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Plant Leaf Disease Identification System for Android

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Abstract- **Plants play a very significant role in the agricultural field. As India is an unindustrialized country and the position of any country in the word depends on its agricultural production. Due to climatic changes and environmental condition many of disease occur in plant. Sometimes human eye cannot identify the diseases, the plant leaf disease badly affect the worth of the production. To overcome this an android application is developed which identifies the diseases on the plant leaves and provides prevention methods. Plant leaf disease identification is done based on the image captured using this android application. Detecting the plant leaf disease at the early stages helps the farmer to overcome it and it properly.**

Index Terms: - Android application, Loading Image, Segmentation, Feature Extraction.

I. INTRODUCTION

In India, Farmers have a great diversity of crops. Various pathogens are present in the environment which severely affect the crops and the soil in which the plant is planted, there by affecting the production of crops .Various disease are observedon the plants and crops .the main identification of the affected plant or crop are its leaves. The various coloured spots and patterns on the leaf are very useful in detecting the disease. The past situation for plant leaf disease detection taken direct eye observation, recall the particular set of disease as per the climate, season etc. India is a cultivated country and about 80% of the population depends upon on agriculture. Farmers have large range of dissimilarity for selecting various acceptable crops and finding the suitable herbicides and pesticides for plant. Plant leaf disease leads to the reduction in both the quality and quantity of agricultural products. The diseased plant leaf refer to the studies of visually observable patterns on the plants.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 leaf diseases were done manually by the proficiency person in that field only. This requires huge amount of work and also requires excessive processing time. Diseases on the plant leaf have turned into a significant problem as it can cause serious reduction and losses in both quality and quantity of agricultural products. A vast majority of the growing national population depends on agriculture yields. But the cultivation of these crops for optimum yield and quality produce is highly technical & challenging. It can be improved by the aid of technological support and mechanized farming. Many authors have worked on the development methods for the automatic detection and classification of leaf diseases based on high resolution multispectral, hyper-spectral and stereo images. The philosophy behind precision agriculture is not only including a direct economical optimization of agricultural production, it also stands for a reduction of harmful outputs into the environment and non-target organisms. In particular, a contamination of water, soil, and food resources with pesticides has to be as minimal as possible in crop production.

Machine learning-based detection and recognition of plant diseases can provide extensive clues to identify and treat the diseases in its very early stages. Identification of plant diseases by naked eye comparatively is quite inefficient, inaccurate and difficult. Automatic detection of plant diseases is very important to research topic as it may prove the benefits in monitoring large fields of crops, and thus automatically detect the symptoms of diseases as they appear on plant leaves. Therefore looking for quick, automatic, low cost and precise method to detect plant disease cases is of great realistic significance. Machine learning-based detection and recognition of plant diseases can provide extensive clues to identify and treat the diseases in its very early stages. Without correct plant leaf disease diagnosis, actual control actions cannot be used at the suitable time. Image Processing is one of the widely used technique for plant leaf diseases detection and classification. Our paper provides a survey of diverse image processing techniques used for study plant leaf diseased plant leaf.

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Disease identification involves the steps like image loading, image pre-processing, image segmentation, feature extraction and classification.

Image processing techniques could beapplied on various applications as follows:

1. To detect plant leaf, stem, and fruit diseases.
2. To quantify affected area by disease.
3. Finding the boundaries of the affected area.
4. Used to determine the colour of the affected area
5. Determining size & shape of fruits

II. RELATED WORKS

Many works involving plant leaf disease detection have been proposed, but in general they do not discuss the effectiveness of their work. S.Selvarajah and S.R. Kodituwakku proposed Texture Feature based Image Retrieval Algorithms. Image Retrieval is the process of retrieving the most closely matched images automatically by extracting the basic features such as edge, shape, color and textures from the query image. Grey –level co-occurrence matrix (GLCM) and Color Co–occurrence matrix (CCM) are the suggested image retrieval system for texture feature. The GLCM and CCM separately combined with a color feature with the use of quantization of HSV color space. The multi-feature extraction is achieved through the Euclidean distance classifier. The proposed system performance is also measured by conducting experiments in different ways.

In the work proposed by Dengsheng Zhang and Guojun Lu, A Comparative Study on Shape Retrieval Using Fourier Descriptors with Different Shape Signatures Shape is one of the most important features in Content Based Image Retrieval (CBIR). Many shape representations and retrieval methods exist. But, most of those methods either do not well signify shape or are difficult to do normalization (making matching hard). Among them, methods based Fourier descriptors (FD) achieve both well representation and well normalization. FD's are derived by exploiting the different shape signatures however, FDs derived from different signatures can have significant different effect on the result of retrieval. In this paper, we build a Java retrieval framework to compare shape retrieval using FDs derived from different signatures. Collectiveproblems and techniques for shape illustration and normalization are also examined in the paper. Data is given to show the retrieval result.

Peng-Yeng Yin, Yang Mingqiang, KpalmaKidiyo, and Ronsin Joseph, focused on A Survey of Shape Feature. It becomes essential to build an automatic and proficient recovery system to browse the entire database. Techniques using textual attributes for annotations are limited in applications. The present approach relies on image feature that exploit visual cues such as shape. This paper describes outline based shape context descriptor for gray scale image repossession. The proposed shape setting descriptor will advance efficiency by using shape parameter and shape representation method. Shape context descriptor has properties like translation, rotation and scale invariant.

III. EXISTING SYSTEM

The current system recognizes the plant leaf disease from the images obtained. Here the K-means clustering is used. This system is based on two SVM classifiers. The proposed method represents the other relevant features in order to get high recognition. They used SVM for classification instead of neural networks because of its ease also gives a perfect result. Firstly classifier is used for the colour to classify the images with the same or nearest colour belonging to the same class. Then the classifier is used to differentiate between the classes with the same colour according to the texture and shape features. The test of this study is carried out in different classes of disease including various pest insect's damages and few forms of pathogens symptoms. The different diseases are caused due to fungal infections, bacterial and viral attacks. Images form necessary data and information in biological field. Plant diseases have turned into a problem as it can cause significant reduction in both quantity and quality of agricultural products. Mechanically recognition of plant leaf diseases is a necessary topic as it helps to recover profit in observing large fields of crops, and thus automatically detect the diseases as they appear on plant leaf. The proposed system is a software solution for automatic computation and detection of texture statistics for plant leaf diseases.Presence of disease on the plant leaf is assess.

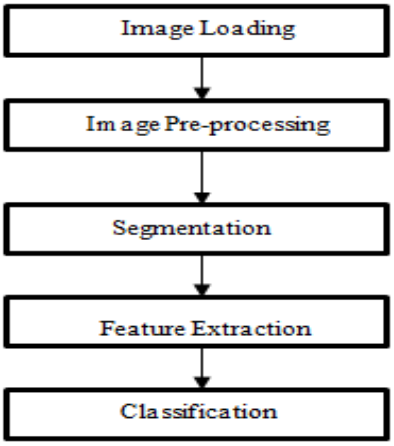

Fig.1.Existing system

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IV.PROPOSED SYSTEM

The steps in the working of the system are:
1. Leaf Image Database Management: Admin user is a super user in this system, who is responsible to upload leaf images into the database. This is a web based application, so Admin can able to upload the images from any computer into MATLAB local database

2.Querying through Image: The user selects an image and input to the system. This sample image is the query for the retrieval process. This sample image is the query for the retrieval process. It can be an image selected from any of the databases associated with the system or other images from outside. Using mobile app.

3.GLCM Feature Extraction: Includes extracting the GLCM features from the query image and database images, comparing the feature vectors, computing the distance values and which help in classification Process.

4.K-means segmentation: Includes extracting the diseased area using k means algorithm where from the query image the algorithm pulls out the leaf which is affected by major part of disease.

5.Classification Process: SVM classifier which is multi classification based is used, polynomial kernel of third order is utilized to implement the classification process.

6.Retrieval: The disease retrieved from images are provided with a treatment plan so as to cure the disease

V. SYSTEM IMPLEMENTATION

1. Procuring the input image
In this method, diseased images of plants are captured through the high-resolution camera to create the required database. This database has different types of plant diseases and images are stored in jpeg format. These images are then read in mat lab using read command.It is the initial condition for the work flow series of image processing because as processing is possible only with the help of an image.
Admin creates the database by acquiring the images through real time this is taken with the phone camera or online.The user captures the image of the diseased leaf and that image is loaded for further processing.
2. Pre-processing the image: Input image should be pre-processed on performing following steps:

i. RGB to Grayscale
In RGB each pixel is made up of 3 components i.e., red, green, blue. So more space and time is required for RGB. That's why RGB is converted to grayscale image.
ii. Resizing of image
Images are resized according to the need. For resizing of images nearest neighbour interpolation is used.
iii. Image filtration
This is the process of cleaning up of an image i.e., removal of noises and highlighting some information. Median filters are used.
3. Segmentation
Segmentation means separating of image into various part of same features or having some similarity. For this we are using K-Means Clustering methodology.The definition of clustering is to divide or partition the input data points into clusters such that data points within the same group have similar properties with each other.The data points in different groups have different properties.
Segmentation generally based on two basic principles: discontinuity and similarity. The discontinuity principle is to extract regions that differ in properties such as intensity, color, texture or any other image statistics. In similarity principle an image pixels are grouped into regions that are similar according to a set of predefined criteria. Thresholding, region growing and region splitting and merging are example of similarity principle.
4. 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.
For detecting the disease Color, texture and morphology features are considered. 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. The feature values are considered and the feature vector is created.
5. Classification of diseases
To detect the type of leaf disease we use Classification technique for training and testing. Classification deals with associating a given input with one of the distinct class. In the given system support vector machine [SVM] is used for classification of leaf disease. The classification process is useful for early detection of disease, identifying the nutrient deficiency.
The SVM is the supervised learning model with associated learning algorithm that analyses data used for classification and regression analysis. SVMs are more commonly used in

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classification problems. SVMs are based on the idea of finding a hyperplane that best divides a dataset into two classes

Based on classification leaves are mainly affected with fungal, bacterial and viral.

a) Bacterial disease symptoms:

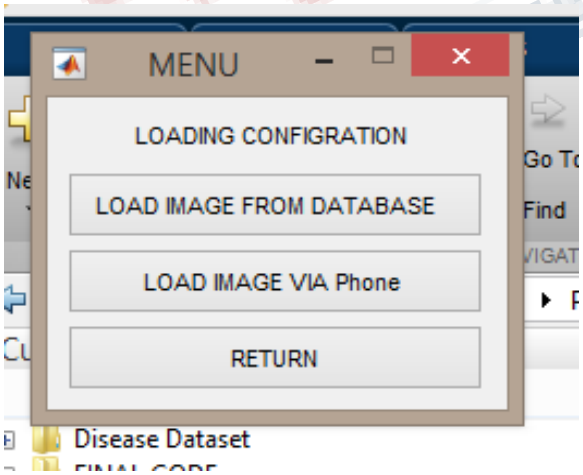
The disease is characterized by yellowish green spots which come into view as water-soaked. The lesions amass and then appear as dry dead spots

b) Viral disease symptoms:

Among all plant leaf diseases, those caused by viruses are most complicated to diagnose. All viral disease presents some degree of reduction in virus-infected plants. The production length of such infected is usually short. This virus looks yellow or green stripes or spots on foliage. Leaves might be wrinkled, curled and growth may be stunned.

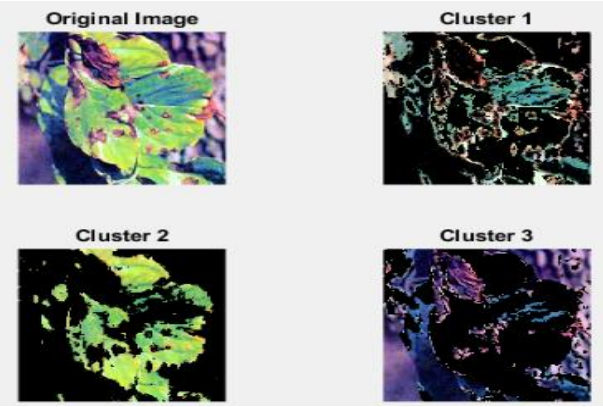
VI. EXPERIMENTAL RESULT

The complete system is designed using matlab and Android operating system the experiments are carried out on single core processor to actually measure the computational cost and time factor associated with it. A diseased leaf samples are capture during different mobile devices at different resolutions.



The above picture represents Loading module, loading of image is done through online or real time. As shown in the figure the user can load the image through existing database or real time using the android phone application.

The snapshot above represents the image taken as an input from the loading module for Pre-processing. Highlight certain features of interest in an image, increase the contrast of the image. The resulted image of pre-processing is enhanced.



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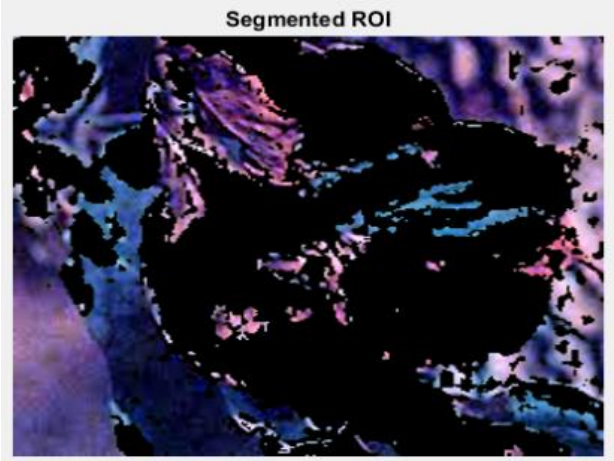
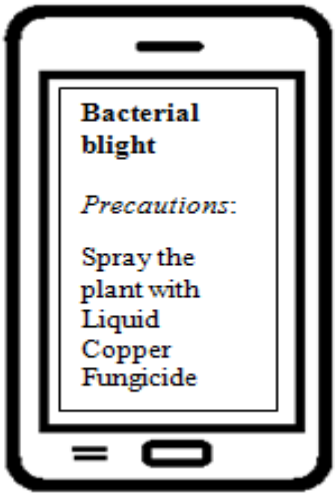


The above snapshot represents theImage from the previous module are taken for segmentation. Clusters of an image should be formed and generated. From the given clusters, we select the cluster which is more clear.



The above photograph represents the output with disease name and prevention measures is appeared on to the android mobile phone

VII. CONCLUSION

The category based on the identifying the leaves images with extracted texture features is proposed and performed. The texture features have been extracted with using the Gray-Level Co-occurrence Matrix (GLCM) algorithm. GLCM was the method which can be used in making any changes for images such as deforming or giving the new leaf image as a test. The ultimate goal is to evaluate algorithm in object-based analysis to help find GLCM and EDGE detection for shape and texture features. This method is designed and tested for texture images then developed for any type of images. Based on the analysis, gray scale images are easy to process and implement. They have better clarity and suited for analysis than RGB images. Histogram equalization is used to enhance the contrast of the images and provides clear image to human eyes. So, these types of images will be used to analyse the plant leaves diseases and determines the diseases level of the plant leaves. Plant disease is detected by SVM classifiers. The Support Vector Machine (SVM) classifiers are based on color, texture and shape features. The algorithm in the planned approach uses image segmentation and classification technique for the detection of plant disease. Finally, SVM classifiers technique is used to detect the type of plant diseases.

VII. FUTURE ENHANCEMENT

The plant leaf disease detection provides the benefits in monitoring large fields of crops, and hence automatically detect symptoms of disease as soon as they appear on plant leaves. The GLCM and EDGE detection algorithm use will find out disease on leaves. The image processing provides used to study the leaf disease. The result is for increasing throughput and will reduction subjectiveness arising from human experts in detecting the leaf disease. Analysing and manipulating image is a technique used for enhancement of the image. It will improve agricultural products automatic detection of symptoms is beneficial. Using this method the plant disease can be identified at an early stage. The result can be delivered in very short time. This method mainly focuses on large databases and advance feature of color extraction that provides the better result of detection. The suitable prevention measures are provided to the farmers on the basis of detection of disease

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