A NOVEL DESIGN AND IMPLEMENTATION OF FINDING DISEASES IN ALOE VERA PLANTS AND ITS PATTERNS

[1] RASHMI J HEGDE, [2] PALLAVI A, [3] NANDINI M L, [4] PRIYANKA M, [5] PROF. PAVAN KUMAR E

Dept. of ECE

Sai Vidya Institute of Technology, Bengaluru, India

rashmihegde276@gmail.com, 7890pallavi@gmail.com, priyankamallesh04@gmail.com, nandiniml9731@gmail.com

_____

Abstract : This paper presents, an advanced evaluating methodology that has been evolved and used to help the agriculturist to take correct decision regarding many features of Aloe Vera plant development process. Suitable evaluation and diagnosis of various parts of leaf of the Aloe Vera disease in the field is very critical for the increased production. The aim of this project is also to overcome the existing problems concerned with over use of Aloe Vera products such as colorectal cancer, diarrhea, hepatitis. To solve this difficulty we are proposing a prototype model with image processing. The genetic algorithm is helpful in finding the useful contents in succulent plant like Aloe Vera which is planted for use in agriculture and medical field. But the continuous use of products containing Aloe Vera is known to cause numerous skin allergies, skin eruptions etc. Due to these disadvantages there is need of suitable substitute to Aloe Vera. Those are found out with the help of genetic algorithm by giving different set of inputs like Aloe Vera, Turmeric to the algorithm and compare output of it.

IndexTerms - Image processing, Genetic Algorithm, recognition of disease caused in plants, Hepatitis, Colorectal cancer, Diaheria, Skin allergies and Rashes,Turmeric.

_____

I. INTRODUCTION

Aloe Vera is a plant species belongs to genus Aloe and it is planted for medicinal and agricultural use. Medicinal plants are the backbone of the Ayurveda medicine system which is useful in the treatment of the certain persistent diseases also [2]. Plant disease has become dilemma as it can cause notable decrease in both quality as well as quantity of agricultural products. Diseases in leaves cause major losses in production of products in agricultural industry [1]. Leaf of the Aloe Vera having disease is one of the main factors to constrain the production and quality of it. The identification of disease takes a long time by using the traditional diagnostic approach, thus farmers frequently not able to prevent and treat the diseases. Leaf of Aloe Vera disease recognition based on leaf image is an essential research topic in the field of computer vision, where the key task is to find an effective way to represent the diseased leaf images. This work is based on image processing techniques and pattern recognition methods, a leaf disease recognition method wasproposed.

Polysaccharides in Aloe Vera is responsible for the health and beauty benefits. The problem related with over use of Aloe Vera products such as colorectal cancer, diarrhea, hepatitis etc. colorectal cancer is also known as colon cancer. Colorectal cancer is the second major source of death among various people in the United States. In 2016, it is estimated that there was 134,630 are recent cases and 50,169 are deaths. from colon cancer. To solve this issue we are proposing computer vision (image processing) technology with genetic algorithm.

In this system, there are two main phases. First phase consists of recognising and analysis of the diseased part through Canny Edge Detection technique. Images are classified according to the type of problems in hand by using few analytical perceptive methods. This helps the farmers to take immediate decisions at that time. Second phase is to reduce the dimensionality of the feature space and improve the accuracy of the Aloe Vera leaf disease identification, the precious features were selected by using genetic algorithm.

Genetic algorithm

Genetic algorithm is an evolutionary process which is used in a way that the population becomes increasingly devised of useful contents and free of harmful contents. The total amount of useful contents are found out by using image processing with genetic algorithm.

Image processing for detecting diseases

Image processing is known to convert an image in digital form and performs few operations on image, to get an enriched image or to bring out some useful information from it. The Image Processing takes image as input like video frame or photograph and output as image or character linked with it. Image Processing finds core research area in engineering and computer science disciplines. Processing an image is known as sharpening, stressing of edges, improve the image contrast or brightening of image, removal of noise. It has great prospect in the plant protection field, which leads to crop management.

The image processing has few useful applications for detecting the more types of the plant diseases which are:

- To identify the edges of defected portion of the leaf and stem.
- Finding shape of the diseased area of the leaf.
- To determine the affected area color.
- The layers of image are separated.
- For Image segmentation.

Various Types of the Aloe Vera Leaf Spot Diseases

The diseases identify on the leaf of Aloe Vera spots are classified as:

ALTERNARIA LEAF SPOT:

Alternaria alternate causing spot on leaf of Aloe Vera. A spot on leaf was identified on Aloe Vera plant as tiny, circular to oval shape with dark brown necrotic sunken spots on the leaves.

ALOE RUST:

Aloe Rust is one type of the plants fungus that affects succulent aloe plants. The Fungus is responsible for circular shape black or brown spots on the leaves. The fungus does not spread beyond the spots that are affected and hence it is self-limiting.

BASAL STEM ROT:

Basal Stem Rot is a fatal Aloe Vera disease that is caused by cold and damp conditions. The Aloe Vera plant base is affected with this type of disease will turn dark red or black and then at very short time it begins to rot**.**

II. PROPOSED METHOD

At present scenario, people are using more Aloe Vera products which indirectly cause skin diseases and health issues. To solve this issue we are proposing the prototype project using image processing. Also this Proposed method presents, an advanced evaluating methodology that has been evolved and used to help the agriculturist to take correct decision regarding many features of Aloe Vera plant development.
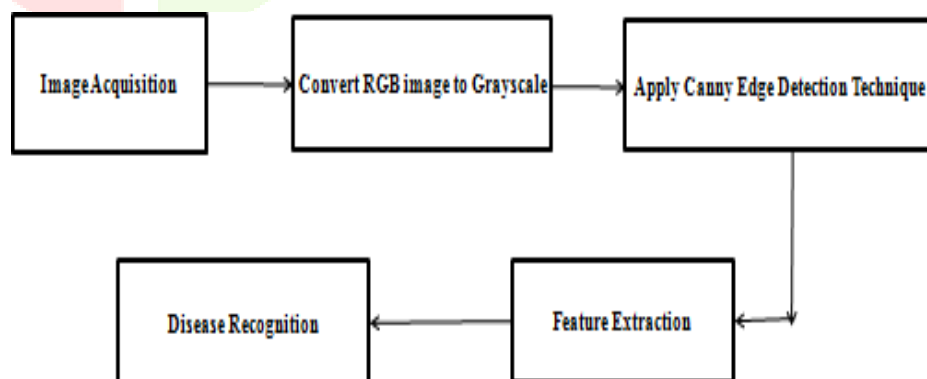

Figure 1. Aloe Vera leaf disease recognition

Initially, the digital images are acquired from the circumstances using a digital camera. Then Image Processing Techniques are applied to the captured images. In this proposed method, farmers can take decision immediately at that time and the yield loss can be reduced. Take the image of an Aloe Vera leaf as an input image and convert into a grayscale image. Next segmentation the edge detection by using Canny Edge detection homogenous techniques used to identify the clarity for the edges. The bounding boxes will show the diseased area of the leaf.

This technique runs in 5 separate steps:

1. Smoothing: Blurring of the image to remove noise. Implemented through Gaussian Filtering with Specific Kernel Size.

2. Finding gradients: The edges should be marked where gradients of the image has large magnitudes.

3. Non-maximum suppression: Only local maxima should be marked as edges. Find gradient direction and using these directions perform non maximum suppression.

4. Double thresholding: Strong edges are examined by using thresholding.

5. Edge tracking by using hysteresis: All edges that are not connected to the strong edge are suppressed for the determination of final edges.

Among several common Aloe Vera leaf diseases, we chose Alternaria leaf spot, Aloe rust, Basal stem rot. While gathering the diseased leaf images of the Aloe Vera, in order to avoid external negative influences of the experimental conditions, the three kinds of Aloe Vera diseases were taken with white background.
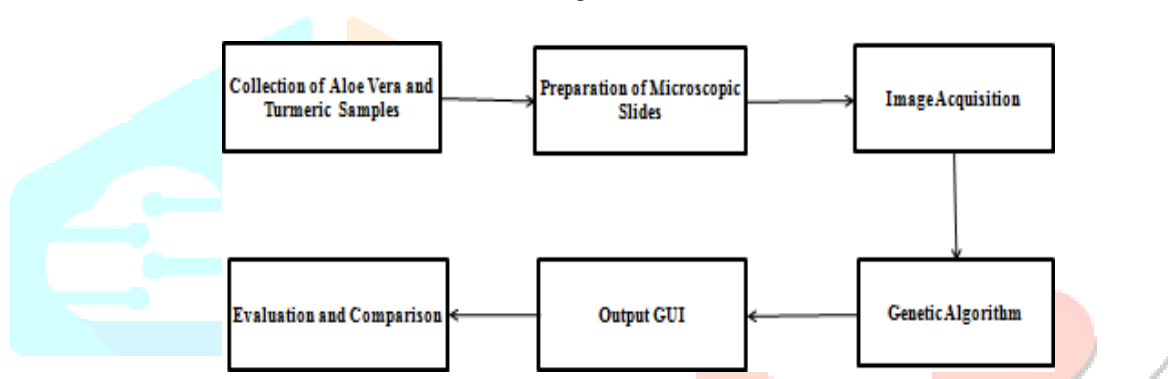

Figure 2.Assessment of Aloe Vera contents using genetic algorithm.

As a part of proposed work, we are evaluating the contents of Aloe Vera using genetic algorithm. At first, we collect the different sample of various types of Aloe Vera gel. Basically microscopic images are rich in information and the microscopy which are not require specific sample preparation skills. Microscopic slides are prepared using stain as methylene blue which helps to enrich the microscopic view of cells in Aloe Vera gel. Moreover, the cells in the gel of Aloe Vera can be observed at relatively lower magnification of 10X [3]. Genetic algorithm code helps for the evaluation. The formulae we are using are:

$$Precision = TP/TP+FP$$
$$Recall = TP/FN + TP$$
$$F\text{-measure} = 2. Precision * Recall / Precision + Recall$$

Where, TP is True Positive

FP is False Positive

FN is False Negative

We repeat the same steps for turmeric also. The calculated F-measure values are compared for the evaluation. We can also take other inputs like Neem and Tulsi.

III. RESULTS

In the process of identifying and diagnosing plant diseased leaf image using Computer Vision technique, feature extraction reduction is a key task. After being infected, the color, texture and shape of diseased leaves are different from the normal ones, which could be an important evidence to diagnose the plant disease. After diseased leaf image edge extraction and spot image segmentation, area of target disease spot were obtained and then the shape features of disease spot could be extracted. Since various types of diseases can be recognised easily.
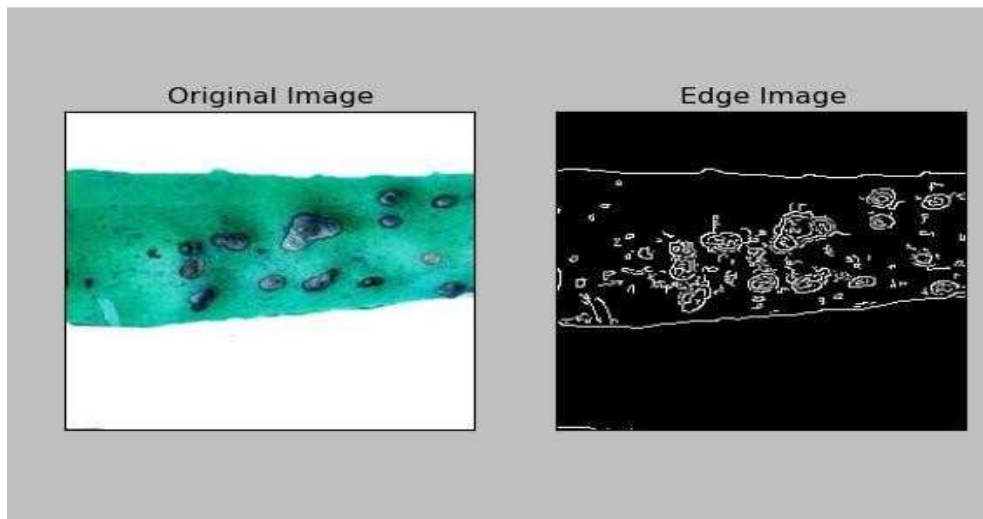
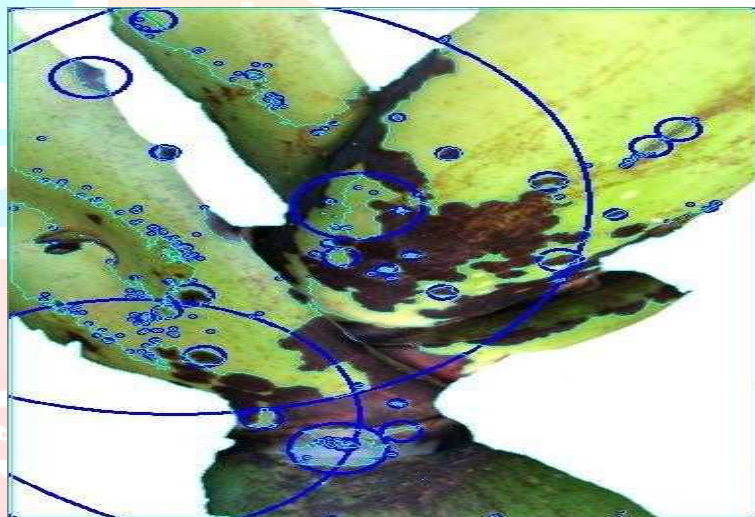Figure 3. Disease pattern recognition using Canny Edge detection

Figure 4. Disease area recognition using bounding boxes.

Table I. Different input samples evaluation

Input to GA	Evaluated values		
	Precision	*Recall*	*F-measure*
Aloe Vera	0.49	0.99	32%
Aloe Vera with Turmeric	0.51	0.76	61%
Turmeric	0.5	0.98	66%

The above table gives the complete evaluation of different inputs provided to the genetic algorithm. The suitable substitute are substituent to an aloe vera can be choose by knowing the percentage of useful contents of each input in this algorithm. By substituting the values of each input to the formulae mentioned in the above the useful content percentage is obtained. Since with the comparison of F measure value of these inputs we can decide which one is better. The quality of the Aloe Vera product can be improved up to 30% approximately by adding Turmeric to it.

The schematic diagram of leaf of the aloe vera disease recognition is as represented in figure 1. The block diagram of computation of Aloe Vera contents using Genetic Algorithm is as shown in figure 2. The figure 3 represents the disease pattern recognition using canny edge detection. The disease area recognition using bounding boxes is as shown in figure 4. Table 1 represents the different input samples evaluation.

IV. CONCLUSION

This paper gives the analysis of Aloe Vera plant leaf diseases and its content evaluation. In this proposed system there are two phases. Initially Edge detection is used to identify the pattern of Aloe Vera leaf diseases and then bounding boxes are used to identify diseased area of the leaf. In second phase, computation of AloeVera and Turmeric contents using Genetic Algorithm and comparison of both results is done. The goal of this work is to develop the computing system that can easily find out the affected part of an Aloe Vera leaf by disease using the image analysis technique. Depending on the type of Aloe Vera leaf disease, pest recommendation is done. Through this proposed method the farmers' burden has been reduced and saves their life. It also reduces loss. From second phase the percentage of useful contents in Aloe Vera is evaluated using genetic algorithm which is useful for common people that whether to use the products of it or not. By comparing the outcome of genetic algorithm with different input like Turmeric the suitable substitute to AloeVera can be easily found and also the suitable substituent to enhance the attribute of the product for better results.

REFERENCES

[1]. Ms. P. RevathiMs.Shivani K Tichkule, Prof. Dhanashri. H. Gawali," Plant Diseases Detection Using Image Processing Techniques", 978-1-5090-4556-3/16/$31.00 ©2016 IEEE .

[2]. Mr.Shravankumar Arjunagi, Dr.Nagaraj.B.Patil,Sharanbasappa Honnashetty,"A Survey on Detection and Computing the Amount of Plant Diseases Using Image Processing ".

[3]. Mr.Sachin D. Khirade,Mr. A. B. Patil," Plant Disease Detection Using Image Processing",978-1-4799-6892-3/15 $31.00 © 2015 IEEE DOI 10.1109/ICCUBEA.2015.153

[4]. Mr.Patil SB,Bodhe SK[2011],"Leaf disease severity measurement using image processing".Int J Eng Technol 3(5):297-301