



Leaf Disease Detection and Prevention Using Image Processing using Matlab

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Abstract— Nowadays many of the farmers and agro help center use the different new technology to enhance the agriculture production. Plants have become important source of energy. There are several diseases that affect plants with the potential to cause economic and social losses. Many of disease are most popular where disease spots occur on the sugar cane plant leaves. If the disease are not detected at first stage than it is more harm full to production. To find out particular disease using Digital image processing helps to find disease and provide prevention for particular disease which types pesticide need to prevent disease. Firstly take Input image in RGB form then the green pixels are removed then the image is segmented useful segment used for extraction finally texture statistics is completed and according to analysis disease prevention is provided.

Keywords— Digital image processing; segmentation; Extraction; Agriculture Production; Spots; Sugarcane.

I. INTRODUCTION

Agriculture is changing social and economic environment day today. Improper management leads to loss in agricultural products [1]. Farmers lack the knowledge of disease and hence they produce less production. Kisan call centres are available but do not service 24*7 and sometimes communication will be fail. Farmers are not able to explain disease properly on call need to analysis the image of affected area of disease. Images and videos of crops provide better view and agro scientist can provide a better solution but it not getting to all farmers. The experimental results indicate that the proposed approach is a valuable approach, which can significantly support an accurate detection of leaf diseases in a less computational effort.

1.1 Image Processing

In today's modern digital world research are continuously trying to increasing the collectively of plants [1]. They have archived by using developing the higher breed seeds and plants. But one problem still exist which is a major concern of the cultivation of crop and that is crop diseases and the pesticides problem. Due to these problems, the cultivation decreases and hence all the farmers and in turn the country suffers the lack of cultivation of plant [2]. Many of the time disease need to prevent at early stage, but it not happens then it damage the plants [3][4]. Due to that whatever the investment need to do that also in loss, to avoiding all these need to detect disease at early stages. Sugarcane is cultivated in long duration that is 10 to 18 months, that leads to attack of many diseases [5]. Fungi-caused diseases in sugarcane are the most predominant disease that appears as spots on the leaves.

In case of severe infection, the leaf become totally covered with diseased spots, disease determines the quantity, quality, stability of yield. Excessive use of pesticides increase the danger of toxic residue level on products it has been identified as a major contributor to ground water contamination now days pesticides price are increasing day by day. To achieve highest production with less cost they need to use modern technique to enhance productivity with minimum time more profit [1].

We are taken 6 type of disease as experimental model for detection.

- a. Brown Spot.
- b. Downy mildew
- c. Sugarcane Mosaic
- d. Red stripe
- e. Red rot
- f. Downy Fungal

1.2 Algorithm

The algorithms that work on feature extraction are as:

- a. Linear SVM
- b. Non Linear SVM
- c. Multiclass SVM

Let us discuss these algorithms in detail as follows:

1.2.1 Linear SVM:

Maximum margin hyper plane and margins for an SVM trained with samples from two classes.

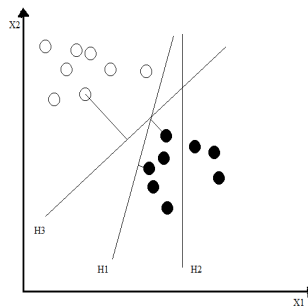


Fig. 1 Hyperplanes in Linear SVM

1.2.2 Non Linear SVM:

This allows the algorithm to fit the maximum-margin hyper plane in a transformed feature space.

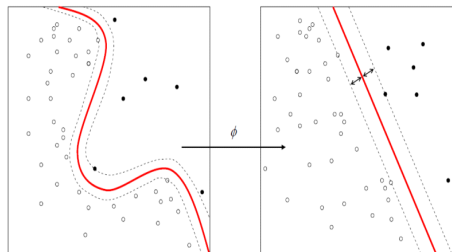


Fig. 2 Kernel machines used in Nonlinear SVM for comparison

1.2.3 Multiclass SVM:

Multiclass SVM aims to assign labels to instances by using support vector machines, where the labels are drawn from a finite set of several elements. In machine learning, support vector machines are supervised learning models with associated

Learning algorithms that analyze data and recognize patterns, used for classification and regression analysis.

1.3 Database

Database contained large amount of image samples files which are containing the disease image and non-disease images. According to Image feature extraction techniques, the features will be extracted and then that image file will be stored in the database [6].

II. LITERATURE SURVEY

Following table shows the literature survey:

Table 1 Review of papers

Sr. No	Title	Author Name and year of publication	Techniques Used
1	Leaf Disease Severity Measurement Using Image Processing	Sanjay B. Patil et al./ International Journal of Engineering and Technology Vol.3 (5), 2011, 297-301	Feature Extraction using threshold method and triangle thresholding method.
2	Classification of Cotton Leaf Spot Diseases Using Image Processing Edge Detection Techniques	P.Revathi Research Scholar, University Coimbatore-21, TamilNadu, India,2012 IEEE.	Cotton Diseases Control has been developed in a BP neural network as a decision-making system.

III. EXISTING SYSTEM

Genetic algorithm (GA) is a powerful searching technique that is used to solve problems in many different ways. Genetic Algorithm (GA) is efficient search method based on principles of natural selection and genetics.GA is used to find out the optimal solutions among the search space with the operators like selection, crossover, mutation, etc. This work presents the methodology for detecting plant leaf diseases and the way for getting optimal solution of leaf disease detection using genetic algorithm [1].

IV. PROPOSED APPROACH

These proposed works are more focus on Detection of disease on the sugar cane leaf using Matlab.

Firstly capture image from digital camera (mobile camera). Most probably the camera with some limitations and criteria will be considered. The captured image will be considered for further feature extraction, using one of the above algorithms. There are many features of images that are to be extracted, but we in our proposed system are going to consider some of them. The below system architecture shows the actual work flow of the concept that we are working on. The main focus of this proposed work is to help the farmers, suffering from loss due to incomplete knowledge of various diseases. The concept should be more user-friendly so, we are focusing on language translation too. Currently we are focusing on two languages that are English and Marathi.

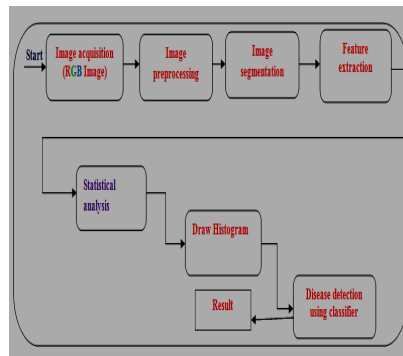


Fig. 3 System architecture

Working flow of proposed approach includes following steps:

1. Take RGB image
2. Image Color transformation of RGB to Gray scale
3. Image segmentation
4. Feature extractions
5. Statistical analyses
6. According to analysis matching of feature extraction are done.

4.1 Image Acquisition:

Disease detection start with taking input image from digital camera, those are in RGB format [7] [1].

Better quality resolutions are used for image-analysis that images are in the format such as TIF, JPEG, PNG, BMP etc.



Fig. 4 RGB Images of infected sugarcane leaf

4.2 RGB to Gray scale Conversion:

In this method while converting the true color images RGB to gray scale by eliminating the hue and saturation information [1].

4.3 Image pre-processing:

By using image pre-processing reject unwanted part of data from the image such as filter the noise, image processing feature include the colour, size and texture of image.

4.4 Image Segmentation:

The result of input image segmentation for a plant disease detection system is to preserve only the infected area in the output image for detection purpose [8]. However, due to the diversity of disease types, the plants are growth in different environmental conditions. To predicate the final result it may be hard to detect and problem of accuracy.

There is information need for prediction of disease is physical location of plant in environment and its infected area of disease according to this information prediction is done [9].

Process for image segmentation based on color of image

- 1) Take Input image
- 2) Locate healthy area of image (which contains green pixels)
- 3) Extend to potentially infected area

4) Get segmentation result.

IV. CONCLUSION

In this paper we have proposed feature extraction based concept of detecting disease of sugarcane leaf. After doing review on various techniques and algorithms we had come to conclusion that, SVM algorithm gives the better result as compare to other algorithms. This approach can also be developed using normal techniques like JAVA, but using Matlab gives the efficient and effective result. As the main focus of this application is user-friendly, this application is designed in such a way that it supports Multi-Lingual concept. This application is helpful for farmer and laboratory where they are can easily protect their crops and there will be increase in growth of production.

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