# DETECTION OF PLANT LEAF DISEASE USING IMAGE PROCESSING APPROACH

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***Abstract*: The major causes for the decrease in the quality and quantity of agricultural production is plant diseases. Farmers encounter high difficulties in identifying and controlling plant diseases. Hence, it is of huge importance to diagnose the plant diseases at early stages so that accurate and timely action can be taken by the farmers to avoid future losses. The project focuses on the approach based on image processing using machine learning for identification of plant diseases. In this paper, we would 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. The input image given by the user to the system undergoes various processing steps to detect the disease and results are returned back to the user via web or android application.**

***Keywords*: Image processing, CNN, OpenCV, Detection, Identification of plant leaf disease.**

## 1. INTRODUCTION

In India grape productivity is highest in the world and there is scope to raise it further. Grape export from India is about 53,920 tonnes valued at 48,500 that makes a share of nearly 1.54% of total export of grapes in world. Near about 70% of population depends on agriculture. Grapes are an important fruit crop in India. Due to disease on grape plant there is loss of about 20-40 % of crop. Therefore, there is a need to identify the diseases at the beginning and suggest solutions to the farmers so that maximum harms can be avoided so as to increase the yield.

The leaf infections may occur due to environmental condition changes such as huge rain fall, drastic changes in temperature or may be due to improper maintenance and some insects and pesticides. Once the disease-causing organisms such as bacteria, virus etc. entered into the leaf tissue, they starts multiplying and decreases the strength of the leaf and degradation starts. For instance, it is seen that the outbreak of diseases which leads to large scale death and famine.

The traditional methodology for disease detection is a just optic observation by specialists through that identification and detection of plant diseases is completed. For doing thus, an over sized team of specialists still as continuous watching of specialists are needed, that prices terribly high once farms are massive. At an equivalent time, in some countries, farmers don't have correct facilities or maybe concept that they'll contact specialists. Because of that consulting specialists even price high still as time overwhelming too. In such condition, the advised technique proves to be helpful in watching massive fields of crops. The automatic detection of the diseases by simply seeing the symptoms on the plant leaves makes it easier still as cheaper.

## 2. LITERATURE SURVEY

In 2017, Vishal Mani Tiwari, Tarun Gupta proposed a research paper "Plant leaf disease analysis using image processing technique with modified SVM-CS classifier" Here, dataset of disease affected leaves is considered for experimentation. The data set contains the plant leaves affected by Alternaria Alternata, Cercospara leaf spot, Anthracnose and Bacterial Blight along with some healthy leaf images. It uses SVM classifier, concept of cuckoo search and image processing techniques using MATLAB.

In 2017, Pallavi.S. Marathe, proposed a research paper "Plant Disease Detection using Digital Image Processing and GSM" The proposed system uses the digital image processing for plant disease detection and GSM for transmitting the name of the pesticide to the Farmer's mobile phone. Disease identification contains steps like image acquisition, image pre-processing, image segmentation, feature extraction and classification, transmission.

In June 2018, Xihai Zhang, Yue Qiao, Fanfeng Meng, Chengguo Fan and Mingming Zhang proposed a research paper "Identification of maize leaf diseases using improved deep Convolutional Neural Networks" In this paper training and testing of images are done by adjusting the parameters , changing the pooling combinations, adding dropout operations ,rectify linear unit functions , and reducing the number of classifiers .By using digital image processing techniques , Support Vector Machine , neural networks, we can detect and classify leaf disease. GoogleLeNet and Cifar10 being two improved deep CNN models, helped to achieve high identification accuracy of 98.9% and 98.8% resp. Recognition accuracy can be improved by improving the diversity of pooling operations.

In August 2018, M.N.Abu Bakar,A.H. Abdullah, N.Abdul Rahim, H.Yazid, S.N. Misman and M.J Masnan proposed a research paper "Rice Leaf Blast Disease Detection using Multilevel Color Image Thresholding" This paper detects the disease of Rice Leaf Blast. The methodology used is Multi- level color image thresholding and image processing technique.

In 2018, Saradhambal.G, Dhivya.R, Latha.S, R.Rajesh, proposed a research paper "Plant Disease Detection and its solution using image classification" This paper proposed an enhanced k-mean clustering algorithm to predict the infected area of the leaves. The color-based segmentation model is defined to segment the infected region and placing it to its relevant classes. Experimental analysis were done on sample images in terms of time complexity and the area of infected region. Otsu classifier and k-means clustering algorithm is used in this paper. Disease detection contains steps like image acquisition, pre-processing, image segmentation, feature extraction and classification. Alternaria Alternata and Bacterial Blight diseases detected in this paper.

In April 2019, Abirami Devaraj, Karunya Rathan, Sarvepalli Jaahnavi and K Indira, proposed a research paper "Identification of plant disease using image processing technique" In this paper the diseases detected are Alternaria Alternata, Bacterial Blight, Antracnnose, Cercospora leaf spot. The methodology used is image processing technique which uses k-means clustering algorithm.

## 3. PROPOSED SYSTEM

Our aim is to develop a software that finds and classifies diseases, ultimately providing its preventive measures and cure. So, we a developing a web-based application and an android app for the plant disease detection using image processing and machine learning. The image of the plant will be provided as an input to the system and this image will be further processed using image processing steps. For this we are using the OpenCV and then the image classification is done using machine learning which will detect the disease of plant. The main algorithm used in the system is CNN (Convolution Neural Network). All of the system would be implemented using Python Language. Our next module is the online suggestion of pesticide shops nearby from where the farmers can buy the required pesticide. And also a direct link to buy the product would be given.

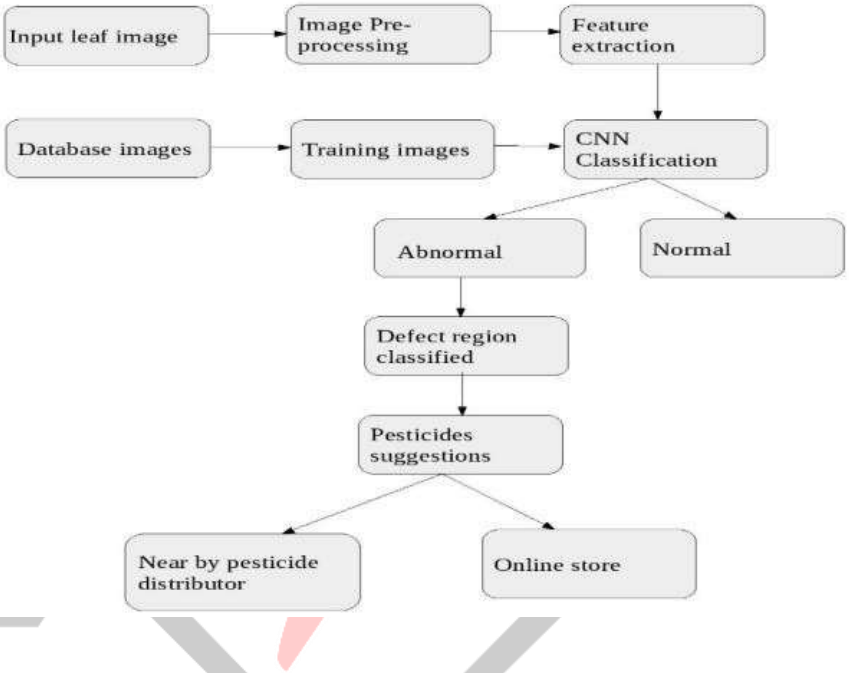


**Fig -1**: System architecture

## CONCLUSION

This paper deals with the application of Convolution Neural Network for recognizing the plant disease. One of the vital applications of image processing is to identify the image which is a vital tool of early disease detection for growth in crop production. This tool will help to lessen the time and cost consumed during manual prediction. From the results obtained above we can conclude that Convolution Neural Network (CNN) provides a remarkable accuracy in detecting the diseases. This work can be further extended to building a real time application which can identify further species of plants instead of just grapes.

The given system uses resizing, Gaussian filtering for image preprocessing to segment the leaf area, then finally CNN classification technique is used to detect the type of leaf disease.

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