detect and identify the affected area. By selecting the one of the cluster our algorithm uses support vector machine for the prediction of disease.

IV. SYSTEM IMPLEMENTATION

4.1 GENERAL

In this chapter we describe the implementation details of the algorithm and steps in which our algorithm works for the identifying the disease. K means color based clustering algorithm is used in this problem. Below are the steps in which an input image is processed.

- Image acquisition
- Image preprocessing and enhancement
- Image segmentation using k means and Otsu classifier
- Feature extraction

4.2 IMAGE ACQUISITION

Image acquisition means to collect different type of samples for the formation of the input dataset. Dataset images further go through the various steps. In order to provide best solution to any problem it is necessary that dataset cover majority of the different type of inputs. We have covered different plant leaves. Different image formats are taken in our dataset. Any other image excluding dataset can be used in our algorithm provided its size is matching and format is known, out algorithm and its classifier gives the prediction of the disease for that random image.

4.3 IMAGE PREPROCESSING AND ENHANCEMENT

It is the second phase in digital image processing. In this using MATLAB input image noise is reduced, pixel values gets more classified, spot reduction and contrast enhancement is there. The purpose of the image preprocessing and enhancement step is that after preprocessing the image its get easy to separate the infected area. Indirectly the classifier we use works better with preprocessed image without and impurities. Values of the pixels also get adjusted in the preprocessed image. MATLAB provides user number of different filters for the enhancement of the image.

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Figure: Image Preprocessing Original Image.

Figure: Preprocessed Image

In figure 4.1 we can see the difference between the two of the images. The first image is the input image and the second one is the preprocessed image in which we enhance the contrast other features of the image using the MATLAB. Preprocessing let the users to reduce the noise in the image and overall quality of the image is improved. The leftover space in the first image is also gets separated in the second preprocessed image. For every different color the contrast gets more enhanced for every pixel value.

4.4 SEGMENTATION:

It means representation of the image in more meaningful and easy to analyse way. In segmentation a digital image is partitioned into multiple segments can defined as super-pixels.

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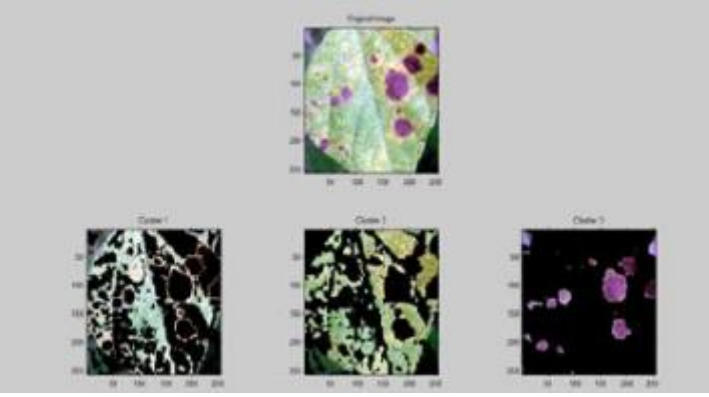
K-means clustering algorithm:

This algorithm is used to cluster/divide the object based on the feature of the leaf in to k number of groups. This is done by using the Euclidean distance metric.

The algorithm of k means



- Initialization: User should select the value of k. k means the number of clusters/groups, i.e. the image is divided in to k number of clusters.
- Every pixel is assigned to its nearest centroid (k).
- The position of centroid is changed by means of data values assigned to the group. The centroid moves to the centre of its assigned points.

Out of these three clusters classification is done for only one cluster which has affected area.

V. RESULTS AND PERFORMANCE ANALYSIS

5.1 GENERAL

The purposed algorithm is made to run for each individual image. In our solution we have covered four different type of diseases which are Alternaria Alternata, Anthracnose, Bacterial blight, Cercospora leaf spot. Given below figures shows the detected disease for input image from a particular disease dataset.

5.2 ALTERNARIA ALTERNATA

Analysis: Plant leaf infected with the alternaria alternate is loaded from database. Contrast enhancement and preprocessing of image is done in the second phase. In image segmentation column one of the cluster is loaded .As the above figure shows the disease classified as Alternaria Alternata .Also area of the affected region in percentage is also shown. To check the accuracy of the our purposed methodology the image is passed through five hundred iteration and every time different clusters is chosen by the algorithm and then accuracy is predicted. The figure shows the accuracy

5.3 ANTHRACNOSE

Analysis: the figure shows the disease classification and prediction of the leaf image infected with anthracnose. Same steps are performed. In this case we can see that disease is classified as the Anthracnose and nearly sixty percentage of area is affected by this disease and the accuracy comes out to be ninety six percentage. Various features which are extracted are also displayed on the right side of the image.

5.4 BACTERIAL BLIGHT

Analysis: In the figure we can see that the diseases identified for the query image comes out to be bacterial blight. Various features both shape color oriented are shown. Preprocessed image and segmented region of interest is shown. In this case disease affected area comes out to be fifteen percentage on the other hand accuracy comes out to be ninety six percentage.

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5.5 CERCOSPORA LEAF SPOT

Analysis: disease classified is Cercospora leaf spot and percentage of the area affected is around sixteen percentage and the accuracy comes out to be approximately ninety five percentage.

5.6 HEALTHY LEAF

Analysis: when the query image of healthy leaf is taken then the result is classified as the healthy leaf with no affected region and accuracy of ninety six percentage.

VI. CONCLUSION

This paper gives the executed results on different diseases classification techniques that can be used for plant leaf disease detection and an algorithm for image segmentation technique used for Automatic detection as well as classification of plant leaf diseases has been described later. Banana, beans, jackfruit, lemon, mango, potato, tomato, and sapota are some of those ten species on which proposed algorithm was tested. Therefore, related diseases for these plants were taken for identification. With very less computational efforts the optimum results were obtained, which also shows the efficiency of the proposed algorithm in recognition and classification of the leaf diseases. Another advantage of using this method is that the plant diseases can be identified at an early stage or the initial stage.

VII. FUTURE ENHANCEMENT

Web based image processing techniques can be implemented. In this user is provide with two modes with and without internet. In case of web base processing remote area users can upload image in system and whole image system techniques and classification algorithm will we implemented in the cloud itself. Real time monitoring of the data is there using the cloud platform. To improve recognition rate in classification process Artificial Neural Network, Bayes classifier, Fuzzy Logic, and hybrid algorithms can also be used.

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