IJAREEIE

e-ISSN: 2278-8875
p-ISSN: 2320-3765

International Journal of Advanced Research in Electrical, Electronics and Instrumentation Engineering

Volume 11, Issue 2, February 2022

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.282

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 7.282|

|| Volume 11, Issue 2, February 2022 ||

DOI:10.15662/IJAREEIE.2022.1102014

Cotton Plant Disease Detection Using Image Based Technology

Lavina Thakur[1], Aboli Pahurkar[2], Amruta Khalokar[3] , Prasad Bundele[4] , Pratik Sonone[5]

Department of Electronics and Telecommunication Engineering, P.R. Pote (Patil) College of Engineering and Management Amravati, India

ABSTRACT: Quality agriculture production is the essential trait for any nation's economic growth. So, recognition of the deleterious regions of plants can be considered as the solution for saving the reduction of crops and productivity. The past traditional approach for disease detection and classification requires enormous amount of time, extreme amount of work and continues farm monitoring. In the last few years, advancement in the technology and researchers focus in this area make it possible to obtain optimized solution for it. To identify and detect the disease in agriculture product various popular of the field like machine learning, image processing and classification approaches have been utilized. It also includes the summary of various features extraction techniques, various segmentation techniques and various classifiers along with benefits and drawbacks.

KEYWORDS: Classification, image processing, machine learning, segmentation, feature extraction, pre-processing.

I. INTRODUCTION

The agricultural land mass is more than just being a feeding sourcing in today's world. Indian economy is highly dependent of agricultural productivity. Therefore, in field of agriculture, detection of disease in plants plays an important role. To detect a plant disease in very initial stage, use of automatic disease detection technique is beneficial. For instance, a disease named little leaf disease is a hazardous disease found in pine trees in United States. The affected tree has a stunted growth and dies within 6 years. Its impact is found in Alabama, Georgia parts of Southern US. In such scenarios early detection could have been fruitful. The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of plant is required, which costs very high when we do with large farms. At the same time, in some countries, farmers do not have proper facilities or even idea that they can contact to experts. Due to which consulting experts even cost high as well as time consuming too. In such conditions, the suggested technique proves to be beneficial in monitoring large fields of crops.

Fig 1: Cotton Leaves

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 7.282|

|| Volume 11, Issue 2, February 2022 ||

DOI:10.15662/IJAREEIE.2022.1102014

II.SYSTEM MODEL AND METHODOLOGY

Digital camera or similar devices are used to take images of leaves of different types, and then those are used to identify the affected area in leaves. Then different types of image processing techniques are applied on them, to process those images, to get different and useful features needed for the purpose of analysing later. Algorithm written below illustrated the step-by-step approach for the proposed image recognition and segmentation processes: (1) Image acquisition is the very first step that requires capturing an image with the help of a digital camera. (2) Pre-processing of input image to improve the quality of image and to remove the undesired distortion from the image. Clipping of the leaf image is performed to get the interested image region and then image smoothing is done using the smoothing filter. To increase the contrast Image enhancement is also done. (3) Mostly green coloured pixels, in this step, are masked. In this, we computed a threshold value that is used for these pixels. Then in the following way mostly green pixels are masked: if pixel intensity of the green component is less than the pre-computed threshold value, then zero value is assigned to the red, green and blue components of this pixel. Plant leaves Disease Detection using image base technology. (4) In the infected clusters, inside the boundaries, remove the masked cells. (5) Obtain the useful segments to classify the leaf diseases. Segment the components using genetic algorithm.

Fig 2: Technique

III.SYSTEM DESCRIPTION

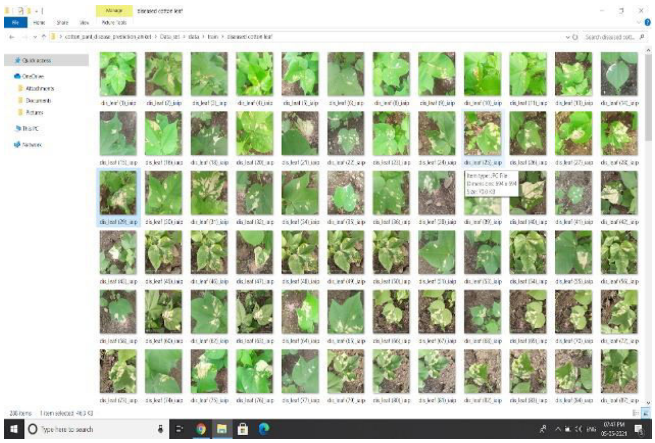
The process of plant disease detection system basically involves four phases. The first phase involves acquisition of images either through digital camera and mobile phone or from web. The second phase segments the image into various numbers of clusters for which different techniques can be applied. Next phase contains feature extraction methods and the last phase is about the classification of diseases. Image Acquisition In this phase, images of plant leaves are gathered using digital media like camera, mobile phones etc. with desired resolution and size. The images can also be taken from web. The formation of database of images is completely dependent on the application system developer. The image database is responsible for better efficiency of the classifier in the last phase of the detection system. Image Segmentation This phase aims at simplifying the representation of an image such that it becomes more meaningful and easier to analyse. As the premise of feature extraction, this phase is also the fundamental approach of image processing. There are various methods using which images Plant leaves Disease Detection using image base technology can be segmented such as k-means clustering, Otsu's algorithm and thresholding etc. The kmeans clustering classifies objects or pixels based on a set of features into K number of classes. The classification is done by minimizing the sum of squares of distances between the objects and their corresponding clusters. Feature Extraction Hence, in this step the features from this area of interest need to be extracted. These features are needed to determine the meaning of a sample image. Features can be based on colour, shape, and texture. Recently, most of the researchers are intending to use texture features for detection of plant diseases. There are various methods of feature extraction that can be employed for developing the system such as Gray-level co-occurrence matrix (GLCM), colour cooccurrence method, spatial grey- level dependence matrix, and histogram-based feature extraction. The GLCM method is a statistical method for texture classification. Classification The classification phase implies to determine if the input image is healthy or diseased. If the image is found to be diseased, some existing works have further classified it into a number of diseases. For classification, a software routine is required to be written in MATLAB, also referred to as classifier. A number of classifiers have been used in the past few years by researchers such as k-nearest neighbour (KNN), support

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 7.282|

|| Volume 11, Issue 2, February 2022 ||

DOI:10.15662/IJAREEIE.2022.1102014

vector machines (SVM), artificial neural network (ANN), back propagation neural network (BPNN). The most commonly used classifier is found to be SVM. Every classifier has its advantages and disadvantages, SVM is simple to use and robust technique.



. Fig 3: Data Set

IV. RESULT AND DISCUSSION

There are two different conditions for training and testing. One is under the lab conditions, which means that the model is tested with the image from the same dataset from which it is used for both training and testing. The other condition is that field condition, this means that the model has tested with the images taken from the real-world conditions. Since the lighting conditions and background properties of the image are totally different when we take sample from the real field, there is the chance that the model to produce very low accuracy, when comparing. So, to overcome this impact, we had an idea of having a mixed variety of images during the training phase.

```
cnn_model.summary()
```

```
Model: "sequential_1"
_________________________________________________________________
Layer (type)                 Output Shape              Param #
=================================================================
conv2d_4 (Conv2D)            (None, 148, 148, 32)      896
_________________________________________________________________
max_pooling2d_4 (MaxPooling2 (None, 74, 74, 32)        0
_________________________________________________________________
conv2d_5 (Conv2D)            (None, 72, 72, 64)        18496
_________________________________________________________________
max_pooling2d_5 (MaxPooling2 (None, 36, 36, 64)        0
_________________________________________________________________
conv2d_6 (Conv2D)            (None, 34, 34, 128)       73856
_________________________________________________________________
max_pooling2d_6 (MaxPooling2 (None, 17, 17, 128)       0
_________________________________________________________________
conv2d_7 (Conv2D)            (None, 15, 15, 256)       295168
_________________________________________________________________
max_pooling2d_7 (MaxPooling2 (None, 7, 7, 256)         0
_________________________________________________________________
dropout_3 (Dropout)          (None, 7, 7, 256)         0
_________________________________________________________________
flatten_1 (Flatten)          (None, 12544)             0
_________________________________________________________________
dense_3 (Dense)              (None, 128)               1605760
_________________________________________________________________
dropout_4 (Dropout)          (None, 128)               0
_________________________________________________________________
dense_4 (Dense)              (None, 256)               33024
_________________________________________________________________
dropout_5 (Dropout)          (None, 256)               0
_________________________________________________________________
dense_5 (Dense)              (None, 4)                 1028
=================================================================
```

Fig 4: Summary

| e-ISSN: 2278 – 8875, p-ISSN: 2320 – 3765| www.ijareeie.com | Impact Factor: 7.282|

|| Volume 11, Issue 2, February 2022 ||

DOI:10.15662/IJAREEIE.2022.1102014

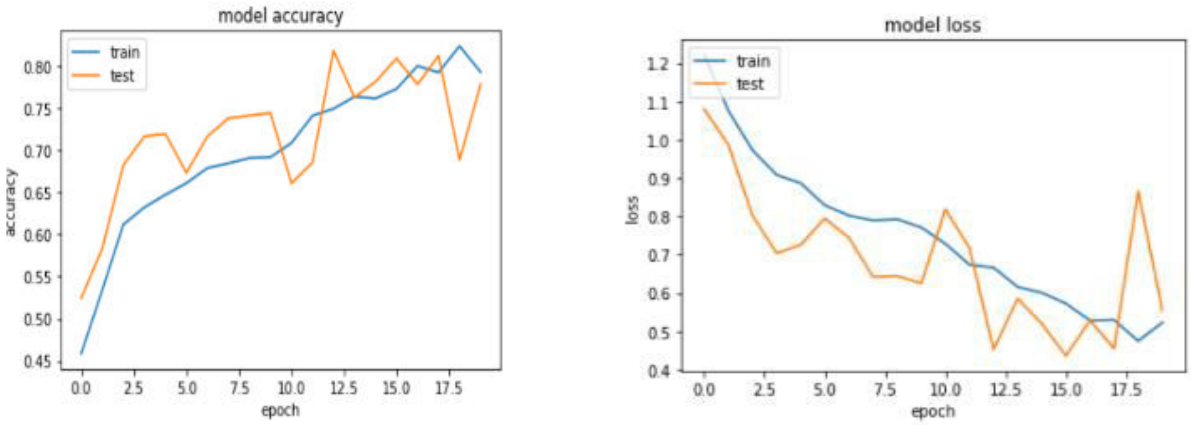


Fig 5: Model Accuracy and Model Loss

V.CONCLUSION

Thus, an application built for the identification of disease affected plants and healthy plant is done and this the proposed work is focuses on the accuracy value during the real field condition, and this work is implemented by having several plant diseases images.

We have successfully developed a computer vision-based system for plant disease detection with average 93% accuracy. Also, the proposed system is computationally efficient because of the use of statistical image processing and machine learning model.

REFERENCES

1.Wenjiang Huang, Qingsong Guan, Juhua Luo, Jingcheng Zhang, Jinling Zhao, Dong Liang, et al., "New Optimized Spectral Indices for Identifying and Monitoring Winter Wheat Diseases", *IEEE journal of selected topics in applied earth observation and remote sensing*, vol. 7, no. 6, June 2014.

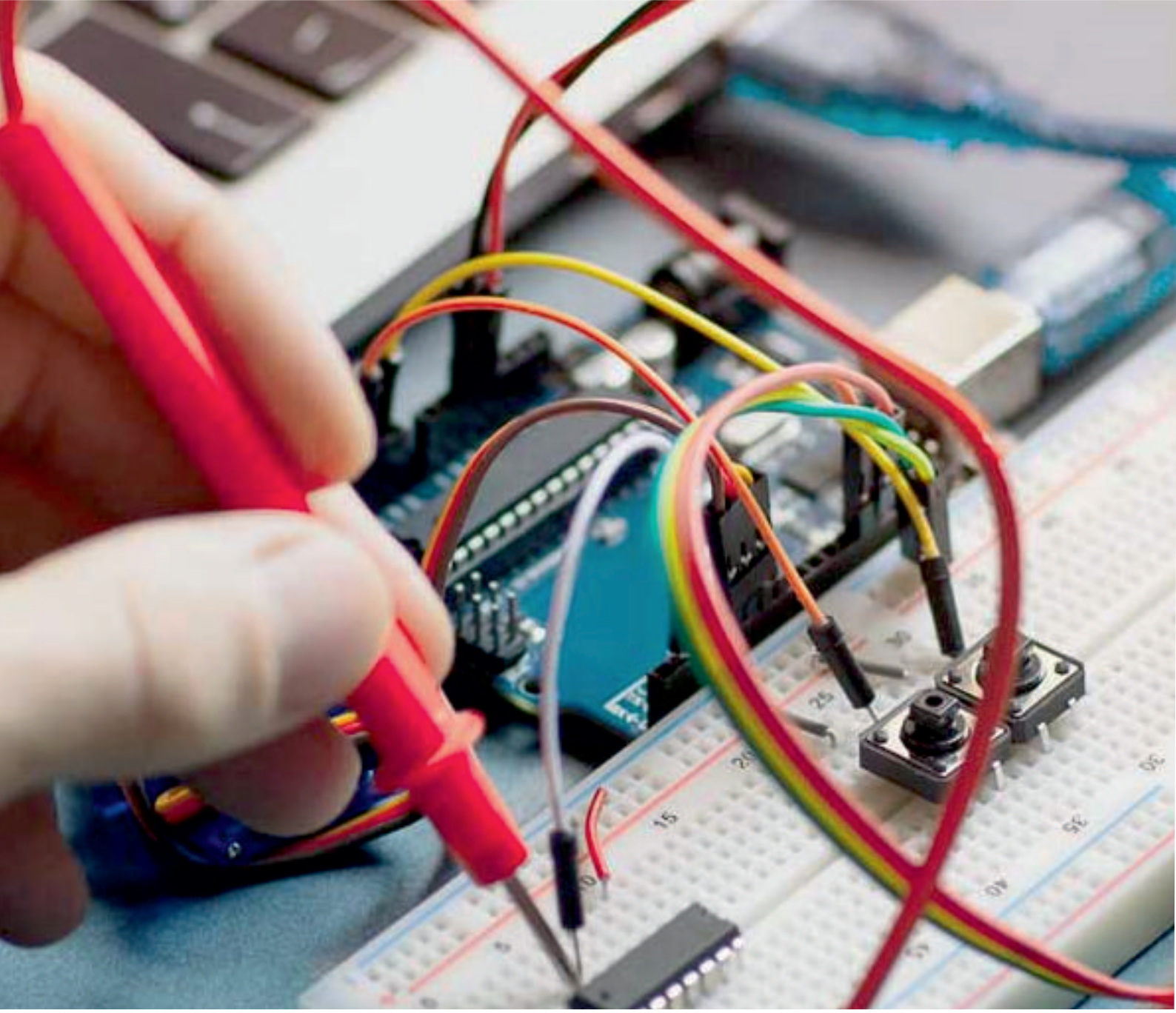
2.K. Thangadurai and K. Padmavathi, "Computer Visionimage Enhancement For Plant Leaves Disease Detection", *World Congress on Computing and Communication Technologies*, 2014.

3.Monica Jhuria, Ashwani Kumar and Rushikesh Borse, "Image Processing for Smart Farming: Detection of Disease and Fruit Grading", *Proceedings of the 2013 IEEE Second International Conference on Image Information Processing*.

4.Zulkifli Bin Husin, Abdul Hallis Bin Abdul Aziz, Ali Yeon Bin Md Shakaff, Rohani Binti and S Mohamed Farook, "Feasibility Study on Plant Chili Disease Detection Using Image Processing Techniques", *Third International Conference on Intelligent Systems Modelling and Simulation*, 2012.

5.Mrunalini R. Badnakhe and Prashant R. Deshmukh, "Infected Leaf Analysis and Comparison by Otsu Threshold and k-Means Clustering", *International Journal of Advanced Research in Computer Science and Software Engineering*, vol. 2, no. 3, March 2012.

6.H. A1-Hiary, S. Bani-Ahmad, M. Reyalat, M. Braik and Z. Abrahamsen, "Fast and Accurate Detection and Classification of Plant Diseases", *International Journal of Computer Applications*, vol. 17, no. 1, March 2011.



INNO SPACE
SJIF Scientific Journal Impact Factor

Impact Factor: 7.282

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

International Journal of Advanced Research

in Electrical, Electronics and Instrumentation Engineering

9940 572 462 6381 907 438 ijareeie@gmail.com

www.ijareeie.com

Scan to save the contact details