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IMAGE PROCESSING BASED DETECTION OF UNHEALTHY PLANT LEAVES

Rupali Mahajan, Dr Mrs S.A. Bhisikar

[1]Rupali S. Mahajan, Dept of Electronics Engineering, Rajarshi Shahu College of Engineering, Tathawade, Pune – 411033, India
[2]Professor Dr S.A.Bhisikar, Dept. of Electronics Engineering, Rajarshi Shahu College of Engineering, Tathawade, Pune – 411033, India

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Abstract - *Agriculture plays an important role in our day to day life. It has played a key role in the development of human civilization. India is an agricultural country and about seventy percent of our population depends on agriculture. So the disease detection of plants plays an important role in the agricultural field. Majority of the plant diseases are caused by the attack of bacteria, fungi, virus etc. If proper care is not taken in this area, it may lead to serious effects on plants and adversely affects the productivity and quality. To detect, the plant diseases we need a fast automatic way. The main approach adopted in practice for detection and identification of plant diseases is naked eye observation through experts. The decision making capability of an expert also depends on his/her physical condition, such as fatigue and eye sight, work pressure, climate etc. So this method is time consuming and less efficient. Here, it is proposed with an idea of detecting plant diseases using image processing. The unhealthy leaves of plant can be detected and can be separated from healthy leaves. This concept can be extended to detect the symptoms of any type of plant diseases that is affected on different horticulture crops.*

Keywords— Image processing, Genetic algorithm

1. INTRODUCTION

India is an agricultural country. In India about 70% of the population depends on agriculture. Plant diseases cause significant reduction in both quality and quantity of agricultural products. Farmers have wide range of diversity to select suitable Fruit and Vegetable crops. However, the cultivation of these crops for optimum yield and quality produce is highly technical. It can be improved by the aid of technological support. The management of perennial fruit crops requires close monitoring especially for the management of diseases that can affect production significantly and subsequently the postharvest life. The Image processing techniques used for the fast and accurate detection of plant diseases. The steps followed by in detection of leaf diseases are image acquisition, image enhancement and noise removal, image segmentation, feature extraction and disease classification.

There are many disadvantages of conventional methods of detecting plant leaf diseases, such as more time consuming, inaccuracy, inefficiency for larger fields, variation in results due to personal issues such as vision of person, environmental factors, etc. It is very important to use technology to overcome these issues. Image processing is one of the best solutions for detecting plant leaf disease detection. Here, the proposed system detects the plant leaf disease using image processing techniques with the help of Genetic algorithm as a classifier.

2. METHODOLOGY

First the images of different plant leaves are acquired. Then image processing techniques are applied to the image of plant leaf to get the necessary features and these features are further analyzed. The block diagram below gives the basic process involved in the system.

The step-by-step methodology is explained as below

1. Image acquisition
2. Colour Transformation
3. Masking the green-pixels
4. Removal of masked green pixels
5. Segmentation
6. Obtain the useful segments
7. Computing the texture features using Colour Co-Occurrence methodology
8. Classification of the disease using Genetic Algorithm.

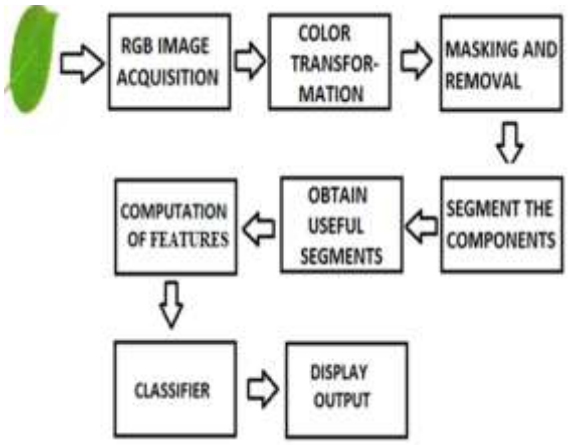

Fig -1: Block diagram

2.1 Color Transformation

The RGB images are converted into Hue Saturation, Intensity (HSI) color space representations. The purpose of color space is to facilitate HSI (hue, saturation, intensity) color model is a popular color model because it is based on human perception. Hue is a color attribute that refers to the dominant color as perceived by an observer. Saturation refers to the relative purity or the amount of white light added to the hue and intensity refers to the amplitude of the light. Color spaces can be converted from one space to another easily. After the transformation process, the H component is taken into account for further analysis.

2.2 Masking and Removal

In this step the greenest colored pixels are identified. After that, based on the specified threshold value that is computed for these pixels, the mostly green pixels are masked. The pixels with zero red, green, blue values were completely removed.

2.3 Segmentation

The infected portion of the leaf is extracted. The infected region is then segmented into a number of patches of equal size. The size of the patch is chosen in such a way that the significant information is not lost. The patch size of 32∗ 32 pixels is taken.

2.4 Computing Texture Features

Texture features like contrast, energy, local homogeneity, and cluster shade and cluster prominence are computed for the Hue (H) content of the image.

2.5 Classifier

Genetic algorithm is used as a classifier to find whether plant leaf is diseased or not. Algorithm begins with a set of solutions called population. Solutions from one population are chosen and then used to form a new population.

3. RESULTS

The work is done in Python. For input a fresh and diseased database of around 1000 plant leaf images of different plants such as potato, tomato, etc. is taken. After transforming the image from RGB to HSI format, the image enhancement is done. Then segmentation process is performed to get useful segments. After that Genetic algorithm classifies the plant leaf with disease as unhealthy plant leaf and the other leaf as healthy leaf. The HSI image, Segmented image are displayed in below fig.

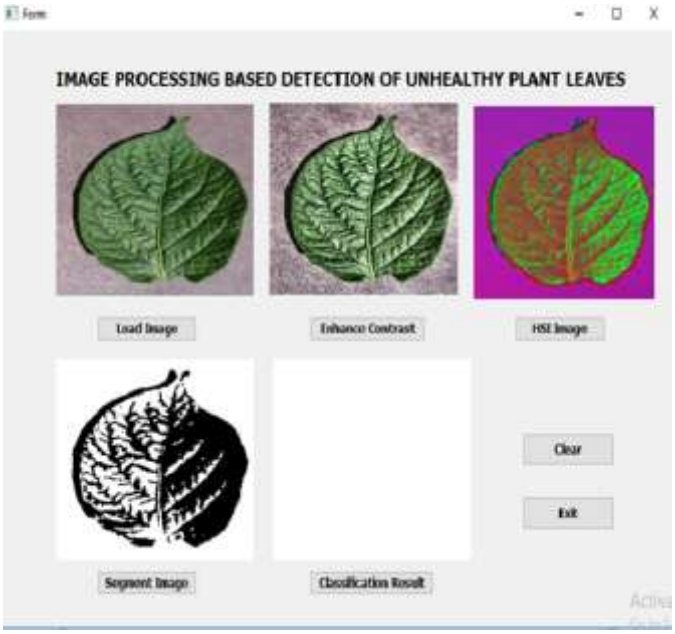

Fig-2: HSI, Segmented image

Fig -3: Result

3. CONCLUSION

The proposed system recognizes plant leaf diseases. Speed and accuracy are the important characteristics required for disease detection. Genetic algorithm is used as a classification technique to identify the plant leaf disease. This technique helps in early and fast recognition of plant leaf disease.

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