DETECTION AND CLASSIFICATION OF FRUIT DISEASES USING IMAGE PROCESSING & CLOUD COMPUTING

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ABSTRACT: **Fruit disease detection is vital at early stage since it will affect the agricultural field. In this paper, mainly consider the detection and analysis of fruit infections which is available in the plant areas and storage of data about the agricultural filed and details of farmers in database and recovering the data using Cloud computing. There are more fruit diseases which occur due to the surrounding conditions, mineral levels, insects in the farm area and other factors. The detected data from the plant area is determined by image processing and stored in the database.**

KEYWORDS: Image Processing, Segmentation, Feature Analysis, K-Means, Neural Network, SVM MATLAB.

I.INTRODUCTION

Agriculture has been the base for every people. It is most important that more than 70% of the people depend on agriculture for their livelihood in India. Nowadays the growth of productivity of plants, crops and fruits are normally affected by the diseases. The disease is a major problem arising in an agricultural field. In plants, most of the leaves and fruits are affected by diseases due to bacteria and virus. This technique is used to determine the infection on leaves, fruits and stem of the plants. In order to generate an automated database to examine the infections using proposed method. The database consists of data related to plant leaves, fruit conditions and the symptoms of disease to be affected.

The fruit details and the identification of disease from the feature extraction are stored in the database. The entire database is viewed and compared with the captured image. The mobile application is developed for processing the data and providing intimation to the farmers. Thus the variation in image from the database and also indicates the disease in the fruits.

II.METHODOLOGY

The technique identifies the infection at the initial stage by processing the images using MATLAB and provides the required information about the diseases. The cloud database contains the details of leaf, fruit and stem infections and they can be utilized by the farmers at any time using mobile application. And it improves the production and helps the farmers by direct usage.

III.BLOCK DIAGRAM

Here the infection in fruit is detected using MATLAB simulation and the corresponding result of disease name and details is given to the data base. The complete system design infection detection is shown in Fig.3.1

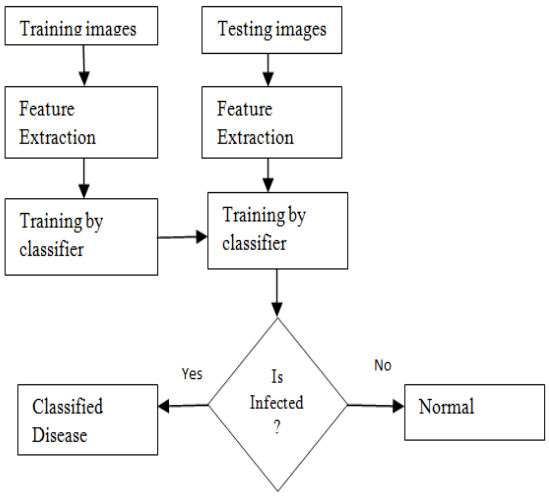


Fig.3.1.System Design of Disease Detection

Initially the images are trained in neural network. The features are extracted and trained using classifier. After training the images are stored in database. The test images are given to the classifier and the images are tested and compared with trained images. If it is affected by disease it gives the classified disease in that fruit image.

IV. INFECTION DETECTION USING MATLAB

Initially whether the fruit is identified by the disease or not using MATLAB software in various steps which shows in the block diagram as fig 4.1.

A. Image Processing

Image processing is one of the techniques used to process the natural image into digital image and also to perform few operations like segmentation, feature extraction, etc., in order to get the information about the image. The image of plant parts are provided as the input to the system and the output is the clustered image which describing about the features extracted.

B.Image Acquisition

Image acquisition involves the process of acquiring the image from hardware source or by collecting the database available about the plant diseases. Here the image is acquired from the camera or normal image from the database.

C.Preprocessing

The process of enhancing the input image and this process involves the noise elimination, edge detection and shape refinement to enhance the image.

D. Segmentation

Image segmentation refers to the method of segmenting the image into multiple segments. It is performed to simplify the classification and analysis of features in the images. The boundary, area, edge and other features of the image are identified in the image.

E.Feature Extraction

Feature extraction is the enhancing of images for representing interesting parts of the image. The features such as spots, color, shape, area and other features are considered in the input images. The color is a main feature because it can separate one disease from another, here intend to use color features such as mean and standard deviation. Furthermore, each disease may have different shape. Texture features such as Kurtosis, skewness, cluster prominence, and cluster shade. It is mainly performed to minimize the complexity in processing the image. The variations in the features indicate the infection in the fruit images and the disease is identified based on the threshold value.

F. Classification

The images are classified and numerical properties of various features are analyzed and classified based on K-Mean, Neural Network and SVM classification techniques. Use Support vector machine for the classification. SVM is supervised learning approach. It classifies the training data based on the classes given as training class labels. This technique involves the feature classification form the image features extracted.

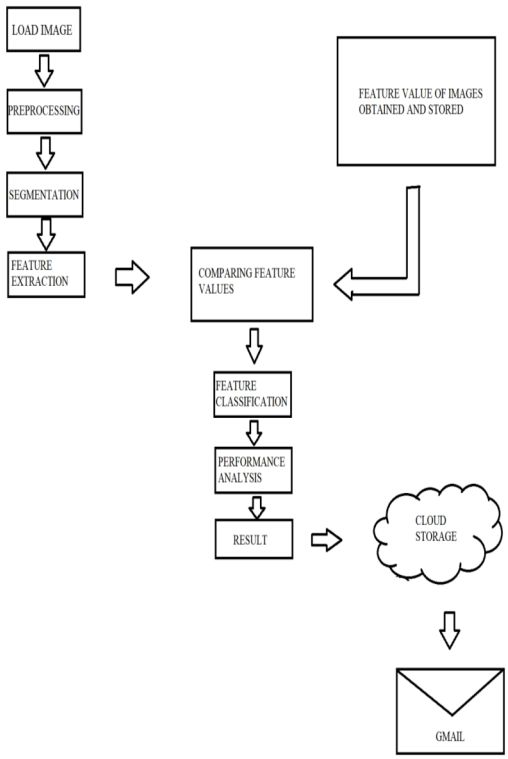


Fig.4.1. Block Diagram of Infection Detection

V. SOFTWARE DESCRIPTION

A. MATLAB

MATLAB is a high-performance language and interactive environment integrating computation, visualization and programming for analyzing data, develop algorithms and create models and applications. The main element of the system is an array which performs all basic processes. This software has vast application including signal processing, test and measurement, computational finance, etc. It provides better solution than performing with spreadsheets or traditional

programming languages through matrix and vector formulation.

B. CLOUD COMPUTING

Cloud computing is the technique of storing, managing and processing data in online. Cloud computing applies traditional supercomputing and process of enhanced storage and access the database. It is used by military and research facilities to perform millions of computations per second. It is also applicable in consumer-oriented processes such as financial portfolios, for delivering personal information in a secured manner.

Cloud Computing provides data backup, disaster recovery and easy business continuity because data can be mirrored at multiple sites on various cloud networks. It provides a friendly, browser-based dashboard that makes easier for professionals and developers in managing their accounts.

VI. RESULTS AND DISCUSSION

The fruit images with infection and the healthy fruits are provided as the sample for the processing. Initially the natural image of fruit is provided as the input for the system. The image is involved in pre-processing, segmentation and the features are identified from the image. If the feature value of the test image varies from the original image, the disease detection is performed. The values of number of samples, True & False Positives, True & False negatives, Accuracy and Specification are analysed and displayed as output along with exact disease name.

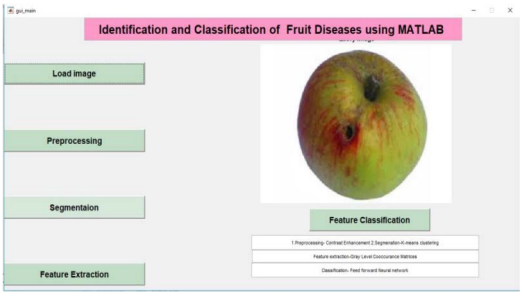


Figure 5.1. Image processing page

The input image is loaded and the pre-processing is performed as shown in Figure5.1. The contrast of the image is enhanced and the segmentation of the fruit image is performed.

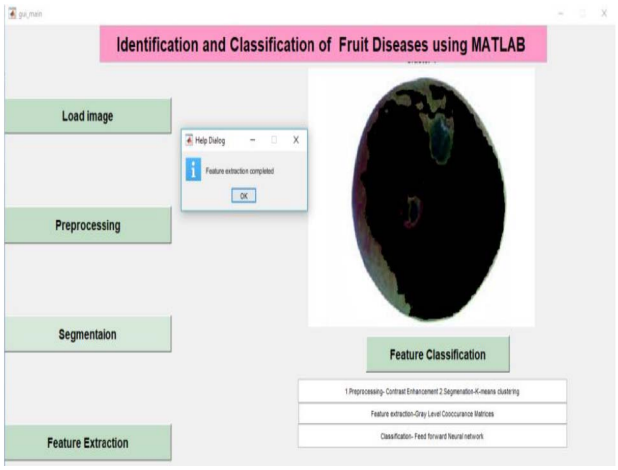


Figure 5.2. Process of performing feature Extraction

The feature values are extracted and compared with the values extracted and the disease is identified as shown in Figure 5.2.

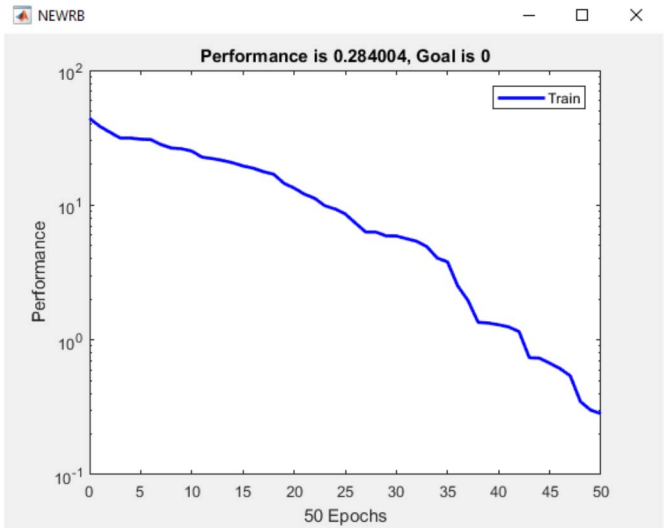


Figure 5.3 Performance Analysis

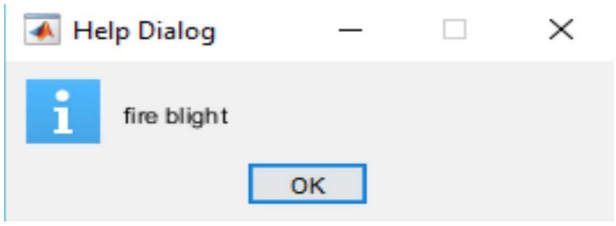


Figure 5.4 Disease identification

The performance of features extracted is analysed and the exact disease name is displayed as the output dialog box as shown in Figure 5.3 and 5.4.

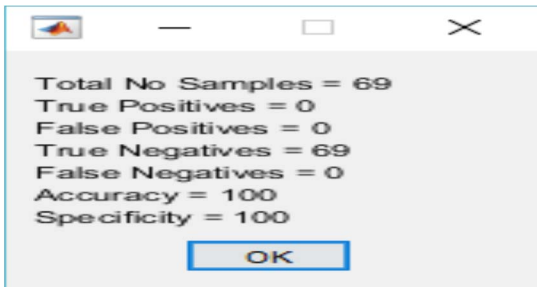


Figure 5.5. Accuracy Specification

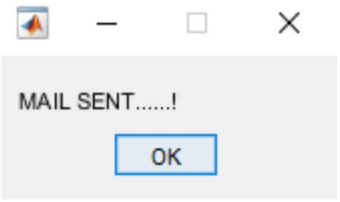


Figure 5.6.Mail Indication

The accuracy and Specification of disease identification is analysed from the samples provided. The mail output of the disease name and the Control measures to avoid the infection is provided.

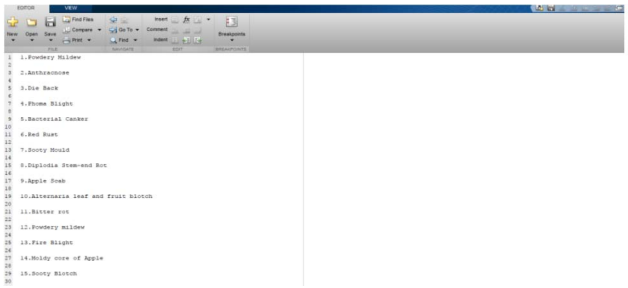


Figure 5.7. Sample Diseases of Fruits

The sample diseases of fruits to identify the infection and provide the control measures as shown in Figure 5.7.

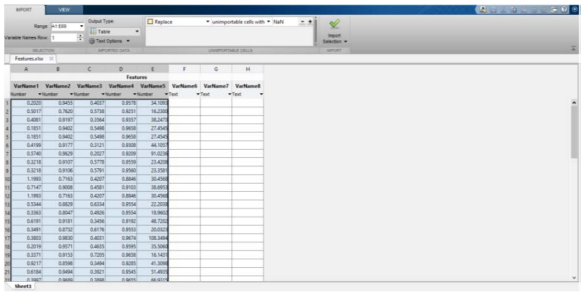


Figure 5.8. Feature Values of Sample Images

The output of disease name and the control measures to avoid the infection are shown in Figure 5.8

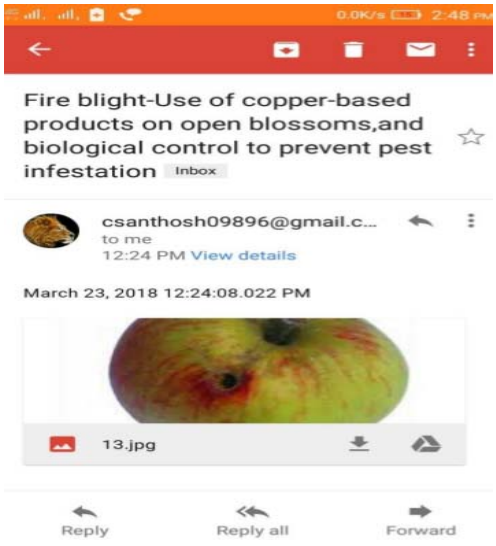
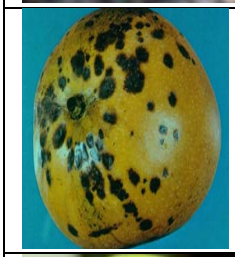


Figure 5.9 Mail Output

DATABASE OF FRUIT DISEASE WITH CONTROL MEASURES

The sample fruit images for testing and analysing the infection in the fruit are shown in the table 5.1 with its control measures

Table 5.1: Various sample images of disease name with its control measures

SAMPLE IMAGE	DISEASE NAME	CONTROL MEASURES
	Powdery Mildew	Alternate spraying of Wettablesulphur 0.2 percent(2g ulfex/litre), Tridemorph 0.1 per cent (1 ml Calixin/litre) and Bavistin @ 0.1 % at 15 days interval are recommended for complete control of the disease
	Anthracnose	Spraying twice with Carbendazirn (Bavistin 0.1%)at15 days interval during flowering controls blossom infection. Spraying of copper fungicides (0.3%)is recommended for the control of foliar infection. Postharvest disease of mango caused by anthracnose could be controlled by dip treatment of fruits in Carbendazim (0.1%) in hot water at 520C for 15 minutes.
	Sooty Mould	Pruning of affected branches and their prompt destruction followed by spraying of Wettasulf (0.2%) + Metacid (0.1%) + gum acacia (0.3%) helps to control the disease.

VII.CONCLUSION

The development of cloud based scheme for helping Indian farmers and agriculture, helps to analyze the agriculture data in a better way to reduce the hoardings and in bringing up a prosperous safe and peaceful farmer society in India. The classification and segmentation of fruit images were performed using K-Means Algorithm and SVM technique. The various features of few fruits were initially extracted and segment the respective images. After comparison with feature values, the various disease names are analysed and the optimal disease for the image is identified and the disease is indicated by an alert box and can be provided as the message through mobile application. The total number of samples provided, the true and false positions, the true and false negativities, the accuracy and the specificity are also indicated in an alert box. And the entire database of fruit infections and the control measures to reduce the infections are stored in the cloud database and the data can be retrieved using the application.

VIII. REFERENCES

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