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Agricultural Plant Leaf Disease Detection and Categorization of Plants using GUI

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ABSTRACT: Crop cultivation plays an essential role in the agricultural field. Presently the loss of food is mainly due to the infected crops. So, early information on crop health and disease can facilitate the control of diseases through proper management strategies. This improves the productivity of crop. Keeping this as objective, in order to achieve an efficient and smart farming system, identification of unhealthy leaf using image processing techniques is contributed Leaf images are captured, pre-processed, segmented, features extracted, and classified to know if they are healthy or unhealthy.In segmentation we use k- means clustering algorithm for more efficiency when compared to other methods. SVM and ANN are used for classification. We use GUI to display output, the type of disease and which family it belongs to.

KEYWORDS: smart farming, pre- processed, segmentation, features extraction, classification, k- means clustering, SVM, ANN, GUI.

I.INTRODUCTION

Agriculture has become the world's most important organization. The agriculture industry plays a Significant role in the economic sectors. During crop cultivation, most of the crops are infected by diseases. Due to the exponential inclination of population, climatic conditions also cause plant disease. Precise, accurate and early diagnosis may reduce the usage of pesticides. The major challenges are disease identification and classification of plants.. When some diseases are not visible to the naked eye but actually are present, a microscope is used to detect the disease, but it becomes difficult to observe each and every leaf and plant. Detection and recognition of diseases in plants using DIP is very fruitful in providing symptoms of identifying diseases at the earliest. The method for detection and classification of leaf diseases is based on masking and removing of green pixels, applying a specific threshold to extract the infected region and computing the texture statistics to evaluate the diseases using MATLAB. So, disease detection is using Matlab image processing techniques. Hence reduce the effort of farmers in terms of time and money.

II.PROPOSED METHODOLOGY

There are five main steps used for the detection of plant leaf diseases as shown in fig.4. The processing scheme consists of image acquisition through digital camera or web, image pre-processing includes image enhancement and image segmentation where the affected and useful area are segmented, feature extraction and classification. Finally the presence of diseases on the plant leaf will be identified. In the initial step, RGB images of leaf samples were picked up.

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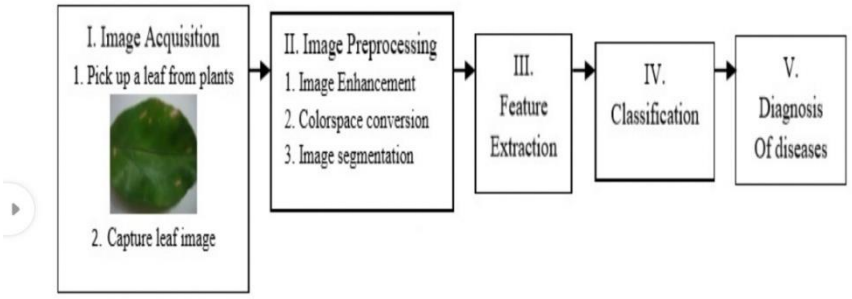
BLOCK DIAGRAM



The step by step procedure is shown below

A.IMAGE ACQUISITION

Image acquisition is the first method of digital image processing. The images of the plant leaf can be acquired using two ways. The first way is to capture image using an external camera, here we can use a digital camera, and the second way is to get the image from the internet, etc. The diseased leaf image is taking a snapshot and load the image into system. Image database itself is responsible for the better efficiency of the classifier which decides the robustness of thealgorithm.

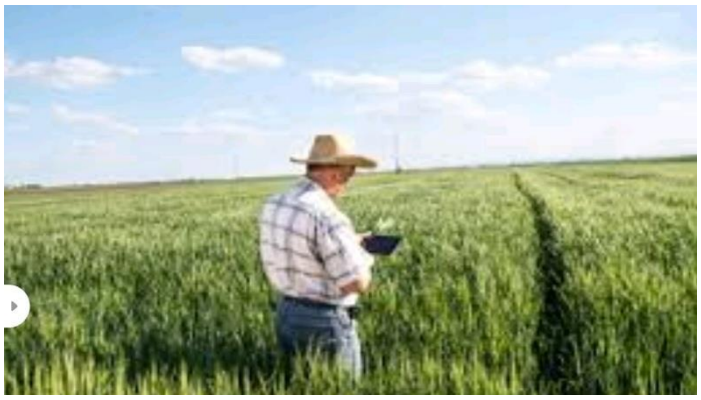


Fig.1 Image Acquisition

B.IMAGE PREPROCESSING

The main purpose of image pre-processing is to improve the image data, which may contain unwanted distortions, or to enhance some image features for further processing. Preprocessing method uses various techniques such as changing image size and shape, filtering of noise, image conversion, enhancing image and morphological operations. In this step, we will use various MATLAB codes to resize image, to enhance contrast and for RGB to grayscale conversion for further operations like image segmentation. In fact a `gray' color is one in which the red, green and blue components all have equal intensity in RGB space, and so it is only necessary to specify a single intensity value for each pixel, as opposed to the three intensities needed to specify each pixel in a full color image. In addition, grayscale images are entirely sufficient time for many tasks and so there is no need to use more complicated and harder-to-process color

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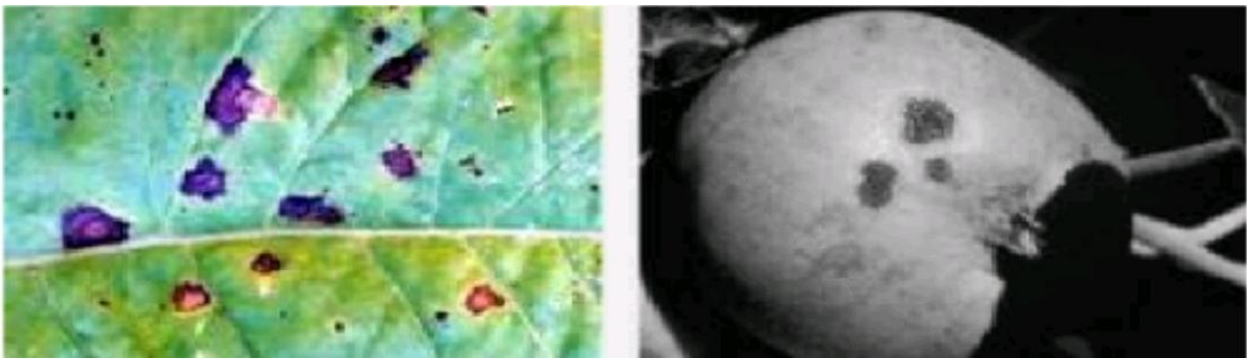

Fig.2 image enhancement

C.IMAGE SEGMENTATION

Segmentation means partitioning of images into various parts of the features having some similarity. The segmentation is done using the method of K means clustering, converting RGB to HSI model, etc. In the project, K means clustering is used for classification of the object based on a set of features into K number of classes. The classification of the object is done by minimizing the sum of the square of the distance between the object and the corresponding cluster. From the results of K-means, labeling of each pixel in the image is done and segmented images are generated, which contain images of diseases. Image segmentation is process used to simplify the representation of an image into something that is more meaningful and easier to analyze.

There are various techniques for image segmentation

A. Region based segmentation
B. Edge based segmentation
C. Threshold based segmentation
D. Feature based clustering segmentation

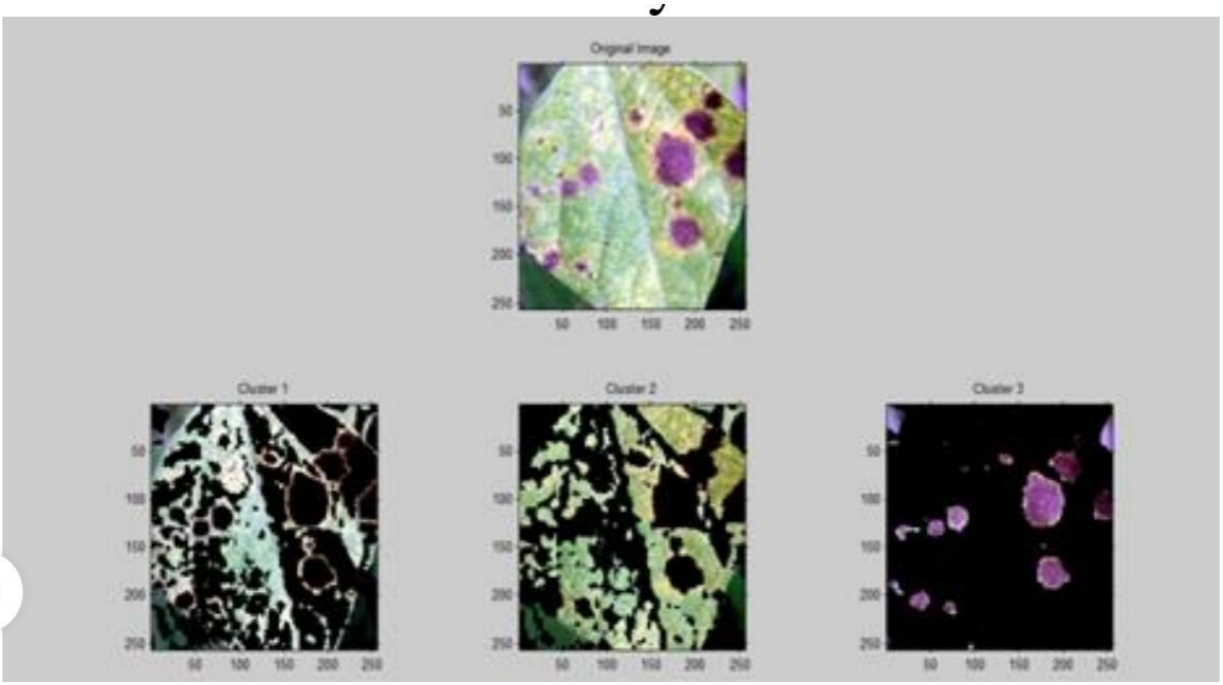

Fig.3 Diseased Leaf Image Clusters

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The image is segmented using k-means clustering algorithm. It is a type of feature based clustering algorithm. k-means clustering is a method of vector quantization, originally from signal processing, that is popular for cluster analysis in data mining. k-means clustering aims partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean, serving as a prototype of the cluster.Here colour is the basic feature in the image. Various steps involved in k-means clustering

- Initially the image is divided into k number of clusters or groups. The k number of objects identified. In this image colours is taken as objects dark green, light green, purple colours.
- Every cluster centroid is there. Calculate the distance from each data point to nearest centroid.
- Divide the k number of clusters by calculating the nearest centroids.

This process is repeated until diseased parts are identified. In this image the third cluster having diseased part. The lower contrast is used for disease detection.

D.FEATURES EXTRACTION

After segmentation the area of interest i.e. diseased part extracted. In the next step, significant features are extracted and those features can be used to determine the meaning of a given sample. Actually, image features usually includes color, shape, morphological and texture features. Plant leaf texture as the most important feature in classifying plants. With the help of texture features, plant diseases are classified into different types. Some properties are playing an important role in recitation of texture viz. uniformity, regularity, density, linearity, directionality, roughness, coarseness, phase and frequency. The method to characterize texture force into four major categories such as statistical, structural, fractals, and signal processing. The one which is used for the extraction of texture feature from images is called texture feature extraction method. The popular extraction techniques in texture field are discussed in this section. Grey Level Co-occurrence Matrices (GLCM) is a statistical method. It is an old and used feature extraction method for texture classification. However, in recent years, instead of using the GLCM individually, is combined with other methods. Spatial Gray-level Dependence Matrices (SGDM) method is a way of extracting statistical texture features. SGDM includes properties viz. contrast, energy, local homogeneity, and correlation.

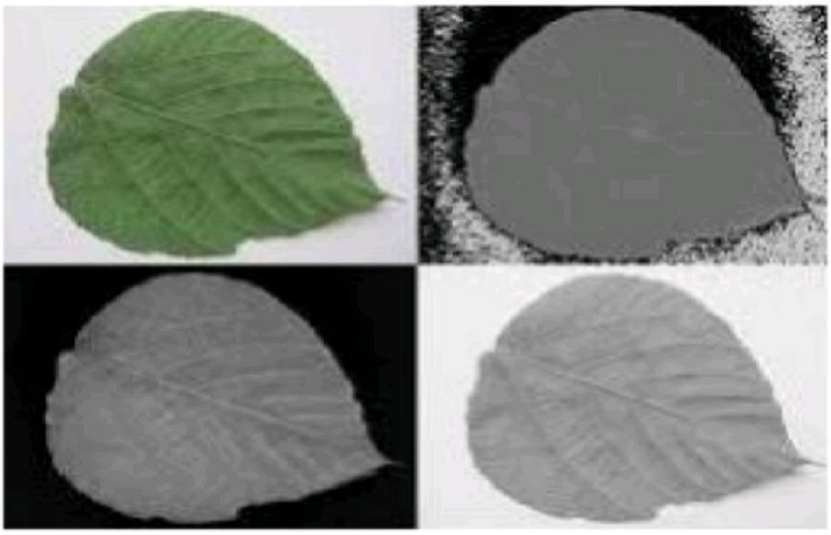

Fig.4 Feature extraction

E.CLASSIFICATION USING SVM,ANN,PCA

Support vector machine:

Support vector machine (SVM) is a non-linear classifier, and is a newer trend in machine learning algorithm. SVM is popularly used in many pattern recognition problems including texture classification. SVM is designed to work with only two classes. This is done by maximizing the margin from the hyper plane. The samples closest to the margin that were selected to determine the hyper plane is known as support vectors. Multiclass classification is applicable and basically built up by various two class SVMs to solve the problem,

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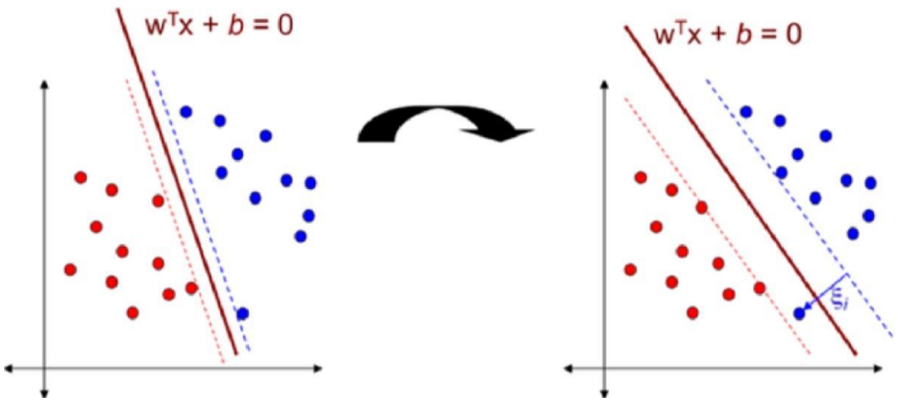
either by using one versus-all or one. We can implement the SVM (Support Vector Machine) technique in our project for efficient disease detection and classification.



The function used is: svmStructDisease = svmtrain(our,dt);

where our is the dataset containing image information of features. „dt" is the set containing set of diseases respectively.

	1	2	3	4	5	6	7	8
1	0.1513	0.2463	0.2463	0.0944	0.1498	0.0737	0.1334	0.0980
2	0.3290	0.1484	0.0279	0.0216	0.0778	0.0300	0.0506	0.2328
3	0.1259	0.1585	0.3204	0.3204	0.0434	0.0092	0.0321	0.0272
4	0.0744	0.1960	0.0839	0.0103	0.0750	0.0679	0.0629	0.0513

Fig.6 SVM dataset

ARTIFICIAL NEURAL NETWORK:

Artificial neural network (ANN) is then trained by choosing the feature values that could distinguish the healthy and diseased samples appropriately. Experimental results showed that classification performance by ANN taking feature set is with better accuracy. The present work proposes a methodology for detecting diseases early and accurately, using diverse image processing techniques and artificial neural network (ANN).

PRINCIPAL COMPONENT ANALYSIS:

"PCA is a technique used to emphasize variation and can bring out strong patterns in a dataset. Its often used toal user interface) is a system of interactive visual components for computer software. The main idea of principal component analysis (PCA) is to reduce the dimensionality of a data set consisting of many variables correlated with each other, either heavily or lightly, while retaining the variation present in the dataset, up to the maximum extent.

GRAPHICAL USER INTERFACE:

A GUI displays objects that convey information, and represent actions that can be taken by the user. GUI objects include icons, cursors, and buttons. These graphical elements are sometimes enhanced with sounds, or visual effects like transparency and drop shadows. A GUI is considered to be more user-friendly than a text-based command-line interface, such as MS-DOS, or the shell of Unix-like operating systems. A GUI uses windows, icons, and menus to carry out commands, such as opening, deleting, and moving files. Although a GUI operating system is primarily navigated using a mouse, a keyboard can also be used via keyboard shortcuts or the arrow keys. As an example, if you wanted to open a program on a GUI system, you would move the mouse pointer to the program's icon and double-click it. Unlike a command-line operating system or CUI, like Unix or MS-DOS, GUI operating systems are much easier to learn and use because commands do not need to be memorized.

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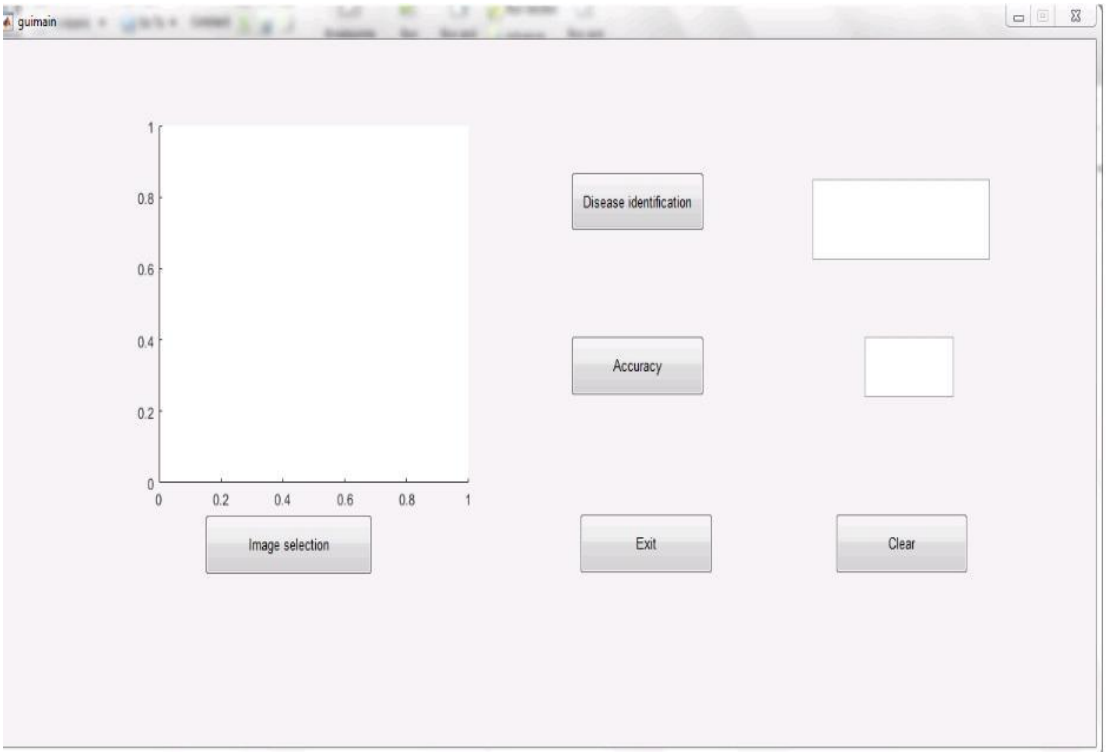
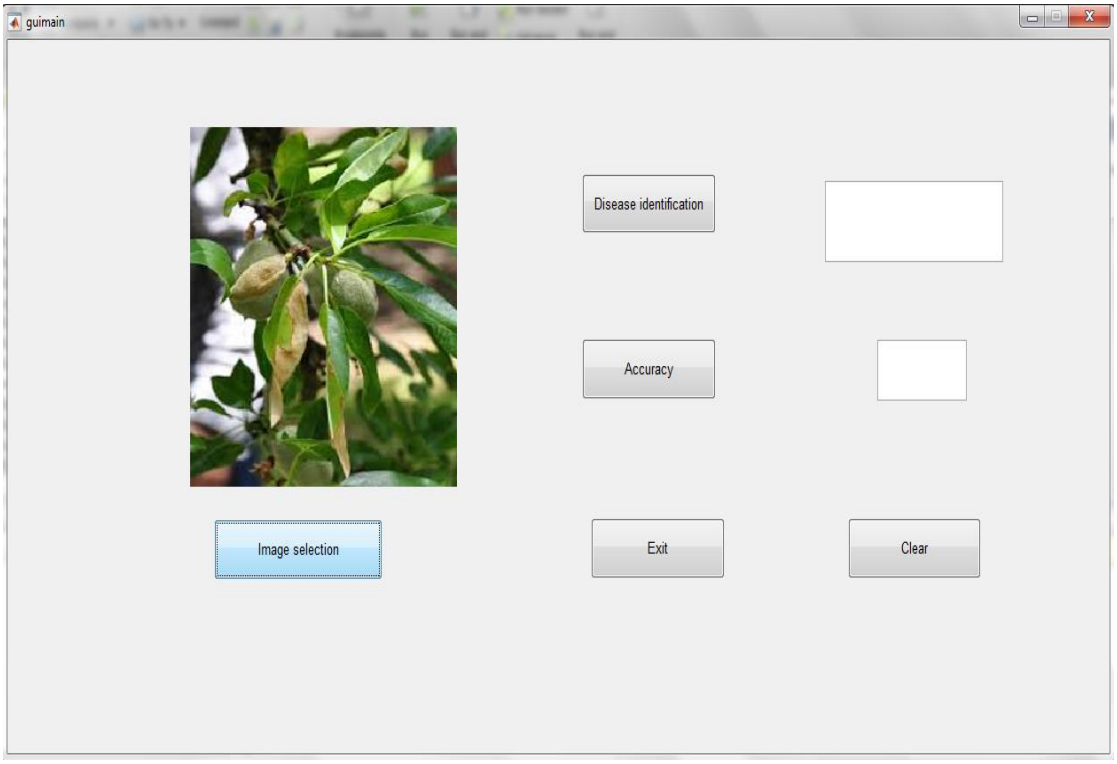
Additionally, users do not need to know any programming languages. Because of their ease of use and more modern appearance, GUI operating systems have come to dominate today's market.

III.EXPERIMENTAL OUTPUT





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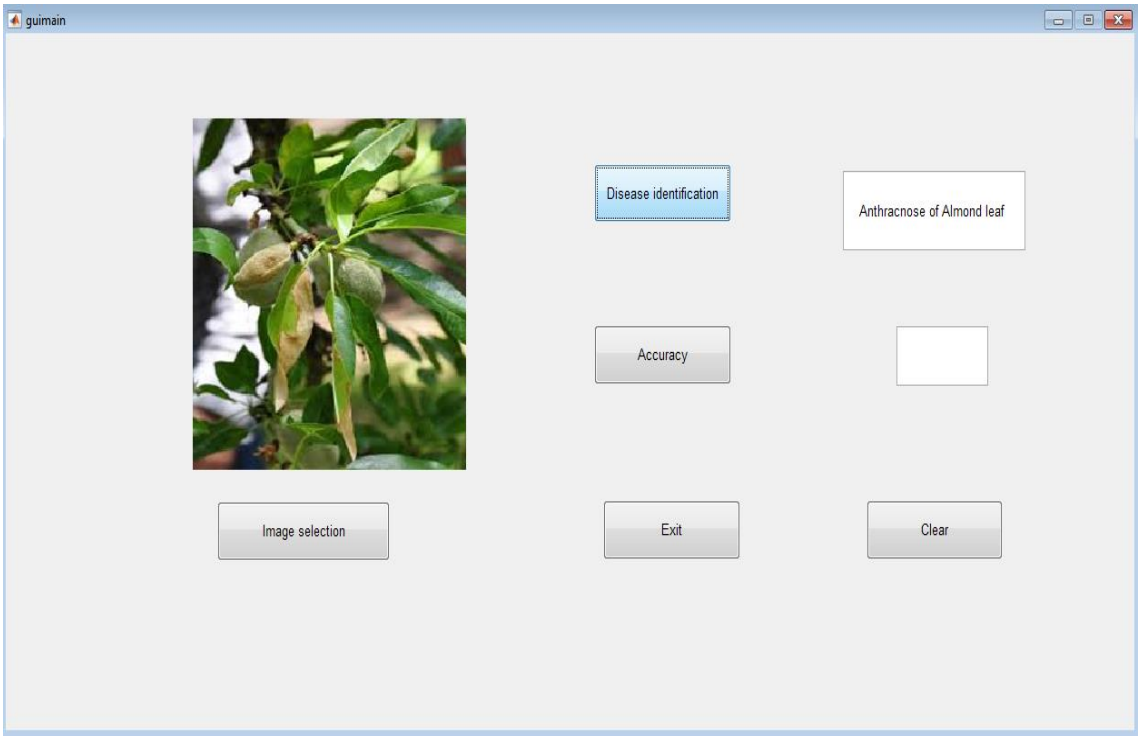

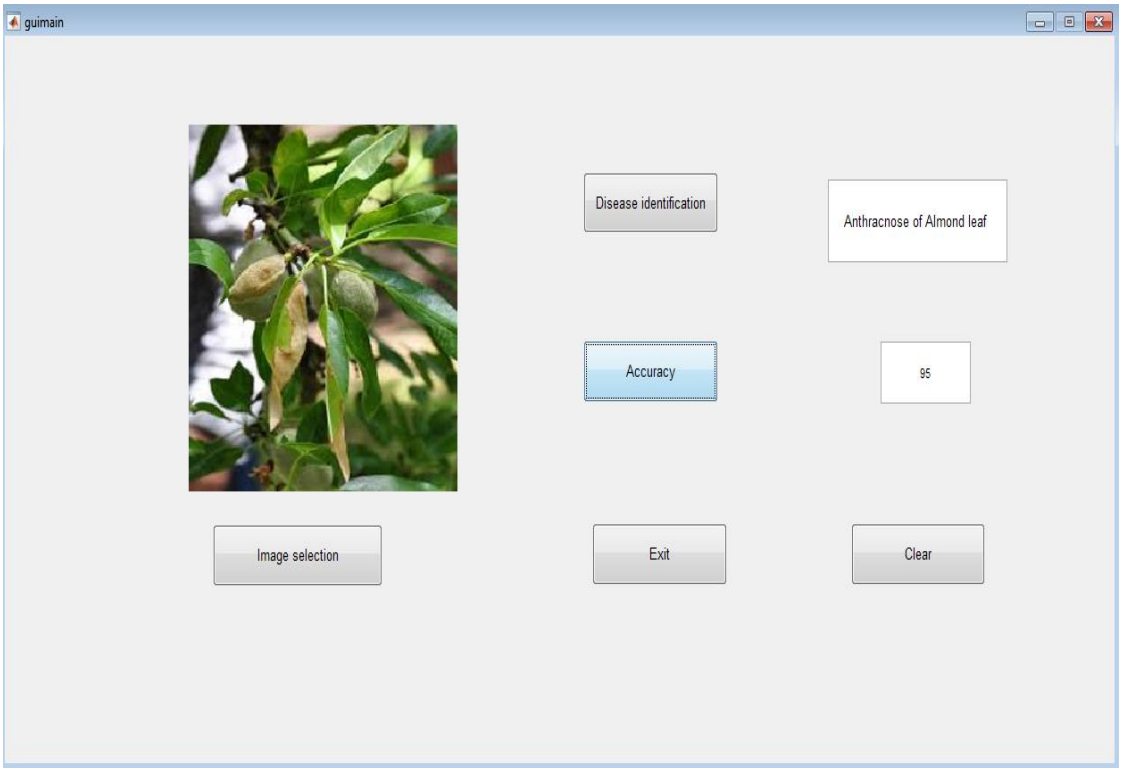

IV.CONCLUSION

The accurate detection and classification of plant diseases, which is very important for the successful cultivation of the crops, can be done using digital image processing. Our project utilizes various techniques that can classify the plant leaf and identifies its disease at the early stage by which we can get healthy yield and more profit.

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REFERENCES

[1]. Sachin .D.Khirade, A.B.patil," Plant disease detection Using image processing,"2015, International conference on computing communication control and automation, IEEE.

[2]. Vijaisingh, Varsha, A.K.Mishra,"Detection of unhealthy region of plant leaves using image processing and genetic algorithm", 205, ICA CEA, India.

[3]. Monica Jhuria, Ashwanikumar and RushikeshBorse, "Image processing for Smart farming, detection of Disease and Fruit Grading," proceeding of the 2013, IEEE, second international conference on image Information processing.

[4]. Mrunalani .R.Badnakhe,Prashant .R.Deshmukh,"Infected leaf analysis and comparison by otsu threshold and K means clustering, "International journal of advanced research in computer science and software engineering,volu me2,Issue 3,march 2012.

[5]. Pat il.J.K,Rajkumar,"Feature Ext raction of diseased leaf images 2012,journal of signal and image processing.

[6]. Anand .H.Kulkarni,AshwinpatilR.K,"Applying image processing technique to detect plant disease,"vol 2,Issue 5,sep.oct 2012.

[7]. HaiguangWang,GualinLi,Zhanhongma,Xiao long li, "Image recongnition of plant disease based on principal component analysis and neural networks,2012,8th international conference on natural computation.

[8]. ShenWeizheng, Wu Yachun, Chen zhanliang, Wei Hongda," Grad ing Method of Leaf Spot Disease Based on Image Processing,"2008, International Conference on Computer Science and Software Engineering.

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