LEAF DISEASE DETECTION USING IMAGE PROCESSING

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Abstract : Image retrieval is a poor stepchild to other forms of information retrieval (IR). Image retrieval has been one of the most interesting and research areas in the field of computer vision over the last decades. Content-Based Image Retrieval (CBIR) systems are used in order to automatically index, search, retrieve, and browse image databases. Colour, shape and texture features are important properties in content-based image retrieval systems. In this paper, we have mentioned detailed classification of CBIR system. We have defined different techniques as well as the combinations of them to improve the performance. We have also defined the effect of different matching techniques on the retrieval process.

Most content-based image retrievals (CBIR) use color as image features. However, image retrieval using color features often gives disappointing results because in many cases, images with similar colors do not have similar content. Color methods incorporating spatial information have been proposed to solve this problem, however, these methods often result in very high dimensions of features which drastically slow down the retrieval speed. In this paper, a method combining color, shape and texture features of image is proposed to improve the retrieval performance. Given a query, images in the database are firstly ranked using color features. Then the top ranked images are re-ranked according to their texture features. Results show the second process improves retrieval performance significantly.

Keywords: **Image acquisition, pre-processing, features extraction, classification, neural network.**

I. INTRODUCTION

India is an agriculture country. 70% of India economy depends on agriculture. Due to environmental changes like huge rain fall, drastic changes in temp, the crops get infected. And that can be characterized by spots on the leaf, dryness of leaf, colour changes in leaf and defoliation. The maximum people cannot be able to identify the disease easily and accurately. For that purpose we need experts that identify the disease. But this is more time consuming process and quite expensive. The proposed project leaf infection detection is made through image processing technique image because image from important data and information in biological science digital image processing and image analysis technology based on advance in micro electronics and computer has many applications in biology.

1.1 Basic Idea

For increasing growth and productivity of crop field, farmers need automatic monitoring of disease of plants instead of manual. Manual monitoring of disease do not give satisfactory result as naked eye observation is old method requires more time for disease recognition also need expert hence it is non effective. So in this, we introduced a modern technique to find out disease related to both leaf and fruit. To overcome disadvantages of traditional eye observing technique, we used digital image processing technique for fast and accurate disease detection of plant. In our proposed work, we developed k-means clustering algorithm with multi SVM algorithm in MATLAB software for disease identification and classification. The old and classical approach for detection and recognition of plant diseases is based on naked eye observation, which is very slow method also gives less accuracy. In some countries, consulting experts to find out plant disease is expensive and time consuming due to availability of expert. Irregular check up of plant results in growing of various diseases on plant which requires more chemicals to cure it also these chemicals are toxic to other animals, insects and birds which are helpful for agriculture. Automatic detection of plant diseases is essential to detect the symptoms of diseases in early stages when they appear on the growing leaf and fruit of plant.

1.2 History of Project

Image segmentation is the process of separating or grouping an image into different parts. There are currently many different ways of performing image segmentation, ranging from the simple thresholding method to advanced color image segmentation methods. These parts normally correspond to something that humans can easily separate and view as individual objects. Computers have no means of intelligently recognizing objects, and so many different methods have been developed in order to segment images. The segmentation process is based on various features found in the image. This might be color information, boundaries or segment of an image. We use Genetic algorithm for color image segmentation.

1.3 Need of Project

Images convey relevant data and information in biological sciences. Digital image processing and the image analysis technology have a vital role in biology and agricultural sectors. Automatic detection of plant diseases and cultivation of healthy plants is of great importance and agricultural automation. The case of a plant, the term disease is defined as any impairment happening to the normal physiological function, producing characteristic symptoms. The studies of plant diseases refer to studying the visually observable patterns of a particular plant. The identification of plants, leaves, stems and finding out the pests or diseases, or its percentage is found very effective in the successful cultivation of crops. The naked eye observation is the approach adopted by many of the farmers for the detection and identification of plant diseases. It requires continuous monitoring and found less useful on large farms. Also, the farmers are unaware of non-native diseases. With the aid of imaging technology the plant disease detection systems automatically detect the symptoms that appear on the leaves and stem of a plant and helps in cultivating healthy plants in a farm. These systems monitor the plant such as leaves and stem and any variation observed from its characteristic features, variation will be automatically identified and also will be informed to the user. This paper provides an evaluative study on the existing disease detection systems in plants.

1.4 Objective of Project

- To implement leaf diseases detection with improvement accuracy.
- Segmentation of diseases part of leaf
- To get the processed leaf image as an input.
- To segment the image using K-Means clustering algorithm.
- Finally provide the type of disease attacked in the leaf using SVM classifier and severity level.

II. Methodology

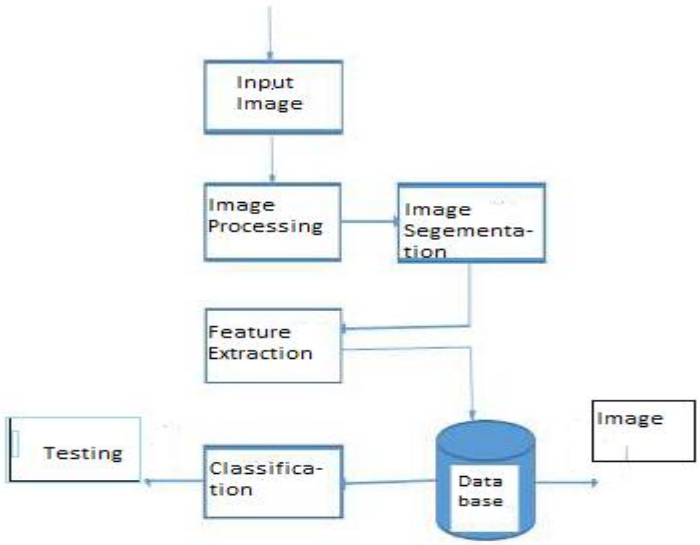


Fig (1): Block Diagram Of Proposed Method

A. Input Image:
We used digital leaf images to identify diseases. The images were taken from different online sources. There are three common rose diseases that we used in this research, i.e., Black spot, Anthracnose and Rust. Fig. 1 shows the disease images in JPEG format.

B. Image Preprocessing:
Image pre-process tasks are the initial stage before feature extraction. There are three steps of image preprocessing processing, i.e., image cropping, image converting and image enhancement. The image is cropped on leaf diseases area, and then converted to gray levels. To enhance the image we used Laplacian filter.

C. Image Segmentation:
Image segmentation is one of the most important precursors for disease detection and has a crucial impact on the overall performance of the developed systems. The K-Means clustering technique is a well-known approach that has been applied to solve low-level image segmentation tasks. This clustering algorithm is convergent and its aim is to optimize the partitioning decisions based on a user-defined initial set of clusters .Paper proposed k-means segmentation method to segment target areas. The area affected by the disease is the target area.

D. Feature Extraction:
Proposed method include two features color texture and space features. These features are total 17 in numbers including 13 color features and 4 shape features. Shape features including area, perimeter, circularity and complexity were extracted from the binary segmentation images. Color features and texture features were extracted from the color segmentation image. The image analysis technique is done using Color Co-occurrence Matrix (CCM).

III. Basic block diagram of system with description

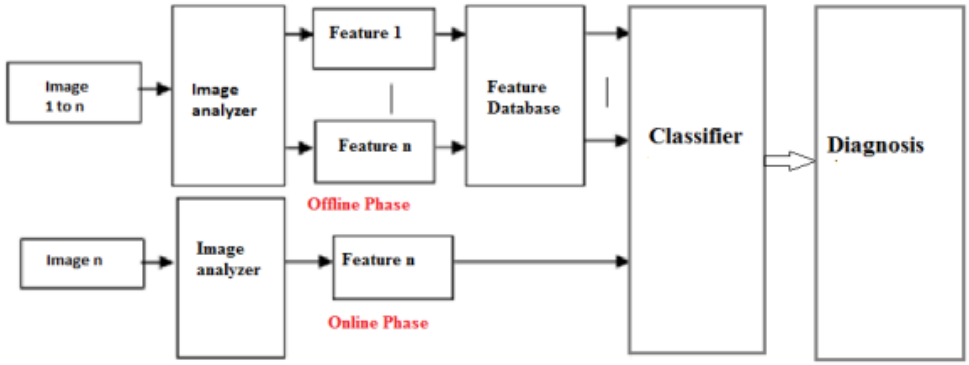


Fig (2): Block Diagram

The processing proposed to done by these blocks is divided into two phases as follows-

Offline Phase: A large set of defected images are processed by image analyzer for extracting abnormal features. Then these features are stored in feature database for later usage by the classifier.

Online Phase: Abnormal feature of a specific defected image is extracted by image Analyzer and then classified by the classifier into a specific disorder, Thus Diagnosis is facilitated. Main aim of image analyzer is to extract the abnormal symptoms of the defected color image represented in spot size, spot color, and spot shape. As shown in figure below input to image analyzer is the acquired defected color image and the output of the image analyzer is the extracted features of the defected image.

A] DATABASE CREATION :

The database contains images of Powdery Mildew and Downy Mildew. These images were captured by camera model DSC T-90 of Sony Company. All the images are in JPEG format and were taken from farms nearby Nasik city.

B] DESIGN OF THE SYSTEM :

The methodology adopted for the system is shown in Figure 3 below.
At first the damaged image should be pre-processed. This pre-processing can reduce the influence made by the background.
The image enhancement consists of following steps -Transformation of the defected image into HSI colour space. Analysing the histogram of the intensity channel to get the threshold by which we can increase the contrast of the image. Adjust the intensity of the image by applying thresholds.

IV.EXPERIMENTAL SNAPSHOTS:

Fig (a): Input Image

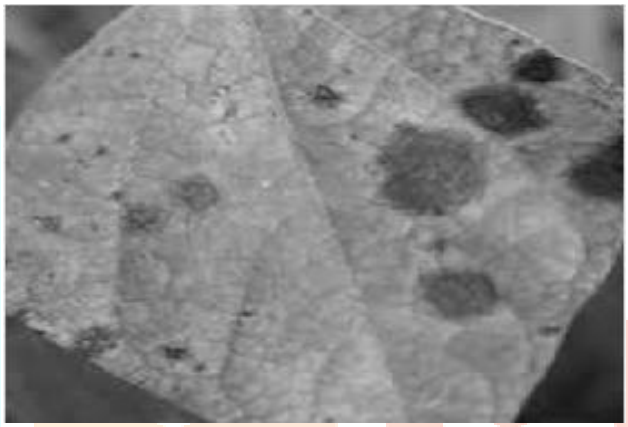


Fig (b): Preprocessing Enhanced Image

Fig (c): Segmentation of Image

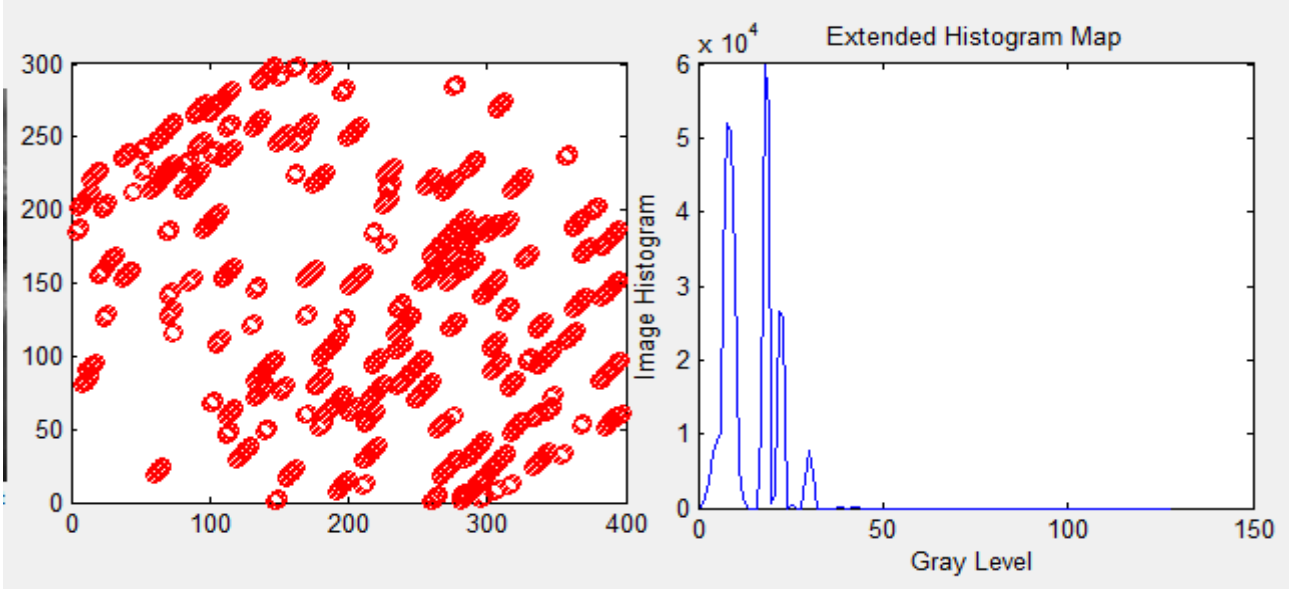
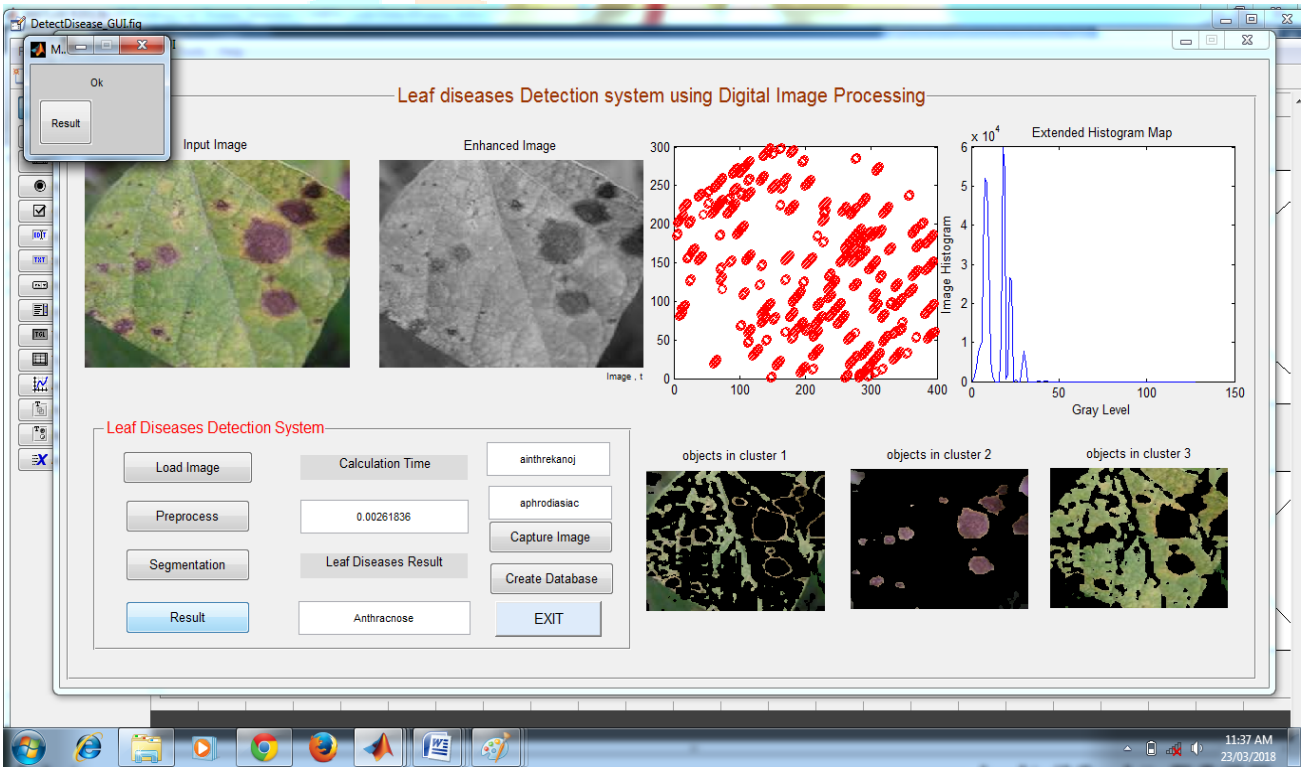


Fig (d): Classification of Image

V. RESULT:



VI. CONCLUSIONS:

This paper presents the survey on different diseases classification techniques used for plant leaf disease detection and an algorithm for image segmentation technique that can be used for automatic detection as well as classification of plant leaf diseases later. Banana, beans, jackfruit, lemon, mango, potato, tomato, and sapota are some of those ten species on which proposed algorithm is 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 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 early stage or the initial stage. To improve recognition rate in classification process Artificial Neural Network, Bayes classifier, Fuzzy Logic and hybrid algorithms can also be used.

VII. Advantages :

- Eco-friendly
- Reliable
- Low cost
- Accuracy

VIII. Application :

1. Detecting diseases on leaf of plant at early stages gives strength to overcome it and treat it appropriately by providing the details to the farmer that which prevention action should be taken.
2. Agriculture crop diseases detection for treatment.

IX. Future Scope :

The method reported in the thesis can be used to design a soya bean expert system for farmers for the early detection of plant foliar infection, infection grading and getting the appropriate cure remotely. Through the thesis work, we have tried to highlight the problems associated with the cultivation of soybean and causes of low yield loss in the developing countries like India. It has been taken-up six soya plant foliar diseases, namely; Rust, Bacterial Blight, Sudden Death Syndrome, Brown Spot, Downy Mildew, and Frog Eye, which are mainly responsible for significant yield loss; it has been proposed a fully automatic method for identification and classification by different digital image processing techniques and also to classify the disease severity level using five classes. It has been derived and development various new parameters and indices like DSI, IPR, DLP, which are subsequently used for disease level prediction.

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