# CLOUD-ENABLED AUTOMATED IMAGE ANALYSIS FOR FRUIT DISEASE DETECTION

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**Abstract**

Having diseases is quite natural in crops due to changing climatic and environmental conditions. Diseases affect the growth and produce of the crops and often difficult to control. To ensure good quality and high production, it is necessary to have accurate disease diagnosis and control actions to prevent them in time. Grape which is widely grown crop in India and it may be affected by different types of diseases on leaf, stem and fruit. Leaf diseases which are the early symptoms caused due to fungi, bacteria and virus. So, there is a need to have an automatic system that can be used to detect the type of diseases and to take appropriate actions. We have proposed an automatic system for detecting the diseases in the grape vines using image processing and machine learning technique. The system segments the leaf (Region of Interest) from the background image using grab cut segmentation method. From the segmented leaf part the diseased region is further segmented based on two different methods such as global thresholding and using semi-supervised technique. The features are extracted from the segmented diseased part and it has been classified as healthy, rot, esca, and leaf blight using different machine learning techniques such as Support Vector Machine (SVM), adaboost and Random Forest tree. Using SVM we have obtained a better testing accuracy of 93%.

## I INTRODUCTION

Indian Economy is highly dependent on agricultural productivity of the country. Grape is very commercial fruit of India. It can easily be grown in all tropical, sub-tropical and temperate climatic regions. India has got different types of climate and soil in different parts of the country. This makes grapevines a major vegetative propagated crop with high socioeconomic importance.The grape plant will cause poor yield and growth when affected by diseases. The diseases are due to the viral, bacteria and fungi

infections which are caused by insects, rust and nematodes etc., these diseases are judged by the farmers through their experience or with the help of experts through naked eye observation which is not accurate and time consuming process. Early detection of disease is then very much needed in the agriculture and horticulture field to increase the yield of the crops. We have proposed a system that can detect and identify diseases in the leaves of the grape plants.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.

## II LITERATURE SURVEY

***Detection of Diseases on Leaves Using K Mean Clustering Method***

An approach for the careful detection of diseases, diagnosis and the timely handling to prevent crops from the heavy losses. The diseases on the cotton are critical issue which makes the sharp decrease in production of cotton. So for the study of interest is the leaf rather than the whole cotton plant because about 8595 of the diseases occurred on the cotton leaves like Alternaria, Cercospora and Red Leaf Spot. In this proposal initially a preprocessing the input image using the histogram equalization is applied to increase the contrast in the low contrast image, K means clustering algorithm is used for an segmentation which classifies objects based on a set of features into K number of classes and finally classification is performed using Neural network.Thusimage processing technique is used for detecting diseases accurately.

***Plant Disease Detection Using Leaf Pattern***

A various methodologies for plant disease detection. Studies show that relying on the pure naked-eye observation of experts to detect and classify the diseases can be time consuming and expensive, especially in the rural areas and developing countries. So they present fast, automatic, cheap and the accurate image processing based solution. Solution is composed of the four main phases; in the first phase we create a color transformation structure for the RGB leaf image and then, they apply an colour space transformation for the colour transformation structure. Next, in the second phase, the images are segmented using a K-means clustering technique. In third phase, they calculate an texture features for the segmented infected objects. Finally, in the fourth phase the extracted features are passed through the pre-trained neural network

***Classification of Diseases Using Image Processing Detection Techniques***

An advance computing technology that has been developed to help the farmer to take the superior decision about many aspects of the crop development process. Suitable evaluation and an diagnosis of the crop disease in the field is very critical for the increased production. This

proposed work is based on the Image RGB feature ranging techniques used to identify the diseases (using Ranging values) in which, the captured images are processed for the enhancement first. Then color image segmentation is carried out to get the target regions (disease spots). Finally, the recommendation is given to the farmers to ensure that their crop and reduce the yeild loss.

## III EXISTING SYSTEM

Web enabled disease detection system have been proposed in .The system proposed a segmentation method which has used mean based strategy for computing threshold and textual features were extracted and classification was done by SVM. The survey discuses about different disease classification techniques used for plant leaf disease and used genetic algorithm for image segmentation. An integrated approach of particle swarm optimization and SVM for plant leaf disease detection and classification was proposed in.Disease detection system for pomegranate leaves was proposed in which used colour-based segmentation and features like color, texture for classifying the leaves. Leaf detection system for pomegranate leaves was proposed in which uses K-means for segmentation and statistical features for classification using SVM. A fast system was proposed for disease detection and classification using Neural Network after extracting the texture features using gray level co-occurrence methodology in . A smartphone based system was developed using machine learing technique to detect the state of the disease of the plant and also the severity levels of each diseases.

***Disadvantages***

Computational Complexity : Graph cut segmentation may increase computational demands, affecting real-time processing.

• Image Quality Dependency : The system's reliance on global features may posechallenges in scenarios with poor image quality or unfavorable lighting conditions.

## IV PROPOSED SYSTEM

We have proposed an automated disease detection and classification system for grape leaves using traditional image processing and machine learning techniques. The proposed system first segments the ROI from the back ground using grab cut algorithm and classify the segmented leaves as healthy, balck-rot, esca and leaf blight. These diseases are caused due to fungi infection on the leaves. Each disease have different characteristics where black rot appears to be circular in shape and has dark margins, esca appears as dark red stripes and leaf blight appears tobe solid reddish-purple spot

***Advantages:***

***High Accuracy*** : The system achieves precise disease identification due to the accurate segmentation provided by the Grab Cut algorithm.

***Visual Distinction***: Utilizes distinctive visual traits for disease classification, enhancing the system's ability to differentiate between various grape leaf diseases.

***Accessibility:*** Users can access the system from anywhere with an internet connection, making it convenient for farmers, agronomists, or researchers to analyze fruit diseases remotely

## V IMPLEMENTATION

***Image Preprocessing*** **:** The images are acquired from the web and are from different sources and sizes. The images also contains noise due to bad lightening condition, weather occlusion etc. To reduce the computational complexity the images are scaleddown to a standard width and height. This scaled image are then processed to filter the noise using Gaussian filter.

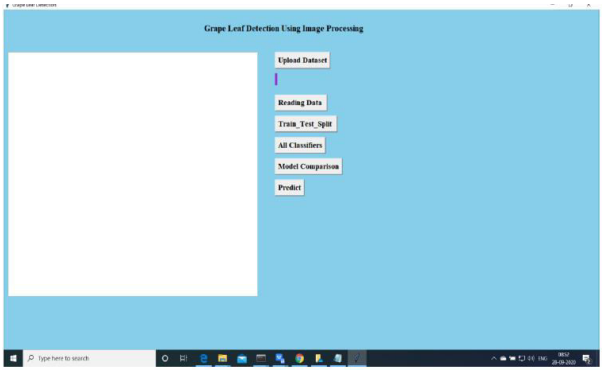
***Image Segmentation*** **:** From the preprocessed image, the leaf part of the image is segmented from the background image Grabcut segmentation algorithm. This algorithm label a pixel as foreground or background using Gaussian Mixture Model (GMM) and also takes initial rectangle which is a rough segmentation between background and foreground. We have used a rectangle of dimension (10, 10, w-30 and h-20) as the bounding box where w and h are width and height of the image.

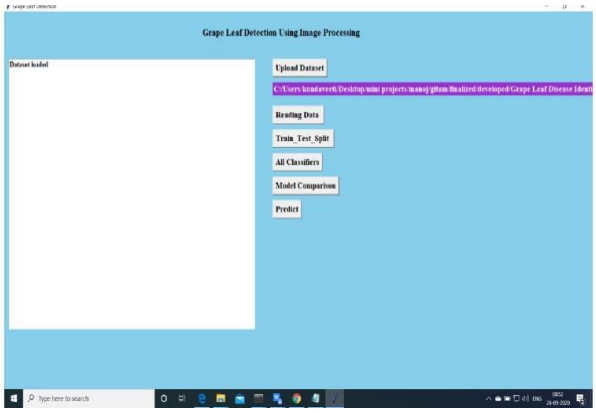
***From Extracted Foreground*** **:** the leaf part, the diseased parts are extracted. The disease part contains lesions, coloured spots and some yellowish part of the leaf. For extracting diseased region from the leaves we have proposed two different methods.

1) Diseased Part Identification- Global Thresholding: In this method, the RGB image is converted into grey scale imageand then global thresholding is applied to convert the imageinto a binary image. On the thresholded image, connected component labeling is applied to find the contours.

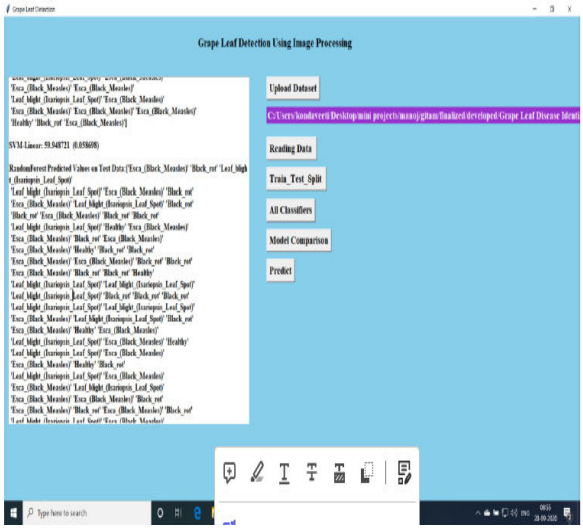
2) Diseased Part Identification - Semi supervised Learning: The diseased part of the leaves generally appears in blue colorin BGR image. To segment the diseased part blue color pixelsare filtered out by converting the RGB image into BGR image.To filter blue color pixels we have used the training image tofind the lower and upper boundary of blue color pixels. Thepixels which lies within lower and upper boundary is then filtered as blue pixels from the input image

## VI RESULTS

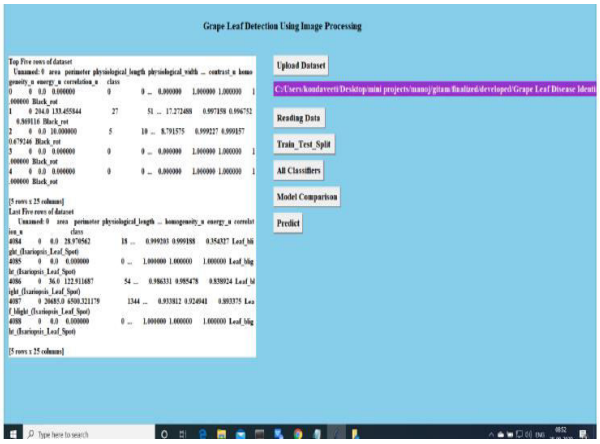




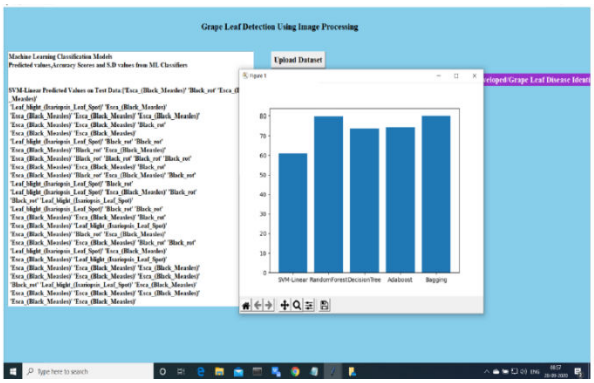

UPLOAD DATASET



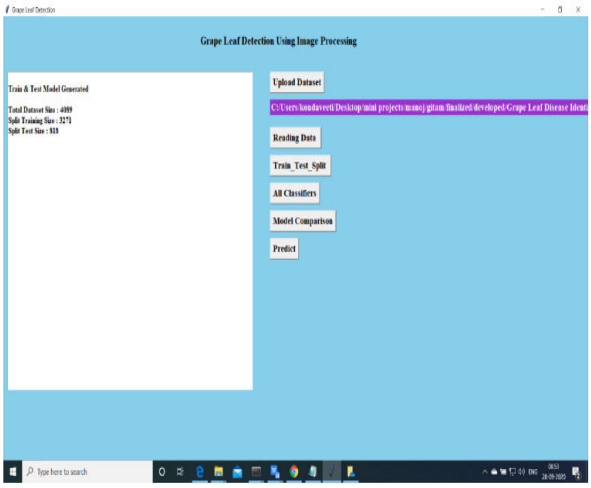

RUN ALGORITHMS



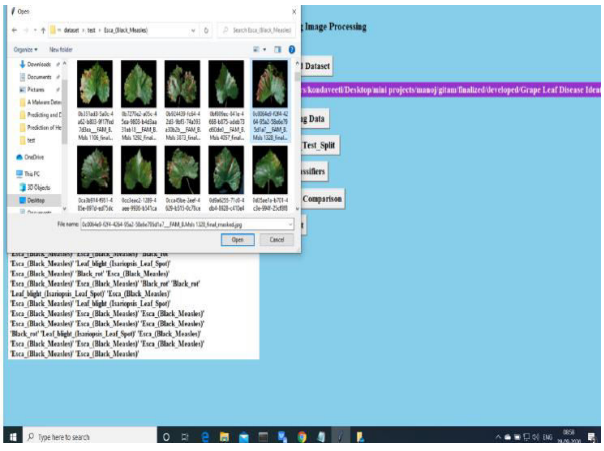

READING DATA




COMPARISION OF MODELS




TRAIN AND TEST SPLIT




PREDICT

## VII CONCLUSION

we propose automatic leaf recognition systems that identify diseases in grape leaves using machine learning technique. The proposed system first segments the leaf part from the background using grab cut segmentation technique. From the segmented leaves diseased region are identified using two different methods. The first method uses global thresholding technique whereas the second method using semi supervised learning technique. From the identified diseased part texture and colour features are extracted and trained using different classifiers and the results are compared.

We have used SVM, random forest and Adaboost algorithms for classification. We have achieved a better result of 93.035% as testing accuracy by using global thresholding and SVM

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