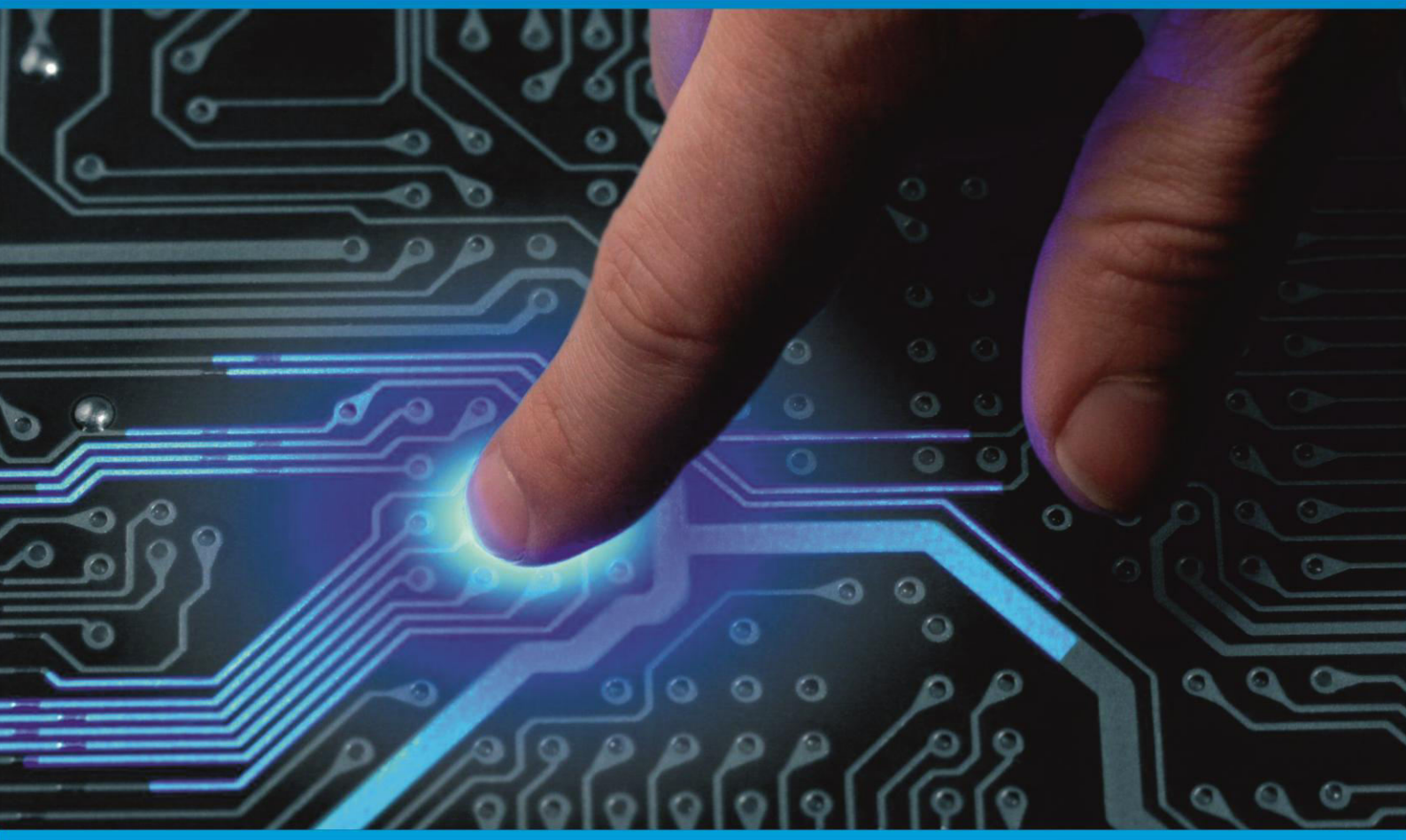
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 5, May 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.488

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 5, May 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0905066 |

Cotton Leaf Disease Prediction Using Artificial Intelligence for Sustainable Crop Production

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ABSTRACT: As a farmer has to always get worried about the crop diseases, he will have to face less crop production due to diseases that will make crop infected and cultivation will get less. The Cotton leaves are normally affected by the disease named Cercospora, Bacterial blight, blight, and Target spot. For this, we have used Deep Neural Network based approach with the use of artificial intelligence for detecting the Cotton leaf diseases automatically with the help of proper device application and platform.

KEYWORDS: Cotton Crops, Image Processing, Cotton leaf disease

I. INTRODUCTION

If you are thinking about cotton crop cultivation in India, then Gujarat is the biggest cotton-growing state. And for years cotton leaf diseases being the main reason for the reduction of the productivity of the cotton. And about 80-90% of diseases such as Alternaria leaf spot and Bacterial blight mainly occur on the leaf of the cotton plant. And till now various image processing concepts such as image filtering, segmentation, image feature extraction has been to detect the leaf diseases. There are various image segmentation methods available such as k-means clustering, Canny and Sober segmentation, and Otsu thresholding. Techniques such as Support Vector Machine (SVM), Neural Network (NN), and Homogeneous Pixel Counting technique for Cotton Diseases Detection (HPCCDD) can be used for classification. Many features played an important role in the classification of the process. Previously proposed system works for identifying disease has faced some limitations such as low, resulting accuracy and very a smaller number of images used for detection of disease.

II. RELATED WORK

Artificial Intelligence is helping us in all aspects. The proposed system is mainly used to develop an application which recognizes cotton leaf diseases. To solve agricultural problems using Artificial Intelligence, a cotton plant disease prediction which will help to predict the disease of the cotton crop and tell the farmers how to cure it. “Cotton Leaf Disease Classification for Sustainable Cotton Production” using Artificial Intelligence especially by Deep learning method could help farmers a lot. We know farmer can’t solve farm’s complex and even small problems due to lack of perfect education. So, this application would be beneficial for the user. User suppose farmer will need to upload the image and then with the help of image processing, we will get a digitized color pictured image of a diseased leaf and then we can proceed with applying the CNN based forward algorithm to predict cotton leaf disease and also provide a solution to the cotton disease found in plants by suggesting names of pesticide.

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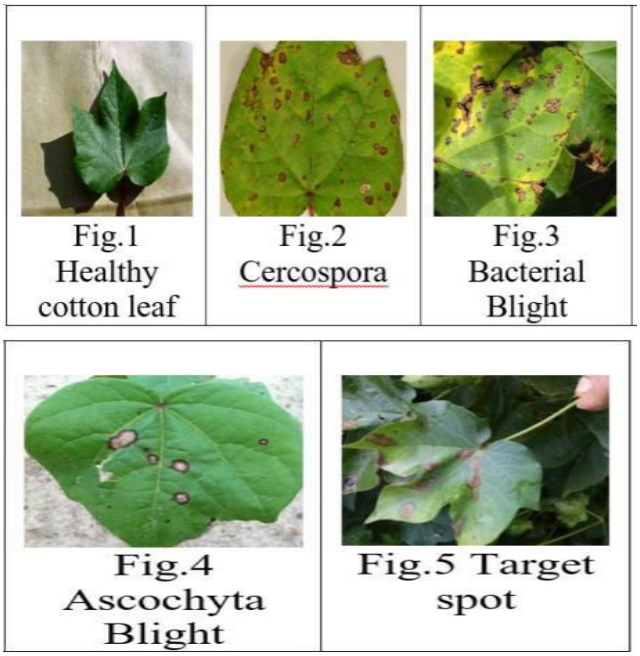

Fig: Major Cotton Leaf Diseases

General approach for detecting the leaf disease is composed of two steps, image processing and classification of disease using machine learning techniques. Image acquisition, Image pre-processing, Image segmentation and Feature extraction steps of image processing are discussed in this section. We also discuss several classification techniques.

Image Processing:

We have captured images from Anand agricultural university, Anand. Images were captured in September-2015 using Sony DSC-W710 model (16 megapixel camera). Images were stored in PNG format. Resolution of the image is 800×600. There are total 190 images of Alternaria leaf spot, Bacterial blight, Cercospora leaf spot, and Nitrogen deficiency. We have set the white background while capturing leaf images.

Image Segmentation:

In image segmentation, green pixels are masked and removed from the image. Green pixels are removed by extracting H, S, and V components of the background removed image. Then we applied threshold value of 0.14 to the H component of the background removed image. If the threshold value of H component is greater than the specified threshold, we set H, S, and V components to zero. This removes green components from image. The result of this step is shown below in Fig.4 (c), which shows extracted diseased portion from the leaf image. After removing green pixels from the background removed image, Otsu thresholding is applied for binary image segmentation. The result of otsu thresholding is shown in Fig. 4 (d). We applied Otsu thresholding to get binary image. The obtained binary image is useful in extraction of shape features.

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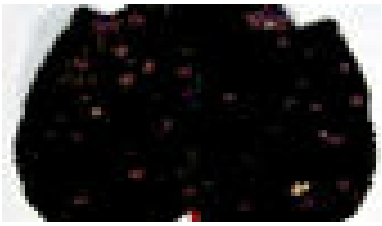

Fig 2.1 Segmentation Image

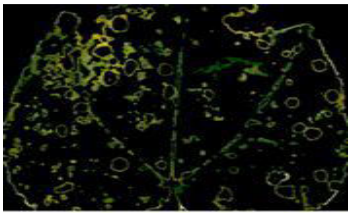

Fig 2.2 Output Image

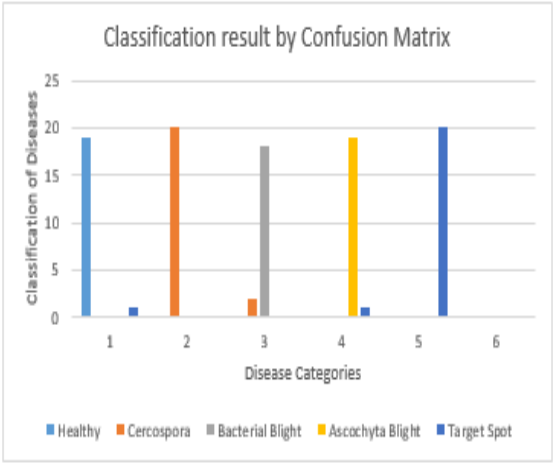

Fig 3.1 Classification by Confusion Matrix

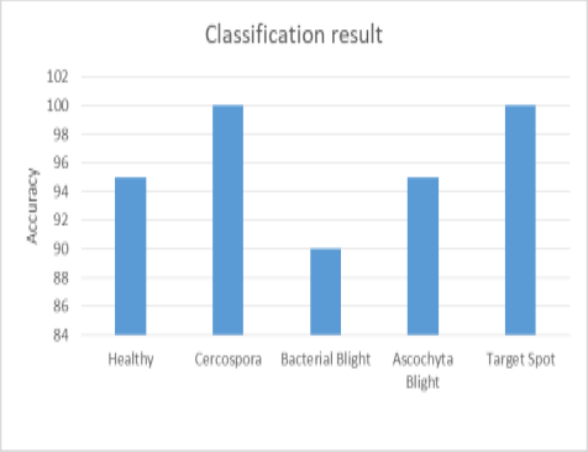

Fig 3.2 Graph showing disease categories with accuracy

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IV. PROPOSED ALGORITHM

a. Convolution Neural Network Algorithm:

CNNs being the regularized versions of multilayer perceptron's. And multilayer perceptron's basically mean fully connected networks, that is, each neuron in one layer is connected to all neurons in the next layer.As CNNs calculation depends on various methodology towards regularization, they can exploit the progressive example in information and can gather examples of expanding intricacy utilizing more modest and more straightforward examples embellished in the channels.

b. *DWM Algorithm:*

The proposed algorithm tries to find the correlations between data by DWM. As if look, it is very much suitable of detecting the concept drift. The outcome appeared by simulation of the DDDAS-based DWM calculation has up to 88 % precision in a significant part of the reproduction case, and ready to discover the conceptual drift.

c. *Digital image correlation algorithms:*

Depend on the following of data across a bunch of pictures, from a 'reference picture' to pictures stepped through later in the examination, regularly called 'deformed pictures. The set of images being used will constitutes a movie from which the displacement measurement will be derived.

V. CONCLUSION AND FUTURE WORK

In this paper, our result on detection and classification of cotton leaf disease using artificial intelligence and machine learning techniques was carried out. Also the survey on background elimination and segmentation techniques was discussed. Through this survey, we concluded that for background removal color space convert from RGB to HSV is useful. We also found that thresholding technique gives good result as compared to other background removal techniques. We performed color segmentation by masking green pixels in the background removed image and then applying otsu thresholding on the obtained masked image to get binary image. This is very useful to remove accurate features of disease. We searched that SVM gives good results, in terms of accuracy, for classification of diseases. There are main five major steps in our present work, out of which three steps have been implemented: Image Acquisition, Image pre-processing, and Image segmentation. The remaining two steps are feature extraction and classification which we will implement in our future work.

Fig: Application For Prediction of Cotton Leaf Disease

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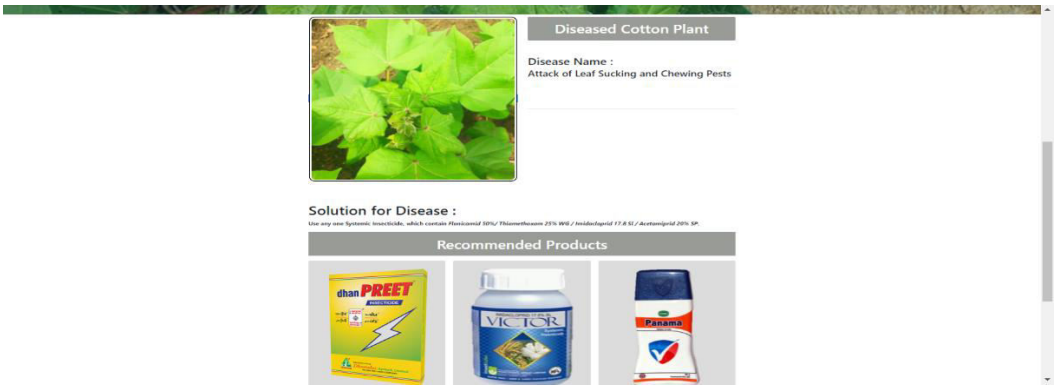

Fig: Output Of The Selected Cotton Crop Image

VI. ACKNOWLEDGEMENT

I would like to express my thanks of gratitude to my guide “Prof. Jayant Adhikari” for their able guidance and support in completing my project. I would like to extend my gratitude to the HOD “Prof. Dr. N. V. Chaudhari Sir” and all professors for providing me with all the facility that was required.

Ms. Swati Chakole.

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BIOGRAPHY

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ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

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