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Disease Detection in Tree Leaves and Fruits using Image Processing Techniques

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Abstract

India is the agriculture based country. Now a day, agricultural product yield is decrease for the reason of disease affect the plants like fungus, virus diseases. In this paper, we detect the tree leaves and fruits disease using image processing techniques. In this paper apple, grapes and pomegranate disease are detected. The apple diseases are apple scab, apple rot, Marssonina leaf blotch, black rot canker, apple mosaic. The grape diseases are black rot, powdery mildew, downy mildew, anthracnose, bacterial leaf spot, and rust. The pomegranate diseases are bacterial blight, aspergillus fruit rot, anthracnose, cercospora fruit spot, cescospora leaf spot.

Keywords*: Classification, Feature extraction, Image processing, Plant disease, Symptom, Artificial Neural networks.*

INTRODUCTION

Image processing is the analysis and manipulation of a digitized image, especially in order to enhance its quality. They perform some operations. There are enhancing the images to extract the information from the images. In the image processing technique, they have the inputs are images and the outputs are images or characteristics. Now a day's image processing technique is rapidly growing method. Image processing basically includes the some steps:

- Importing the image through image acquisition tools
- Analyzing and manipulating the image
- The output result can be altered image or that is based on image analysis.

Plant disease is defined as the abnormal status of plant. They affect the plant growth. The main purpose of this article is how to monitor the plant disease detection and suggest better solution for healthy yield and productivity. It will help the farmers to detect the disease in primary stage and prevent losses. It produces a high-quality yield of great good grain.

LITERATURE SURVEY

Nitesh Agrawal, Jyoti Singhai, Dheeraj K. Agarwal [1] has discussed about Detect the grape disease and classifies using multiclass support vector machine. In this paper having the proposed method, the input image is given to Preprocessing and they occur in segmented process. Image Database is collected. Both images are classified using multiclass SVM.

Sachin D. Khirade, A. B. Patil [2] has discussed about Plant disease detection using image processing. The plant diseases are detected using some basic image processing steps. There are preprocessing, Image Acquisition, Image preprocessing, image segmentation, feature extraction, classification. The RGB image is converted into the HIS model for segmentation. For the image segmentation process, we are using K-means clustering. The classification process occurs in

artificial neural network and Back propagation network.

Rashmi Pawar, Ambaji Jadhav [3] has proposed Pomogranate Disease Detection and Classification. In this paper, the image Acquisition process is occurred. There are image is in RGB form. Then the image is resized and noise is removed in preprocessing. In the image segmentation process, the K-means clustering is applied. In Otsu Threshold Algorithm, the Thresholding creates binary images from grey-level images by setting all pixels. The Color, texture, morphology, edges are obtained in feature extraction. For classification, K-propagation is a training method used for a multi layer neural network.

R. Meena Prakash , G. P. Saraswathy, G. Ramalakshmi, K. H. Mangaleswari, T. Kaviya [4] has proposed Detection of Leaf Diseases and Classification using Digital Image Processing. In the image acquisition process, the input image is resized to 256x256 pixels. In preprocessing, they include color space conversion and image enhancement. For the image segmentation process, they use K-means clustering algorithm. For the feature extraction, they had taken Contrast, Energy, Homogeneity, Correlation features. Finally Classification process using Support Vector Machine (SVM).

PROPOSED METHODOLOGY

When considering trees only, leaves and fruits show wide variety in shapes. The general shape of a leaf is a key part of the process of identifying a leaf or fruit. The problem being that the borders among the different terms are not well defined, since leaves or fruits can naturally have intermediate shapes. The margin of the leaf and texture of fruit is also a very important feature to spot. We present a study on segmentation of leaf images restricted to semi-controlled conditions, in which leaves or fruits are photographed against a solid light-colored background. Such images can be used in practice for plant species identification, by analyzing the distinctive shapes of the leaves or fruits. We restrict our concentration to segment in this semi controlled condition, providing us with a more well-defined problem, which at the same time presents several challenges. The most important of these are the variety of shapes, usual presence of shadows and specularities. We evaluate some popular segmentation algorithms on this task. Day by day more urbanized and artificial world, the knowledge of plants. That they used to represent our most immediate environment. In some way lost, except for a handful of specialists. What is supposedly seen as unquestionable progress also scattered away the names and uses of so many trees, fruits, flowers and herbs. But now a day, with a certain reappearance of the idea that plant resources and diversity have to be treasured, they will to reclaim some touch with nature feels more and more material. The identification of species is the first and important key to understand the plant environment. Botanists traditionally on the composition of fruits, flowers and leaves, herbs to identify species. The principal use of leaves or fruits, which are possible to find almost all, simple to snap and easy to analyze from two-dimensional images. It is the most sensible and widely used advance in image processing. In this project we introduce a method planned to compact with the obstacles raised by such complex images. The segmentation step based on a leaf or fruit model is first performed and then used to an Otsu thresholding. The leaves and fruits are then classified over datasets. In this project we introduce a method designed to deal with the obstacles raised by such complex images, for simple. A first segmentation step based on Otsu threshold method is first performed, and later used to guide the evolution of affected boundaries. And implement artificial neural network classification algorithm to classify the fruit and leaf diseases.

IMAGE ACQUISITION

Leaves and fruits are structures focused for photosynthesis and they are arranged on the tree in such a way as to exploit their coverage to light without shading each other. In this module, we can upload the leaf or fruit images from the datasets. We can input any size of image and any type. This module we can input apple, grapes, pomegranate fruits and leaves images.

PREPROCESSING

In this module convert the RGB image into gray scale image. The colors of leaves and fruits are always in RGB shades and the variety of changes in atmosphere cause the color feature having low reliability. Therefore, to recognize various plants using their leaves and fruits, the obtained image in RGB format will be converted to gray scale before pre-processing. Where R, G, B is the color of Red, Green and Blue of the pixel, respectively. RGB values range from 0 to 255.

The noises are removed from images by using filter techniques. The goal of the filter is to filter out noise that has degraded image. It is based on a statistical approach. Typical filters are considered for a desired frequency response. Filtering is used to reduce "salt and pepper" noise in image processing. A median filter is more effective for reduce the noise and protect edges. They appear the binarization.

IMAGE SEGMENTATION

In this module, we can implement Otsu threshold with automatic descriptors. Image segmentation is an effective method for detecting foreground objects in images with stationary background. Background calculation is a commonly used class of techniques for segmenting objects of interest in a scene. Reflections, background clutter, shading and shadows are the major factors that affect the efficiency of the system. In the first step, using the Otsu's method Segmentation operation has performed RGB channel by taking threshold value. The value of threshold has been decided on the basis of the extensive image analysis method. The algorithm assumes that the images contain two classes of pixels. There are bi-modal histogram (foreground pixels and background pixels), it then calculates the optimum threshold separating the two classes. So their combined spread (intra-class variance) is minimal, or equivalently (because the sum of pair wise squared distances is constant), so that their inter-class variance is maximal.

DISEASE DETECTION

Leaves and fruits are affected by bacteria, fungi, virus and other insects. ANN has significant application in fruits and leaf quality evaluation. The purpose of ANN is to generate a network system with little errors but also yield good result from the testing data set. In this module implement artificial neural network algorithm to classify the leaf and fruit image as normal or affected. Vectors are constructed based leaf features such as color, shape, textures. The neural network has a framework for many different machine learning algorithms to work jointly and process complex data inputs. An Artificial Neural Network is based on a collection of nodes are called artificial neurons. Each connection is connected with each other. They can transmit a signal from one neuron to another. In the ANN implementations, the signal at a bond between artificial neurons are a real number and the output of each artificial neuron is calculated by some non-linear function of the sum of its inputs. The connections between the artificial neurons are called 'edges'.

Step 1: Randomly initialize the weights and biases.
Step 2: Feed the training samples.
Step 3: Propagate the inputs forward and then compute the net input and output of each unit in the hidden and output layers.
Step 4: Back propagate the errors to the hidden layer.
Step 5: Update the weights and biases to reflect the propagated errors.

In the Training and learning functions are mathematical procedures used to

automatically adjust the network's weights and biases.
Step 6: Terminating the conditions

Based on these steps leaves and fruits are classified with disease names with improved accuracy rate.

RESULTS AND DISCUSSIONS

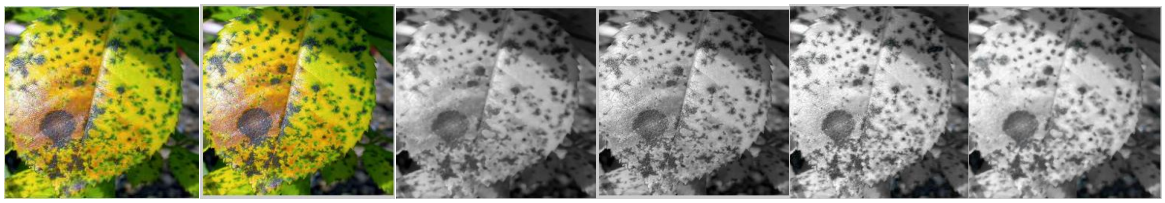

Fig: a. ***Fig: b.*** ***Fig: c.*** ***Fig: d.*** ***Fig: e.*** ***Fig: f.***

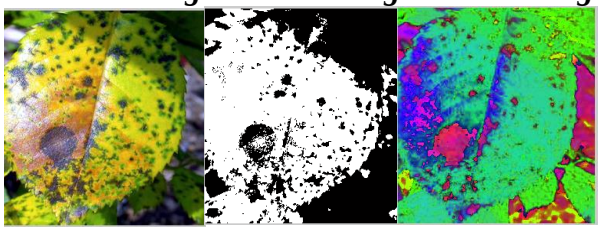

Fig: g. ***Fig: h.*** ***Fig: i.***

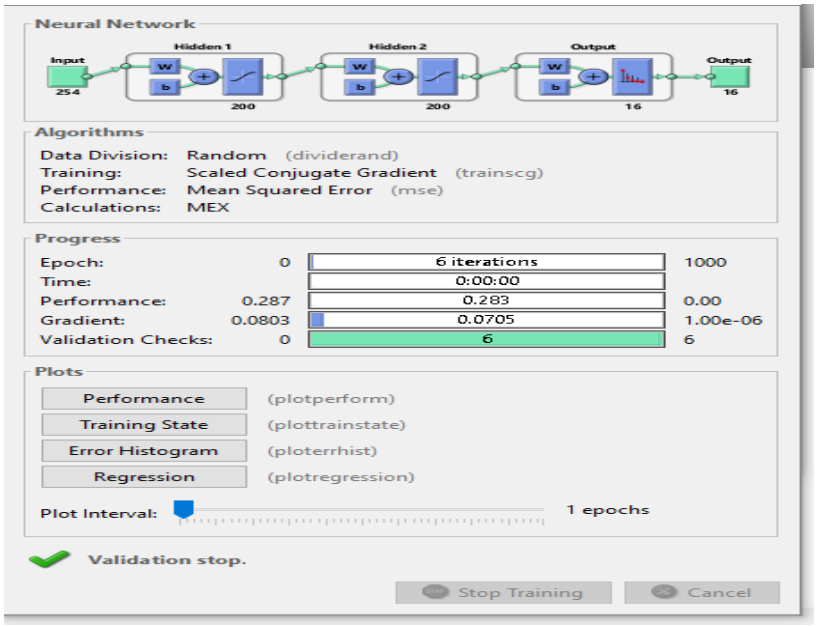

Fig: j.

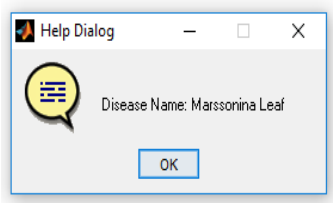

Fig: k.

Fig: 1. (a)(b)(c)(d)(e)(f)(g)(h)(i)(j)(k) *are Input image, Resized image, Gray image, Noise removal Image, Color filter, Filtered image, Contrast enhanced, Otsu segmentation, Conversion to HIS, Neural network, Disease name respectively.*

CONCLUSION

The accurate detection of tree leaves and fruit disease is very important for the successful cultivation. This detection is using image processing techniques. This paper discussed various methods to detect the disease. There are image acquisition, preprocessing, feature extraction, image segmentation and classification. ANN method is using for classification**.**

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