IJIRCCE

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

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 7, July 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.542

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907182 |

Leaf Disease Detection Using Machine Learning and Diagnosis By Regulated Pesticide Spraying

Sushaktha H M , Sushma N, Sangeetha B, Rashmitha C, Sandhya Rani V

UG Students, Dept. of ISE, The Oxford College of Engineering, Visvesvaraya Technological University, Belgaum, India

Assistant Professor, Dept. of ISE, The Oxford College of Engineering, Visvesvaraya Technological University, Belgaum, India

ABSTRACT: Crop diseases are a noteworthy risk to sustenance security, however their quick distinguishing proof stays troublesome in numerous parts of the world because of the non attendance of the important foundation. Emergence of accurate techniques in the field of leaf-based image classification has shown impressive results. This paper makes use of Random Forest in identifying between healthy and diseased leaf from the data sets created. Our proposed paper includes various phases of implementation namely dataset creation, feature extraction, training the classifier and classification. The created datasets of diseased and healthy leaves are collectively trained under Random Forest to classify the diseased and healthy images. For extracting features of an image we use Histogram of an Oriented Gradient (HOG). Overall, using machine learning to train the large data sets available publicly gives us a clear way to detect the disease present in plants in a colossal scale.

KEYWORDS: Diseased and Healthy leaf, Random forest, Feature extraction, Training, Classification

I.INTRODUCTION

India is mainly a land of agriculture. Most of the population depends on agriculture and it constitutes around 22% of the India's income. Since the agriculture is the back bone of India, damage to crops will affect the livelihood of the people. Crop disease can be of three types Bacterial, Spots and Fungal. Traditional methods were used for detecting the crop disease. Analyzing the disease through naked eye is one such traditional method. For small scale farmers it is very easy to diagnose the disease by going through the entire field. For large scale farmers early diagnosis of the disease by going through the entire field is very difficult. So to overcome this problem it's required to take necessary steps to improve the crop yield that helps the small scale as well as large scale farmers.

The necessary steps that can be taken to increase the crop yield are early disease detection of the crops, plants and leaves. Early detection of the disease increases the crop yield. This helps the farmers to get good quality crops and also good quantity of crops. Agriculture can be modernized by the use of the equipment's for each and every agricultural operation such as for ploughing, seeding, weeding, harvesting etc.… Modern techniques are used in agriculture in order to increase the yield of the crop. Robots are used in the agricultural fields for seeding ploughing, seeding, weeding, fruits distinguishing and many more. This project implements an agricultural robot for leaf diseases detection using image processing and machine learning techniques. This method of early detection of the crop disease and informing the farmers gives rise to new modern method in agriculture.

II.RELATED WORK

Jayaprakash Sethupathy(2018) conducted a study by using a system that used open - cv for image processing. It used k-means for image segmentation. It used SVM classifier for disease classification. Internet of things is a system consists of actuators or sensors or both that provides connectivity to the internet directly or indirectly. Leaf disease can be detected camera interfacing with RPI. The paper presents the study of IOT techniques to engross the use of technology in Agriculture

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907182 |

Zhihua Diao, Chunying Diao (2017) conducted a study using a leaf.The leaf used was wheat leaf. The system used the industrial camera for capturing the images. The images were transferred to computer and was used to detect the disease. This system used threshold segmentation.

Asmita Sarangdhar Adhao,Vijaya Rahul Pawar (2018) conducted a study where the camera captures the images of the crop and sends them to Raspberry Pi. During the output extraction from the input image captured by camera it performs various image processing techniques. The main principle used here is the Convolution Neural Networks (CNN) which is one of the Deep Learning techniques and mainly used to process the captured image to obtain the resultant output. The message is intimated to the farmer using Internet Of Things (IOT).

M Suresha, K N Shreekanth, B V Thirumalesh (2017) conducted a study using another leaf. The leaf used was paddy leaf. Segmentation method is used for getting the region of interest. Shape was the main feature to detect the disease. Geometrical shape characteristics were used to detect the shape. Classification of disease is done using KNN-Classifier. Shape feature was the only feature for classifying the disease.

III.PROPOSED ALGORITHM

A. *Design Considerations:*

An agricultural robot is designed for detecting the leaf disease, monitoring the field condition and informing the farmers in theform of SMS. The system makes use of image processing and machine learning model for leaf disease detection. In this system an agricultural robot is designed using the modern processor Latte Panda. The Latte panda is integrated with machine learning model. The Agricultural robot goes through the entire field and captures the image and the captured image is subjected to preprocessing. The preprocessing step mainly includes the noise removal, Image transformation, Histogram Equalization. Image preprocessing is done for the better image analysis. Once the image preprocessing is done, image segmentation is carried out. For the image segmentation we use the clustering Mean shift clustering algorithm. It is one of the best method for image segmentation and most efficient method for image clustering. Once the Clustering/Segmentation of the images are done, extraction of standard features is performed. In this step features are extracted based on the color, shape, texture and patterns. After the feature extraction is done, classification and identification of the disease is done by SVM classifier. Support Vector Machine Classifier is a supervised machine learning algorithm. SVM algorithm diagnoses the disease based on the extracted features. Once the disease is identified the result is sent to the owner or farmer in the form of SMS using the GSM (Global system of Mobile) module connected to the Robot. A pesticide sprayer is also equipped in the robot for spraying the required pesticide for the particular disease. The robot consists of a soil moisture sensor which detects the humidity of the soil. The result of the humidity of the soil is also sent to the farmer in form of SMS (Short Message Service). The entire robot is controlled by an android application which communicates with serial communication pattern. The android application is a Bluetooth controlled application which communicates with the Bluetooth model that is integrated in the robot. The communication between the Bluetooth model of robot and the android application is through UART (Universal asynchronous receiver-transmitter) communication.

B. *Description of the Proposed Algorithm:*

Image processing

Image processing is one of the methods to convert the image into digital form in order to extract some of the characteristics and also enhance the image for further use. It is a signal dispensation in which the input will be in the form of image like video, frame or photograph the output will be image or the characteristics associated with it. The different steps in image processing are,

- Image Acquisition
- Image Preprocessing
- Image Segmentation
- Feature extraction

Image Acquisition

The image is obtained from USB digital camera that is connected to the latte panda and the image is stored in the buffer of the latte panda that is used for further processing. The images will be cropped to 256*256 pixels of dimension.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907182 |

Image Preprocessing

The image that is taken from the camera is subjected to preprocessing. The Preprocessing step mainly includes different methods such as noise removal, color transformation, masking of green pixels etc... In this project conversion of RGB image to gray scale and also conversion of RGB into HSV is performed. The main purpose of converting the images into gray scale and HSV is to enhance the image for further processing.

Image Segmentation

There are many image segmentation methods such as clustering, threshold, neural network based and edge based. Here we are using clustering algorithm. The algorithm used is the Mean Shift algorithm. The main aim of using the segmentation method is to find region of interest. Mean shift is a sliding window based algorithm that attempt to find the dense area of data points. It is centric based algorithm meaning that it attempts find the center point of each group which usually works by updating to be the mean of the points within the sliding window.

Feature extraction

There are many Features to be considered such as texture, color and shape. This is one of the important steps where the characteristics of the images are stored in the form of array and latter used for the detection of the disease. Here we use Haralick texture, Hu moments and color Histogram as feature for the purpose of detecting the disease as features. Haralick texture is used for detecting the texture of the leaf, Hu moments can be used for getting the shape of the leaf where as the color Histogram is used for getting the color.

IV.PSEUDO CODE

Step 1: For each data point x€X, find the neighboring point N(x).
Step2: For each data point x€X calculate the mean shift m(x) from the equation.

$$m(x) = \frac{\sum_{x_i \in N(x)} K(x_i - x) x_i}{\sum_{x_i \in N(x)} K(x_i - x)}$$

Step3: For each data point x€X, update x←m(x).
Step4: Repeat Step1 for n_iterations until most convergence.

V.SIMULATION RESULTS

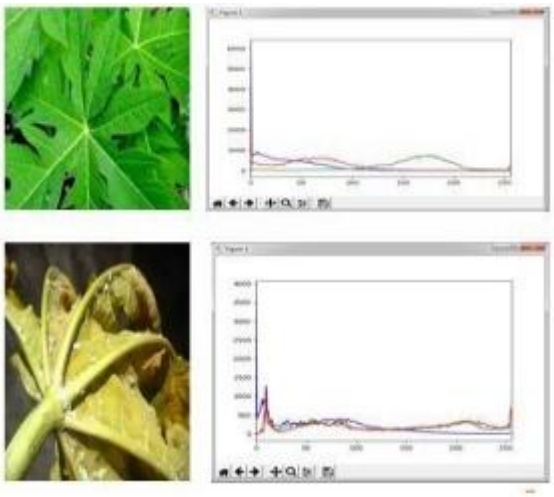

Fig.1. Healthy Leaf and Diseased Leaf

VI.CONCLUSION AND FUTURE WORK

The agricultural robot is capable of detecting the disease. The diseases Blight, Fusarium Wilt, Gray Mildew and Leaf curl are detected using one of the most efficient classification algorithm SVM classifier. The accuracy of

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.542 |

|| Volume 9, Issue 7, July 2021 ||

| DOI: 10.15680/IJIRCCE.2021.0907182 |

detecting the disease is about 89%. The robot is also capable of moving around the field. The robot is controlled using a Android application that allows the user to easily control the robot. The robot helps the famer to adopt modern technology in agriculture that benefits the farmer in early detection of diseases. It also helps the farmer in monitoring the field condition, so that proper amount of pesticides as well as water can be used when needed.

In future the robot can be trained with another machine learning model that will take decisions on its own for navigation. It can also be equipped with another camera that can be used view the movement of the robot.

REFERENCES

1. Z. Diao, C. Diao and Y. Wu, "Algorithms of Wheat Disease Identification in Spraying Robot System" 2017 9th International Conference on Intelligent Human-Machine Systems and Cybernetics(IHMSC) ,Hangzhou ,2017 ,pp. 316-319. doi: 10.1109/IHMSC.2017.183"

2. M. Suresha, K. N. Shreekanth and B. V. Thirumalesh, "Recognition of diseases in paddy leaves using knn classifier," 2017 2nd International Conference for Convergence in Technology (I2CT), Mumbai, 2017, pp. 663-666.doi: 10.1109/I2CT.2017.8226213

3. JayaprakashSethupathy , Veni S Department of Mechanical Engineering * Department of Electronics & Communication Engineering, Amrita School of Engineering, Ettimadai, Coimbatore Amrita VishwaVidyapeetham, Amrita University, "OpenCV Based Disease Identification of Mango Leaves" International Journal of Engineering and Technology (IJET) 2016".

4. "G.R. GAYATHIRI, DR.M.G.SUMITHRA M.E – Embedded Systems, Professor - Department of ECE, Bannari Amman Institute of technology, Bannari Amman Institute of technology, Sathyamangalam, Tamil Nadu, Sathyamangalam, Tamil Nadu. "Leaf Disease Diagnosis and Pesticide Spraying Using Agricultural Robot (AGROBOT)" International Journal of Advanced Research in Electronics and Communication Engineering (IJARECE) Volume 5, Issue 4, April 2016"

INNO SPACE
SJIF Scientific Journal Impact Factor
Impact Factor: 7.542

doi cross ref

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

Scan to save the contact details