

Survey On Plants Disease Detection Using Machine Learning

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Abstract

Agriculture is a significant source of income for Indian people. Experts do the manual method of detecting disease in a plant. For this, a large team was required, and continuous monitoring was required; that was a complicated task when we do this with a large number of crops. In some places, farmers were unaware of the experts, and they do not have proper facilities. In such conditions, one technique can be beneficial in keeping track of and monitoring a large number of crops. This technique is known as Automatic Detection. This technique makes it much easier and cheaper to detect disease. Machine Learning can provide a method and algorithm to detect the disease. There should be the training of images of all types of leaves that include the ones that are healthy and disease leaf images.

Keywords Segmentation, Image acquisition, Feature extraction.

I. INTRODUCTION

India is a vast country with 1.34 billion people. About 31% of the Indian workforce is involved in agriculture. Nevertheless, agriculture accounts for just 15% of India's GDP. The reason India is lagging in agriculture is that we do not use proper technique.

Many crops get destroyed because of the lack of use of technology. One of the important sources of income for people in India is agriculture. A variety of crops are grown by farmers, but one reason for the destruction of crops diseases. The main reason for the destruction of the crop in India is plant disease. Different plants suffer from different diseases. The central part is the leaf of a plant to examine the disease with the help of agriculture experts who knew plant disease used to detect diseases in plants. However, this kind of detection of diseases in plants was costly and time-consuming. Hence, a better method was required to detect diseases in the leaf. Computer and software play an important role in the detection and classification of leaf diseases. For leaf disease detection, there are lots of image processing and pattern recognition techniques that can be used. The key to preventing agricultural loss is leaf disease detection.

Remote sensing is important to the source of agriculture information. Remote Sensing methods are fast and superior. While working with agriculture areas with remote sensing, the important parameters that should keep in mind are characteristics of the agriculture field, different crop types, and differences in their feature characteristics such as shape and texture. They provide identifiable signatures of crop type, crop density to

perform an agriculture survey. For accurate crop estimation, information on crop type and information of spatial coverage is essential.

Different studies that are focused on crop area identification using remotely sensed data have pointed out different stages of crop types cannot be performed with single data images. Some algorithm is used like Maximum likelihood, Nearest Neighbor and minimum distance used for image classification identify surface objects and produce land cover maps. The use of remotely sensed data in agricultural monitoring and researches have been conducted.

India mainly depends upon agriculture. The agriculture product is reduced due to plant disease quality. The disease can be mainly caused by fungi and bacteria—an important source of energy in agriculture. For the growing population to feed, it is not used. They can solve global warming. Experts in plant disease detection detect whether there is a change in the color of the leaf. Sometimes experts also go wrong in identifying the different diseases as the same disease because monitoring should be continuous and is very costly. Image Processing is any form of processing where it will take input as an image, e.g., photographs; the output will be an image or the characteristics of that image. Disease detection plays an essential role in the field of agriculture. An increase in population change in the climatic conditions is also responsible for plant disease. Usually, diseases in the leaf are detected by farmers by the naked eye. This cannot be correct because they judge it by their experience. Therefore, for the accurate diagnosis of leaf diseases, automatic detection is essential. To have sustainable development, one of the major challenges is to reduce the use of pesticides. What will reduce the use of pesticides if there is an early diagnosis, accurate results.

II. LITERATURE SURVEY

Anuradha Badage et al. [1] proposed disease detection in rice with Pattern Recognition Techniques. The system that was proposed in this paper used a software prototype system in order to detect disease in rice depending on various plants of images. The proposed method has the following steps – the first step is feature extraction of images, using zooming algorithms to detect points, and the final step is the use of the neural network for classification. The method in order to detect disease in plants – The framework that was proposed is based on image processing for the automatic detection of disease in plants and its classification. The classification of the disease is based on feature and color extraction from the



RGB color model, where the RGB colored regions have to be deduced from regions of interest.

Sachin D. Khirade et al. [2] proposed ANN for the detection of disease in plants. Identification of the disease in the plant is very important to prevent the losses within the amount of agricultural yield. It needs a large amount of labor experience in plant diseases, and much time is required. For disease detection in plants, image processing is used. Unhealthy leaf detection involves various steps. The exploitation of pictures of leaves is the way that they are used for disease detection in plants. To detect an unhealthy plant, it has mentioned many ways to detect it. This paper has also mentioned some extraction and classification of feature techniques to extract the options of an infected leaf. This paper mentioned lots of different techniques to detect a part of the plant that is unhealthy. This paper has also proposed some methods such as classification and extraction of features to extract the infected leaf options and, therefore, the plant disease classification. The use of ANN for disease detection in plants will be with efficiency is used.

Bhumika S. Prajapati et al. [3] proposed detection and classification of disease in a cotton plant was done using machine learning. The survey done on various algorithms such as background removal in an image and segmentation techniques used to filter the image was mentioned. Through this survey, we have concluded that for the removal of background color, area conversion from HSV to RGB is beneficial. The thresholding technique has become better, and we have found that it gives us a smart and better result as compared to other background removal methods. We also have a way to do color masking by segmentation unnecessary pixels within the removed image of the background and so applying obtaining thresholding covert induce image binary to image. Extraction of correct illness becomes helpful by using this technique. Classification of diseases and their accuracy provides better results by using the technique of SVM. It consists of 5 main steps in which 3 main steps are already applied: Image Acquisition, Image pre-processing, and Image segmentation.

Malvika Ranjan et al. [4] proposed a different method that is mainly visual and needs accurate judgment. Picture of an unhealthy leaf is taken because the results after we perform segmentation on that picture, color HSV options are as a result extracted. Artificial neural network after the Image segmentation is trained to tell the difference between a healthy and unhealthy picture. Performance of an ANN classification has an accuracy of more than 80%.

P. Revathi et al. [5] discussed Edge detection Segmentation in a picture algorithm during which the pictures taken are processed for enrichment. Feature image segmentation is distributed to induce to find the area of disease on the leaf. After that, image features such as boundary, shape, color, and texture square measure are extracted to check for disease in the leaf. This analysis work consists 3 elements of the cotton leaf spot. The first is the color segmentation of cotton leaf, the second is the

detection of Edge based on Image segmentation, and the third is to analyze and classify the sickness.

Jayaprakash Sethupathy et al. [6] proposed an OpenCV-based model is used, that uses the image process and Machine learning model in order to detect disease in a plant. OPEN CV, a python library, is used to process images and classifier SVM is also used for recognition and classification of the image. In this research paper, a model based on machine learning is used to check the test pictures. The photographs were pre-processed in order to remove noise and enhance color. More the picture was divided victimization the K-means bunch algorithmic rule. Options were extracted for detective work the sickness.

David Hughes et al. [7] proposed a Deep Learning approach to discover plant diseases. A model was trained based on the pictures of leaves of plants to classify goals and to check the un-wellness of pictures that the model has not seen before. The 2 deep learning architectures that were used were Google-Net and Alex-Net. Google-Net uses the transfer learning technique for coaching and performs higher than Alex-Net. Satish Madhgoria et al. [8] proposed a method for disease detection is a classification method in order to detect unhealthy parts of leaf pictures. The algorithms are tested on a large number of datasets. The proposed formula might be extended for different detection tasks that conjointly chiefly consider color info; however, an extension to different options is well attainable. The task in order to detect disease is carried out in 3 steps. First is that we tend to perform image segmentation and division of image input into background and foreground. The second step includes SVMs that are used to calculate the category of every picture element happiness to the foreground, and at last, we tend to do additional refinement in the picture by checking the neighbor to remove all wrong classified image pixels from the second step.

K Narsimha Reddy et al. [9] proposed a survey on a completely different methodology for disease detection in plants. There are many ways in machine-based or laptop-based systems to check for un-wellness of a plant-like k-NN methodology, SVM, and convolutional neural networks. All the un-wellness cannot be known single mistreatment methodology. From the result of classification methods, we tend to return to the conclusion of the following. K-nearest-neighbor methodology maybe one of the best algorithms to predict the category. A comprehensible drawback of a k-NN methodology is the construction predictions of time quality. However, the NN algorithm of the structure is quite challenging to understand.

M.Malathi et al. [10] proposed the survey on disease detection in plants victimization image process techniques. Illness in a crop is caused by less amount and quality of the agricultural product. Symptoms to identify an illness in plants by oculus is very tough for the farmer. Crop protection, particularly in giant farms, is completed by victimization computerized image process technique, which will notice pathologic leaf victimization color info.

Betting on the applications, several image process techniques have been introduced to unravel pattern recognition and a few automatic classification tools. Within the next section, these papers gift a survey of these projected systems in a significant manner. There are several strategies in machine-controlled or pc vision for illness detection and classification; however, still, there is a lack during this analysis topic. All the illnesses cannot be known single victimization technique. Authors in [11-15] have discussed different techniques for diagnosing plant diseases.

III . BASIC STEPS FOR DISEASE DETECTION

Image segmentation – Breaking the digital image into multiple segments is called image segmentation. To identify leaf borders in an image, image segmentation is used.

Image pre-processing – Manipulation of images using digital images is called image pre-processing. To enhance image features and to suppress unwanted distortions, image pre-processing is used.

Texture Features extraction – It gives us information about intensities in an image, spatial arrangement of color, which is used to identify the disease that plant contains.

NN classifier – A neural network model is trained on a large dataset of leaf images to classify different types of diseases in plants when it is provided with a new leaf image. It is based on leaf feature extraction; the leaf features are orthogonalized into different variables and passed as an input vector to the neural network.

IV. CONCLUSION

Computer and software can play an important role in the detection and classification of leaf diseases. Leaf disease detection is the key to prevent agricultural loss. The machine learning method of detecting disease can help us save valuable time and money. It is effortless to use, very reliable. In some cases, even outperforming experts in the field of agriculture. Advancement in Image processing and machine learning will improve the accuracy of disease detection in the future. The use of these types of technologies in agriculture is a must to ensure food security for our future generation.

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