Crop Health Analysis using Matlab

Richa Narnaware[1] Sumedha Raikwad[2] Ruchika Sandekar[3] Shraddha Gondane[4] Harshada Joshi[5]
[1,2,3,4,5]Student
[1,2,3,4,5]Department of Electronics and Telecommunication Engineering
[1,2,3,4,5]YCCE, Nagpur, India

Abstract— Identifying crops is crucial for some of the reasons. Crop maps which may be of any type are generated by national or multinational agencies of agriculture, insurance and regional agricultural councils to plan and prepare an inventory of grown crops in various regions. This is effective for the purpose of forecast of grain supplies, collection of crop production statistics, facilitation of crop rotation, soil production mapping, assessment of crop damaged because of storms and other natural hazards and to monitor farm activities. Important activities include identification of the type of crop. Old techniques to obtain this information are ground surveying and census. In order to make standardize measurements however, especially for multinational agencies, remote sensing can provide data collection and information of strategies. Use of remote sensing will offer an effective and dependable means of acquiring the required information, to order map crop type. Remote sensing and loading images from MATLAB database and then segmenting it can provide structure information about the health of the vegetation. Accuracy, defected area, enhanced area cluster are analyzed in this paper.

Keywords: MATLAB, mapping, crop damage

I. INTRODUCTION

To produce and access accurate maps of crops during any season is very essential for effective and fast agricultural monitoring. Diseases on plant leads to reduction in the quality as well as quantity of agricultural products. To study plant disease is the crucial thing to make plants alive. To monitor health and disease of any plant plays a crucial role in satisfactory and successful crop cultivation in fields and farms. Various efforts have been made to analyze crop distribution from time to time, but very less attention is paid towards the composition dynamics and spatial extent of crops in a season. To understand how crops are distributed at beginning stages allows for the timely adjustment of crop planting structure. Remote sensing image analysis is a very important and commonly used approach to image analysis in digital image processing. Image classification methods use group of pixels to represent land cover features. There are three main image classification techniques in Remote Sensing: Pixel-based image classification and Object-based image classification [6].

Health assessment of a crop and early crop infestation detection, is important to ensure best agriculture production [3]. Some kind of stress related with, for example, insects, moisture, weed and fungal should be detected a little bit before-hand or early so as to provide a chance for the cultivator to lessen the effect [1]. Crops don't grow in similar fashion throughout the field and consequently the yield of crops can vary from spot to spot [2]. Remote sensing gives the farmer an opportunity to identify spots in a field which lacks something as he can find a solution for it in any form like the best suitable fertilizer, pesticide. By implementing this type of mindset, the farmer can ameliorate the productivity from his land and can turn down the cost required for farm inputs. Many are involved in the activities like pricing, trading, and crop distribution and sell process that have never worked in the ground field. Information consisting of well-being of crop are needed so as to calibrate prices and to carry out agreements. Almost everyone from these people depend upon the products like CAI, to calculate rates of broadening and production and end result from time to time and to keep an eye on other countries agricultural industry production [7].

In short, the main objective of this paper is to identify type of crop in remote areas, to detect the type of disease in crop and to display final result of various parameter in GUI (graphical user interface) [4]. This is done using various techniques like segmentation, smoothing, sharpening, filtering etc.

II. METHODOLOGY

Proposed methodology flow diagram is depicted in the Fig.1 and step by step method is also shown below.

– Read input image
– Apply various image processing operations

1) Smoothing operation.

This technique removes high spatial frequency noise in an image. This is done by employing moving window operator that affects only one pixel at a time. Low pass Filters are used for this [5].

2) Sharpening operation.

Highlights edges and fine details in an image. So because of this the contrast between bright and dark regions increases and results in bringing out various features [5]. The following array is a kernel for a common high pass filter used to sharpen an image:

3) High pass filtered image.
4) Low pass filtered image.
5) Segmented image

– Pixel based segmentation

Pixel level classification is carried out by considering only the spectral information which is provided before-hand for that single pixel.

– Object based segmentation

Classification is based on a local group of pixels considering the spatial properties of every pixel as they relate to each other.

– Compare pixel based and object based segmentation output results
– Health mapping

All rights reserved by www.ijsrd.com

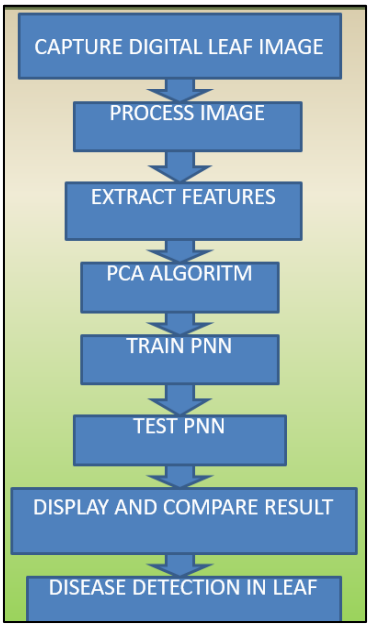

Fig. 1: Proposed Methodology flowchart.

III. RESULTS AND DISCUSSION

Maintain Sample leaf for disease detection on MATLAB software is shown in the Fig.2. Moreover, the resulting image or images are depicted in the Fig.3. The sample leaf is taken for detection goes through various image processing operations like smoothing, sharpening, etc.

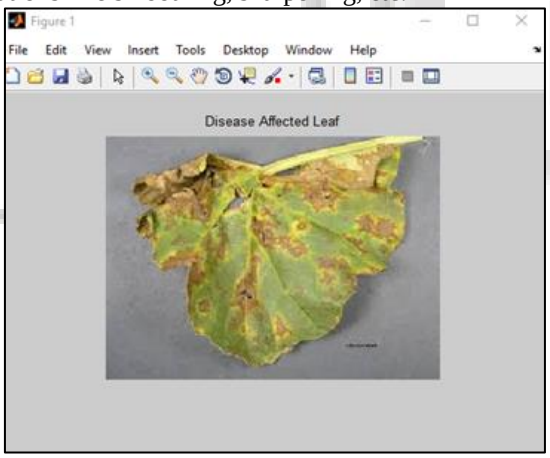

Fig. 2: Sample leaf for disease detection.

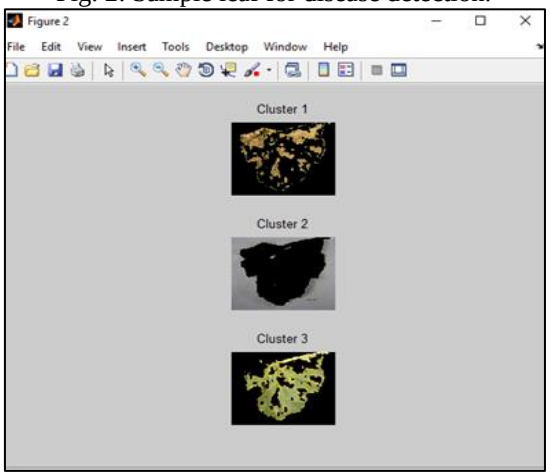

Fig. 3: Disease affected leaf detection.

From the above Fig.3, we can see that the diseased leaf is first detected and then segmented and lastly highlighted in cluster 3.

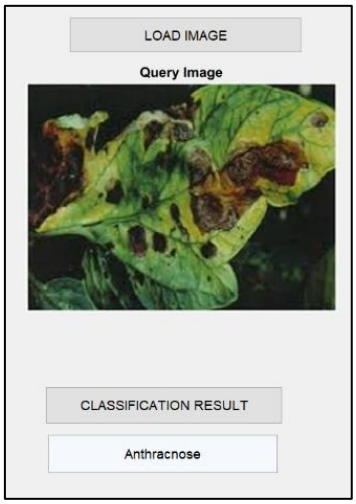

Fig. 3.1: Classification.

Fig. 3.2: Output of enhanced image.

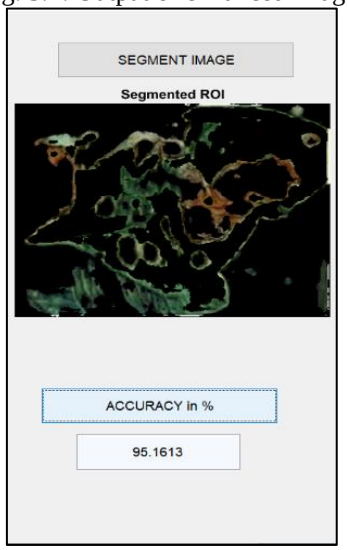

Fig. 3.3: Segmented Image result.

First of all SVM classification was performed on a sample leaf and the output came to be the exact one which is shown. Then the percentage of accepted region is depicted

All rights reserved by *www.ijsrd.com*

which came out to be around 20% and lastly the segmented ROI has 96% accuracy.

From Load image library we can choose any image from the dataset for detection procedure. In enhancement contrast enhancement operation of that image can be seen. In segmented ROI, the same image has been segmented. ROI means region of image which we want to filter or on which we perform different operations. Then the classification result shows the detected disease of the leaf, affected region in percentage gives what percent of defect is and accuracy is the accuracy of the operation we are performing as there are number of images on which we are performing the same operation in GUI so it should be accurate enough to give proper and required output. So, it tells us the percentage of accuracy of this system or project. Then in the Fig.3.2, 3.3, the factors on which the classification or segmentation is done with their corresponding values are depicted. We are showing our results in GUI because as there are many numbers of sample leafs and we have to perform same operation on each image so to process each image separately and perform same operation again and again.

IV. CONCLUSION

For accurate detection, classification of disease of plant is crucial for the cultivation of crop and this is possible using image processing. In this paper different methods for segmentation of disease area of plant is stated. It also depicts image enhancement, sharpening of image and smoothing or filtering images at various stages. This helps in classification and increases the accuracy to detect diseases. Various techniques for detection and classing of disease in plants like mapping, PCA algorithm and SVM are discussed which is used effectively. Because of all these techniques, identification and classification of plant diseases can be done with better accuracy using image processing techniques from MATLAB.

REFERENCES

[1] Santanu Phadikar and Jaya Sil "Rice Disease identification using Pattern Recognition Techniques" Proceedings of 11th International Conference on Computer and Information Technology (ICCIT 2008)25- 27 December, 2008, Khulna, Bangladesh, pp. 1-4244- 2136-7/08.
[2] Dheeb Al Bashish, Malik Braik and Sulieman Bani Ahmad "A Framework for Detection and Classification of Plant Leaf and Stem Diseases" 2010 IEEE International Conference on Signal and Image Processing, pp. 978-1- 4244-8594-9/10.
[3] Sabah Bashir and Navdeep Sharma "Remote Area Plant Disease Detection Using Image Processing" IOSR Journal of Electronics and Communication Engineering (IOSRJECE) ISSN: 2278-2834 Volume 2, Issue 6 (Sep-Oct 2012), PP 31-34.
[4] "Graphical user interface". Science Daily. Retrieved 2019-05-09.
[5] https://www.bogotobogo.com/Matlab/Matlab_Tutorial_Digital_Image_Processing_6_Filter_Smoothing_Low_Pass_fspecial_filter2.php.
[6] Khirade, Sachin & Patil, A.B.. (2015). Plant Disease Detection Using Image Processing. Proceedings - 1st International Conference on Computing, Communication, Control and Automation, ICCUBEA 2015. 768-771. 10.1109/ICCUBEA.2015.153.
[7] https://www.nrcan.gc.ca/earth-sciences/geomatics/satellite-imagery-air-photos/satellite-imagery products/ educational-resources/14652.

All rights reserved by *www.ijsrd.com*