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PLANT LEAF DISEASES DETECTION USING PYTHON V3.5.2

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Abstract-

The major cause for the decrease in the quality and amount of agricultural productivity is plant diseases. Farmers encounter great difficulties in detecting and controlling plant diseases. Thus, it is of great importance to diagnose the plant diseases at early stages so that appropriate and timely action can be taken by the farmers to avoid further losses. The project focuses on the approach based on image processing for detection of diseases of plants. In this paper, we propose an Android application that helps farmers for identifying plant disease by uploading a leaf image to the system. The system has a set of algorithms which can identify the type of disease. Input image given by the user undergoes several processing steps to detect the disease and results are returned back to the user via android application.

Keywords— Image processing, Detection, Identification of plant leaf diseases, Convolutional neural network

1. INTRODUCTION

The most widely used method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases are done. For doing so, a large team of experts as well as continuous monitoring of experts is required, which costs very high when farms are large. At the same time, in some countries, farmers don't 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 a condition, the suggested technique proves to be beneficial in monitoring large fields of crops. And automatic detection of the diseases by just seeing the symptoms on the plant leaves makes it easier as well as cheaper. Plant disease identification by the visual way is a more laborious task and at the same time less accurate and can be done only in limited areas. Whereas if automatic detection technique is used it will take fewer efforts, less time and more accurately. In plants, some general diseases are bacterial, black spotted, and others are Rust, viral and Red cotton Leaf. Image processing is the technique which is used for measuring the affected area of disease, and to determine the difference in the color of the affected area [1]. Image segmentation is the process of separating or grouping an image into different parts. There are currently many different ways of performing image segmentation, ranging from the simple thresholding method to advanced color image segmentation methods. The segmentation process is based on various features found in the image. This might be color information, boundaries or segment of an image.

I. LITERATURE REVIEW

- Mr. Vijai Singh, et al,[1]

In this paper author presents an algorithm for image segmentation technique used for automatic detection as well as classification of plant leaf diseases and survey on different diseases classification techniques that can be used for plant leaf disease detection. Image segmentation, which is an important aspect for disease detection in plant leaf disease, is done by using genetic algorithm.

- Mr. Al-Bashish D, et al,[2]

Author describes a methodology for recognition of plant diseases present on leaves and stem. The proposed work is composed of K-Means segmentation technique and the segmented images are classified using neural

network. They developed a method for detecting the visual signs of plant diseases by using the image processing algorithm. The accuracy of the algorithm was tested by comparing the images, which were segmented manually with those automatically segmented.

- Mr. Rajleen Kaur, et al,[3]

In this paper author proposed automatic detection of diseases and diseased part present in the leaf images of plants and even in the agriculture Crop production. In this paper, SVM is implemented which contains two datasets; one is training dataset and train dataset. Firstly original image is captured and then it is being used for processing. Secondly it gives us the black and background pixels of image segmented and also separate the hue part and saturation part of image. Thirdly detection of disease and diseased part of image is detected and healthy part is segmented from it. This work will also provide % of area in which diseases is present and give us the name of disease. As in the results of one image diseased area is 5.56%. This work provides accuracy which is better as in proposed algorithm results.

- Mr. Yogesh Dandawate, et al,[4]

In this paper the author proposed algorithm that uses Scale Invariant Feature Transform (SIFT) technique which automatically recognizes the plant species based on the leaf shape. The SVM classifier proves its ability in automatic and accurate classification of images. The experimental result shows that this approach can classify the leaves with an average accuracy of 93.79%. The proposed system will enable the farmers to get advice from the agricultural experts with minimal efforts.

- Mr. Ramakrishnan.M, et al, [5]

In this paper the author upgraded processing pattern comprises of four leading steps. Initially a color renovation constitute intended for the input RGB image is formed, This RGB is converted into HSV because RGB is for Color generation and color descriptor. The next step is plane separation. Next performed the color features. Then using back propagation algorithm detection of leaf disease is done.

- Mr. Rahul Das, et al,[6]

This paper proposes a disease detection and classification technique with the help of machine learning mechanisms and image processing tools. Initially, identifying and capturing the infected region is done and latter image preprocessing is performed. Further, the segments are obtained and the area of interest is recognized and the feature extraction is done on the same. Finally obtained results are sent through SVM Classifiers to get the results.

- Mr. Melike Sardogan, et al, [7]

In this paper author describe a Convolutional Neural Network (CNN) model and Learning Vector Quantization (LVQ) algorithm based method for tomato leaf disease detection and classification. The dataset contains 500 images of tomato leaves with four symptoms of diseases. In this model, the filters are applied to three channels based on RGB components. The LVQ has been fed with the output feature vector of convolution part for training the network. The experimental results validate that the proposed method effectively recognizes four different types of tomato leaf diseases.

- K. P. Ferentinos, [8]

In this paper the author implement convolutional neural network models were developed to perform plant disease detection and diagnosis using simple leaves images of healthy and diseased plants, through deep learning methodologies. Training of the models was performed with the use of an open database of 87,848 images, containing 25 different plants in a set of 58 distinct classes of [plant, disease] combinations, including healthy plants. The significantly high success rate makes the model a very useful advisory or early warning tool, and an approach that could be further expanded to support an integrated plant disease identification system to operate in real cultivation conditions.

II. BLOCK DIAGRAM

The system consists of the following blocks:

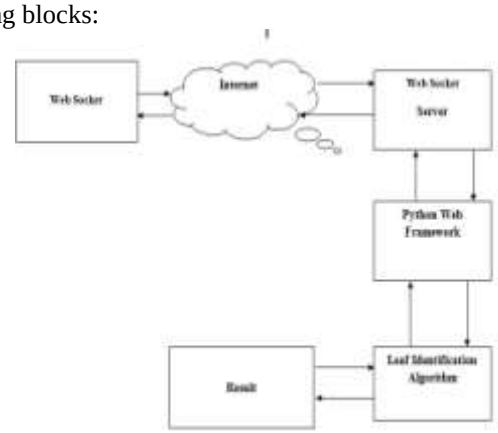


Fig1.System Architecture

Web Socket: Web Socket is a computer communications protocol, providing full-duplex communication channels over a single TCP connection. Send the Acquired Image by using a mobile camera to the web socket Server. In Our Project, we used a Local Server.

Python: Python is an interpreted high-level programming language for general-purpose programming. In python, OpenCV is to be installed.
'Open source computer vision library' initiated by some enthusiast coders in ' 1999' to incorporate Image Processing into a wide variety of coding languages. It has C++, C and Python interfaces running on Windows, Linux, Android, and Mac. It is one of the Libraries used for the image processing in python. On python web framework by using: leaf Identification algorithm it detects and identifies the Leaf and diseases. By using Database it sends the result back to the sender farmer.

I. FLOW CHART:

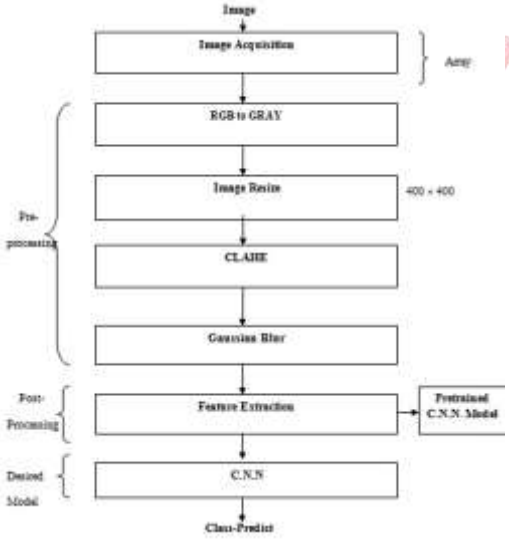


Figure 2: Flow Chart

II. THE STEPS OF THE PROPOSED SYSTEM:

A. Image Acquisition- The images of the plant leaf are captured through the camera. This image is in RGB (Red, Green, and Blue) for color transformation structure for the RGB leaf image is created, and then, a device-independent color space transformation for the color transformation structure is applied

B. Image Pre-processing To remove noise in the image or other object removals, different pre-processing techniques is considered.

RGB to Gray Converter-Weighted method or luminosity method-You has seen the problem that occurs in the average method. The weighted method has a solution to that problem. Since red color has more wavelength of all the three colors, and green is the color that has not only less wavelength than red color but also green is the color that gives a more soothing effect to the eyes.

It means that we have to decrease the contribution of red color, and increase the contribution of the green color, and put blue color contribution in between these two. So the new equation that form is:

New grayscale image = ((0.3 * R) + (0.59 * G) + (0.11 * B)). According to this equation, Red has contributed 30%, Green has contributed 59% which is greater in all three colors and Blue has contributed 11%.

Image Resize- The resolution of document images is typically higher than 2000 _ 2000, which is too large to be fed to a CNN with the current availability of computing resources. Large input dimension not only costs more computation resources but also leads to a greater chance of overfitting. After Converting RGB image into Gray it resizes into a standard format that is either 400 × 400 for better resolution.

CLAHE -Ordinary AHE tends to over amplify the contrast in near-constant regions of the image since the histogram in such regions is highly concentrated. As a result, AHE may cause noise to be amplified in near-constant regions. Contrast Limited AHE (CLAHE) is a variant of adaptive histogram equalization in which the contrast amplification is limited, so as to reduce this problem of noise amplification.

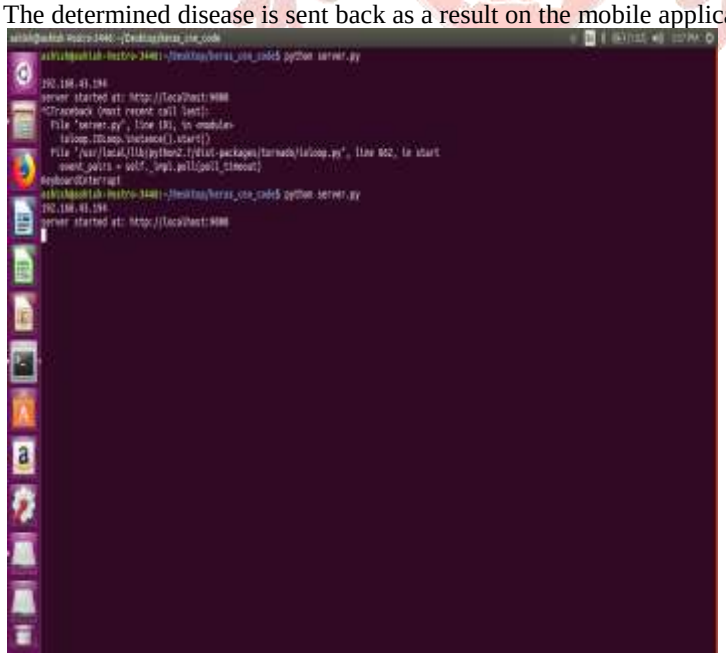
Gaussian blur -In image processing, a Gaussian blur (also known as Gaussian smoothing) is the result of blurring an image by a Gaussian function (named after mathematician and scientist Carl Friedrich Gauss). It is a widely used effect in graphics software, typically to reduce image noise and reduce detail.

Convolutional Neural Networks–After removing noise from the image it required to extracts the feature. We propose to use a CNN for document image classification.

The main idea is to learn a hierarchy of feature detectors and train a nonlinear classifier to identify complex document layouts. Given a document image, we first perform downsampling and pixel value normalization, then feed the normalized image to the CNN to predict the class label.

V. RESULTS

- Image is captured through the mobile camera.
- The captured image is uploaded to the local server using android application.
- Image undergoes various image processing algorithms at the server to determine the disease.
- The determined disease is sent back as a result on the mobile application.



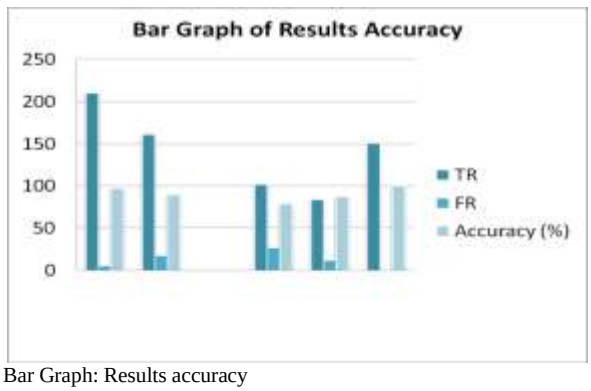
- Fig. 3 Python server tries to connect mobile app

Fig. 4 Image Capture for Database

Fig. 5 Result on Mobile Screen

Disease Name	TR	FR	ACCURACY(%)
BACTERIAL	210	06	97.22
BLACK SPOTTED	161	18	89.94
MILDEW	102	27	79.06
RUST	84	12	87.5
HEALTHY	151	00	100

Table: Accuracy of the five diseases



Bar Graph: Results accuracy

- **VI. CONCLUSION**
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- The use of automated monitoring and management systems are gaining increasing demand with technological advancement. In agricultural field loss of yield mainly occurs due to widespread disease. Mostly the detection and identification of the disease are noticed when the disease advances to the severe stage. Therefore, causing the loss in terms of yield, time and money. The proposed system is capable of detecting the disease at the earlier stage as soon as it occurs on the leaf. Hence saving the loss and reducing the dependency on the expert to a certain extent is possible. It can provide help for a person having less knowledge about the disease. Depending on these goals, we have to extract the features corresponding to the disease.
- **VII. REFERENCES**

- [1] Al-Bashish D, M. Braik and S. Bani-Ahmad, 2011. Detection and classification of leaf diseases using K-means-based segmentation and neural networks based classification. Inform. Technol. J., 10: 267-275. DOI:10.3923/itj.2011.267.275, January 2011.
- [2] Armand M.Makowski "Feature Extraction of diseased leaf images", Fellow, IEEE Transactions on information theory Vol.59, no.3 March-2013
- [3] H.Al-Hiary, S. Bani-Ahmad, M.Reyalat, M.Braik and Z.AlRahamneh, Fast and Accurate Detection and Classification of Plant Diseases, International Journal of Computer Applications (0975-8887), Volume 17-No.1.March 2011.
- [4] DaeGwan Kim, Thomas F. Burks, Jianwei Qin, Duke M.Bulanon, Classification of grapefruit peel diseases using color texture feature analysis, International Journal on Agriculture and Biological Engineering, Vol:2, No:3,September 2009. Open access at http://www.ijabe.org.
- [5] Jasmeet Kaur, Dr.Raman Chadha, Shvani Thakur, Er.Ramanpreet Kaur. A Review Paper on Plant Disease Detection using Image Processing and Neural Network Approach. International Journal of Engineering Sciences & Research Technology. April 2016. ISSN: 2277-9655.
- [6] Diptesh Majumdar, Dipak Kumar Kole, Aruna Chakraborty, Dwijesh Dutta Majumder. REVIEW: DETECTION & DIAGNOSIS OF PLANT LEAF DISEASE USING INTEGRATED IMAGE PROCESSING APPROACH. International Journal of Computer Engineering and Applications. June 2014. Volume VI; Issue- III.

[7] S. S. Sannakki, V. S. Rajpurohit. An Approach for Detection and Classification of Leaf Spot Diseases Affecting Pomegranate Crop. International Journal of Advance Foundation and Research in Computer. January 2015, Volume 2, Special Issue (NCRTIT 2015), ISSN 23484853.

[8] Davoud Ashourloo, Hossein Aghighi, Ali Akbar Matkan, Mohammad Reza Mobasheri, and Amir Moeini Rad," An Investigation Into Machine Learning Regression Techniques for the Leaf Rust Disease Detection Using Hyperspectral Measurement" 2016 IEEE.

- [9] Mr. Melike Sardogan "Plant Leaf Disease Detection and Classification based on CNN with LVQ Algorithm" 2018 3rd International Conference on Computer Science and Engineering (UBMK) 2018 IEEE.

[10] K. P. Ferentinos, "Deep learning models for plant disease detection and diagnosis", Computers and Electronics in Agriculture, vol. 145, pp. 311-318, 2018.