

Advances in Image Processing for Detection of Plant Disease

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Abstract—These paper deals with how the plant disease can be identified. Nowadays an identification of disease on the plants or leaves is difficult. The damage that takes place in a plants or leaves which leads to the complete fall down of crops that yields annually. Providing pesticides are not always proved efficient because it may be a toxic content. In other to overcome this type of issues we have to use image processing techniques along with the SVM classifier and the algorithm named as K-means clustering algorithm.

Keywords—Classifier; Clustering Algorithm; Identification; Image Processing Techniques; Pesticides.

Abbreviations—Histograms of Oriented Gradients (HOG); Hue, Saturation, Value (HSV); Support Vector Machine (SVM).

I. INTRODUCTION

INDIA is an agricultural country and nearly two thirds of the total population is directly depends upon the agriculture. Because agriculture is the basic workforce of people who are basically uneducated. But they do their cultivation based upon their own knowledge even though they didn't know that what kind of crop that grow well on their land. More than that now a days farmer faces too many difficulties in their annual yield of crops and plants because of two major problems. They are Water Scarcity and Disease which attacks plants. This project deals with the identification of disease that attacks plant or leaves. Identification of disease will resolve half of the problem because most of the farmers knows that her plants or leaves were attacked by disease but they don't what kind of disease is that? How to prevent that? What kind of pesticides to be used? [Muhammad Jamal Afridi et al., 1; Jagadesh D. Pujari et al., 2]

Pesticides are not always too good to use on plants because it may cure the disease but also it damage the growth level of plants and the yields of plants is completely collapsed. These led to the fall of annual yield if plants so that it will affect the farmers and our nation economically. The livelihood of farmers may become trouble. Fungus, Bacterial, Virus are the basic form of diseases that takes place on the plants. In this project, we are going to use an advance in image processing techniques in order to find the kind of disease that attacked on a plant [Nitin P. Kumbhar & Sanjay B. Dhaygude, 3].

II. SYSTEM ANALYSIS

2.1. Existing System

In previously plant disease identification is based upon the two major techniques:

- Histogram method
- Threshold method

The graphical representation of X and Y axis is called as histogramic representation. Therefore on, X axis consists of 256 grey level values that varies from 0 to 255 and Y axis deals with the number of pixels having corresponding grey level. When an grey level values increases, along with the number of pixels. Therefore a normalized histogram is obtained by dividing each value of the histogram by the total number of pixels in the image [Till Rumpf et al., 4; Bentoutou et al., 5].

In threshold method, the object in an image is separated from its background. Threshold can be used to create a binary image from an grey scale image.

The main disadvantage of the above methods are that they didn't give the exact segmentation which is used as segmented image and another disadvantage is these methods give too much of noise in it output [Chang et al., 6].

2.2. Proposed System

In the proposed method for the detection of plant disease is completely based upon the image processing techniques. We know the basic processes that involves in image processing techniques [Chen et al., 7].

The following figure shows the various image processing techniques

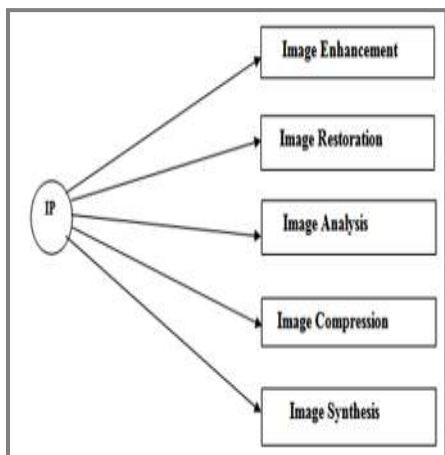


Figure 1: Various Image Processing Techniques

We have to upload an image to start the image processing techniques, then it may remove the unwanted noise, colour codes that present in an image that the user provide. Then the RGB colour format is used to find level of RGB present in an image. Then by using the SVM Classifier, it give the label to the unlabelled data which may used to find kind of disease [Cheng & Sun, 8].

III. BLOCK DIAGRAM

The proposed system block diagram that used to detect the disease is shown below:

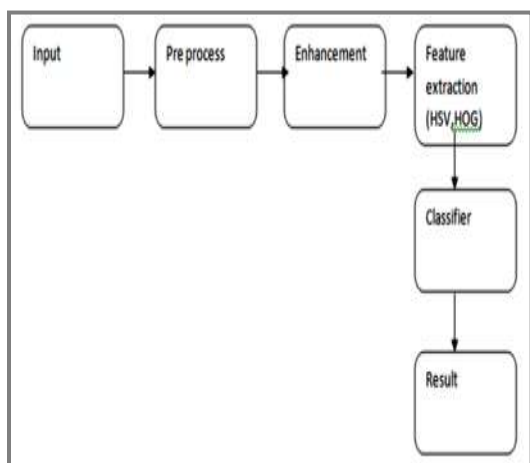


Figure 2: Block Diagram

Here the input is the raw image that we took or taken from the internet. In the section of preprocess the presence of noise and the grey levels in the image is removed according to their preprocessing requirements. Segmentation is the process of partitioning the digital image into the multiple segments and enhancement is the process of improving the quality of an image i.e., it may improves the contrast, brightness, sharpening the image. But it may not add any additional details to an image after enhancement. Feature extraction is the method of transforming the set of input data into a set of features. A set of features may consist of Area,

Eccentricity, Circularity, and Perimeter. And the statistical features like mean, variance, correlation, entropy. Here we use the methods like HOG and HSV. The next step is classifier, we used an classifier called as Support Vector Machines in which a set of learning methods used for classification and regression. It may also used to predict the label of an unlabelled data in future. Here the coding is used to identify the kind of diseases based on the label. After providing an label to data it will show the kind of disease that took place in the dialog box [Cheriet et al., 9].

IV. ALGORITHM

The algorithm that we used here is K-Means clustering algorithm. It is an unsupervised clustering algorithm which is used to classify the input data points into multiple classes based on their inherent distance from each other. The algorithm assumes that the data features form vector spaces and tries to find a natural clustering in them.

V. SOFTWARE REQUIREMENTS

We used a simulation tool to detect a kind a diseases. The software used here is MATLAB. MATLAB is a high performance language for technical computing integrates computation, visualization and programming in an easy to use environment where a problems and solutions are expressed in familiar mathematical notation. The features of MATLAB are:

- High-level language for technical computing. Development environment for managing code, files, and data.
- Interactive tools for iterative exploration, design, and problem solving.
- Mathematical functions for linear algebra, statistics, filtering, optimization, and numerical integration.
- 2-D and 3-D graphics functions for visualizing data.
- Tools for building custom graphical user interfaces.
- Functions for integrating MATLAB based algorithms with external applications and languages, such as C, C++, Fortran, Java™, COM, and Microsoft Excel.

VI. SAMPLE OUTPUT



Figure 3: Affected Image Sample

This is an affected leaf that we taken through the camera, mobile phone, or taken from internet. Then it starts the image processing procedures, finally it displays the output like as follows:

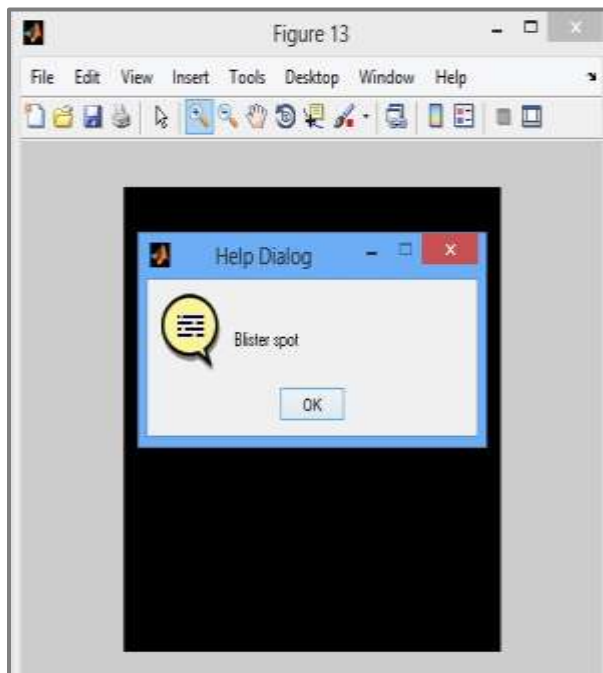


Figure 4: Output

VII. APPLICATION

The main application of this project is

- Agriculture

In order to help the farmers easily to identify the disease and to provide what type of pesticides used to cure the infected area on the plants.

VIII. CONCLUSION

Thus we used a common process to detect the plant disease using the image processing along with the search of most convenient and suitable segmentation method for this method. More than that segmentation is a very important factor in plant disease analysis, since the automation involves

processing of plant disease from the image which is directly captured from the farms. Here, the segmentation method is more accurate than the existing system and the noise level is also removed. So that these method is easily applicable to all areas in order to detect the disease.

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