DETECTION AND CLASSIFICATION OF FRUIT DISEASES USING MACHINE LEARNING

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ABSTRACT- Fruit disease detection is vital at an early stage since it will affect the agricultural field. This paper mainly considers the detection and analysis of fruit infections which is available in the plant areas and the storage of data about the agricultural field and details of farmers in the database. Fruit diseases may occur due to the surrounding conditions, mineral levels, insects in the farm area and many other factors. The collected data from the plant area is determined by image processing and the data is stored in the database.

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

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 fruits is normally affected by diseases. The disease is a major problem arising in an agricultural field. In plants, most of the fruits are affected by diseases due to bacteria and virus. This technique is used to identify the infection of fruits. In order to generate an automated database to examine the infections using the proposed method. The database consists of data related to fruit conditions and the

symptoms of the disease to be affected. The details of fruits and the disease identified from the feature extraction are stored in the database. The entire database is viewed and compared with the captured image. Thus, the variation in the image from the database and also indicates the disease in the fruits.The technique identifies the infection at the initial stage by processing the images and provides the required information about the diseases. The database contains the details of fruit infections, the input images undergo segmentation and then classification using K-Means and Support Vector Machine (SVM) respectively.

II. RELATED WORKS

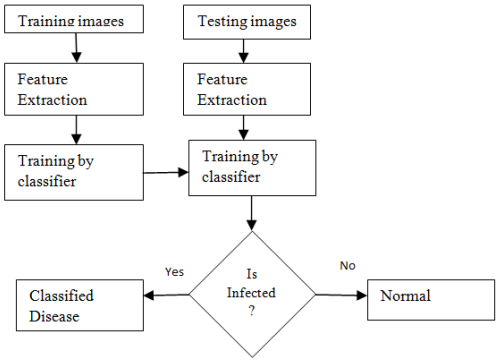
Ilic*et al.* 2015 discussed that early detection of fruit disease is essential in order to rectify the problems present in the fruits. Data mining techniques are utilized for this purpose. Image processing techniques requiring optimization also. The Automatic approach helps in enhancing and finding the problems present within the fruit. Optimization mechanism also helps in detection of diseases at early stage hence help in the curing process. [1]

Jhuria&Kum 2013 discussed disease in fruit causes diseases since the spread of the virus in the human body through fruit is exceedingly fast. Apple fruit is commonly infected and cause diseases. An Extensive amount of research is done in this area. K means clustering technique is used to filter out the information generated and then the distortion is detected. The Local binary pattern mechanism available in the image processing toolbox is utilized for this purpose. [2]

Engineering *et al.* 2015 proposed automation as a technique that is made to analyze distortion in fruits. In order to accomplish this fruit grading system is done. This process of automation utilizes feature extraction. Once features are successfully extracted, classification can be accurately performed. [3]

Shiv Ram Dubey1, Pushkar Dixit2, Nishant Singh3, Jay Prakash Gupta4, “Infected Fruit Part Detection Using K-Means Clustering Segmentation Technique”. International Journal of Artificial Intelligence and Interactive Multimedia.This work presents a novel defect segmentation of fruits based on color features with K-means clustering algorithm. Color images of fruits are used for defect segmentation. Defect segmentation is carried out into two stages. At first, the pixels are clustered based on their color and spatial features, where the clustering process is accomplished. Then the clustered blocks are merged to a specific number of regions. Using this two-step procedure, it is possible to increase the computational efficiency by avoiding feature extraction for every pixel in the image of fruits. Although the color is not commonly used for defect segmentation, it produces a high discriminative power for different regions of the image. This approach thus provides a feasible robust solution for defect segmentation of fruits.[4]

III. DATA AND METHODS



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

A. Image Processing

Image processing is one of the techniques used to process the natural image into a 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 is provided as the input to the system and the output is the clustered image that describing the features extracted.

B. Image Acquisition

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

C. Preprocessing

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

D. Segmentation

Image segmentation is a 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 enhancement 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 the main feature because it can separate

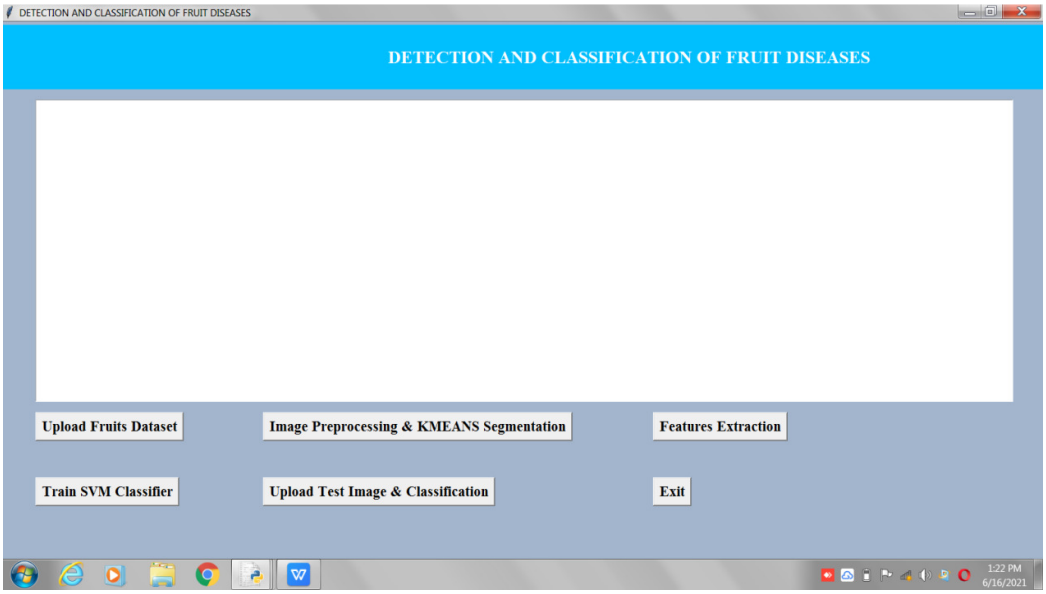
one disease from another, here intend to use color features such as mean and standard deviation. Furthermore, each disease may have a different shape, texture features such as Kurtosis, skewness, cluster prominence, and cluster shade. It is mainly performed to minimize the complexity of processing the image. The differences in the features indicate the infection in the fruit images and the disease is identified based on the threshold value.

F. Classification

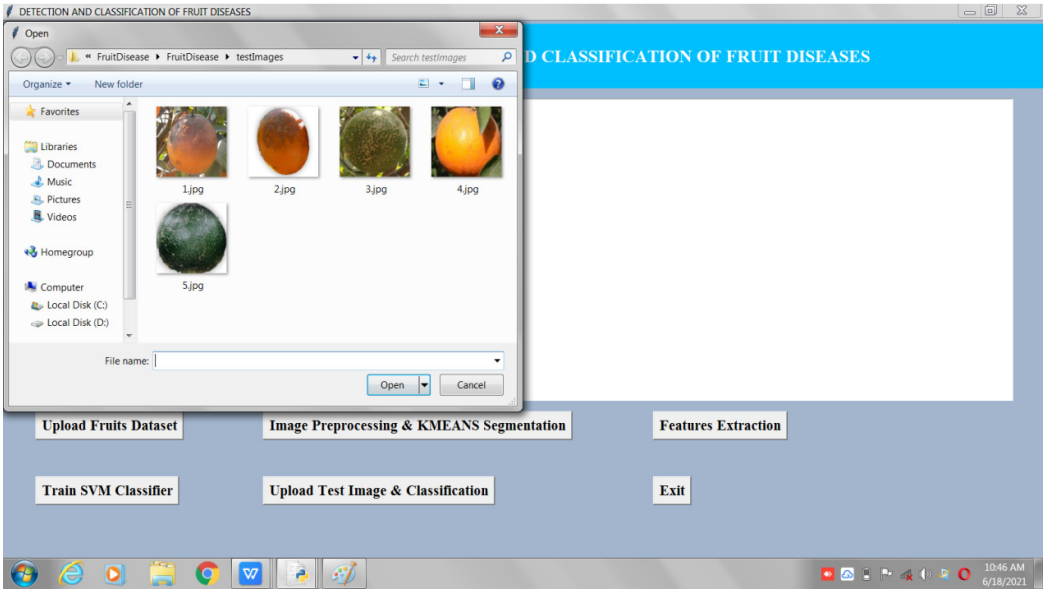
The images are classified and numerical properties of various features are analyzed and classified based on K-Means and SVM classification techniques. Use a Support vector machine for the classification. SVM is a supervised learning approach. It classifies the data which is being trained based on the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

IV. RESULTS

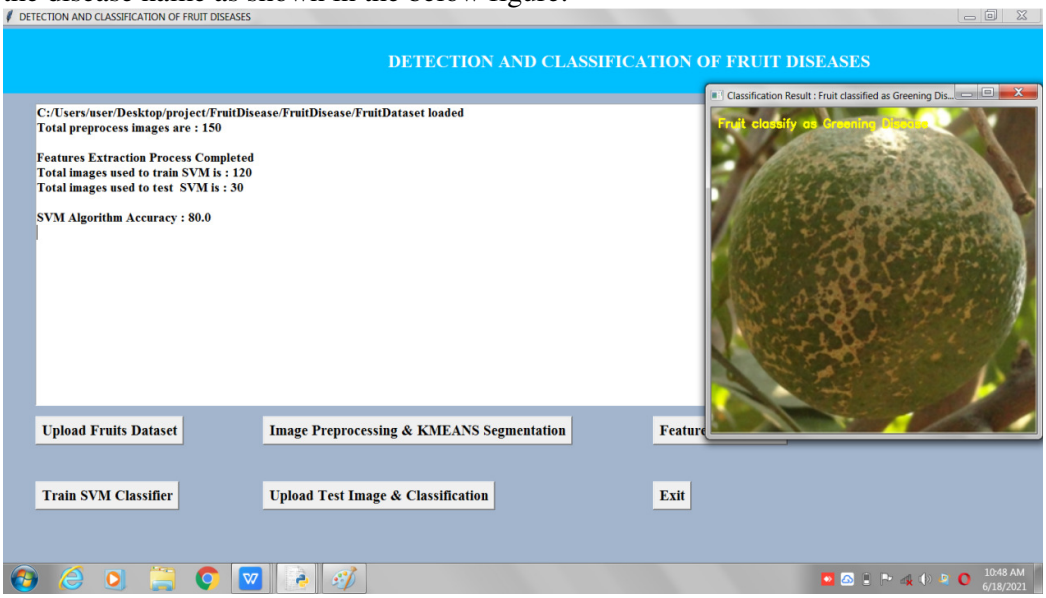
The images of fruits with infection and the images of healthy fruits are provided as the sample for the processing. Initially, the natural image of fruit is provided as the input for the system. The image is preprocessed, segmented and the features are identified from the image. If the features of the test image are different from the original image, disease detection is identified.



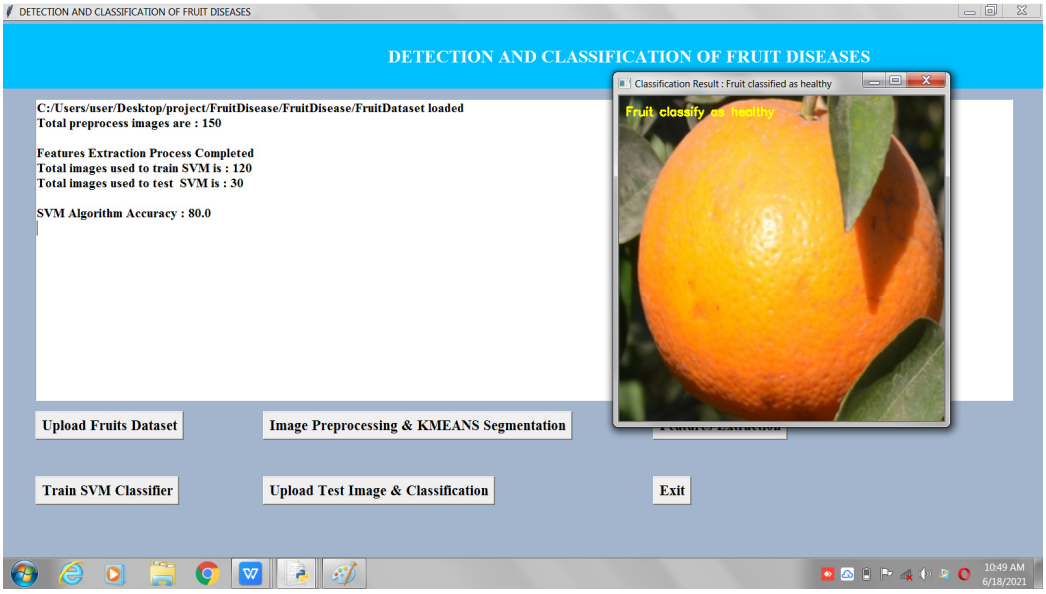
This is the interface which is created.The buttons it contains are Upload Fruits Dataset,Image Processing & KMEANS Segmentation,FeatureExtraction,Train SVM Classifier,Upload test image & Classification and Exit.



For uploading test image new window will be opened ,select any test image and click on open, the image gets uploaded and a pop image will be displayed as output with the disease name as shown in the below figure.



The input image is loaded and the pre-processing is performed. The contrast of the image is enhanced and the fruit image is segmented. The feature values are extracted and compared with the values extracted before and the disease is identified as Greening Disease as shown in Figure.



The input image is loaded and the pre-processing is performed. The contrast of the image is enhanced and the fruit image is segmented. The feature values are extracted and compared with the values extracted before and the fruit is classified as Healthy as shown in Figure.

V. CONCLUSION

The development of a fruit disease classification system for helping Indian farmers and agriculture helps to analyze the agriculture data in a better way to reduce hoardings and in bringing up a wealthy, safe and calm 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 analyzed and the optimal disease for the image is identified and the disease is indicated by an alert box. The total number of samples provided, the true and false positions, the true and false nativities, the accuracy are also indicated in an alert box.

VI. REFERENCES

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