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HARITHAM: A PLANT DISEASE IDENTIFICATION SYSTEM

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ABSTRACT

Kerala is popular for its richness in medicinal, aromatic and cash crop plants due to a diverse agro-climate; hence suitable for pest and pathogens too. Early and accurate intervention of plant diseases will help to control it. Existing disease diagnostic methods are manual and challenging and mostly seeking for an expert second opinion .This project proposes an efficient soft computing based diagnostic system for identifying plant leaf diseases commonly found in Kerala state. Plant disease is one of the important factor which causes significant reduction in improving quality of plant production through soil fertility analysis and leaf detection using machine learning. Detection and classification of plant diseases are important task to increase plant productivity and economic growth. The proposed system is a website for users where one can upload the pictures of tomato plants specifically its leaves. For classification we have built a pre trained machine learning model based on a dataset of 9 categories of tomato plant diseases. When a user selects the choice for classification in the website, the pre trained model is loaded and input image is fed in to the model. Results are displayed on the website based on the classification output from the model.

Key words: Disease identification, Image processing, Leaf images

1.INTRODUCTION

Diseases and pests are the causes that challenges the cultivation of any crop that needs careful diagnosis and timely handling to safeguard the crops from heavy loses. Therefore, in field of agriculture, detection of disease in plants plays an instrumental role. If proper care is not taken in this area then Causes serious effects on plants and due to which respective product quality, quantity or productivity is affected [1]. For instance a disease named little leaf disease is a hazardous disease found in pine trees in United States. Detection of plant disease through some automatic technique is beneficial as it reduces a large work of monitoring in big farms of crops, and at very early stage itself it detects the symptoms of diseases i.e. when they appear on plant leaves. Detection and classification of plant diseases are important task to increase plant productivity and economic growth. Plants are highly prone to diseases that affect the growth of the plant which in turn affects the ecology of the farmer. Each year, plant viruses and fungal attacks lead to crop losses of up to 30 percent. That is why it is important to detect plant disease early on. Yet laboratory tests are expensive and often time consuming. The symptoms of plant diseases are conspicuous in different parts of a plant such as leaves etc. Manual detection of plant disease using leaf images is a tedious job.

Hence it is required to develop computational methods which will make the process of disease detection and classification using leaf images automatic [4]. Emergence of accurate techniques in the field of leaf-based image classification has shown impressive results. This paper makes use of deep learning to identify the healthy and diseased leaf from the data sets constructed. Our proposed paper includes various phases of execution namely

Dataset collection, training the classifier and classification. The created datasets of diseased and healthy leaves are collectively trained to classify the diseased and healthy images. [2].

2.LITERATURE REVIEW

Sensor arrays otherwise called Electronic Noses (ENs) have been utilized to examine the Volatile Organic Compounds (VOCs) of both solid and contaminated tomato (Solanum lycopersicum) crops. Measurable and keen frameworks strategies were utilized to process the information gathered by an EN. Principal Component Analysis (PCA), K-Means clustering and Fuzzy C-Mean (FCM) clustering were connected to envision any bunches inside the dataset. Moreover, Multi-Layer Perception (MLP), Learning Vector Quantization (LVQ) and Radial Basis Function (RBF) based Artificial Neural Network (ANNs) were utilized to figure out how to order and thus arrange the datasets. Utilizing the RBF, MLP and LVQ systems we accomplished 94, 96 and 98% arrangement exactness for the sound, fine mold (Oidiumlycopersicum) and arachnid parasite tainted plants separately. From these outcomes it is obvious that EN is fit for separating between the solid and misleadingly contaminated tomato plants and thus might be conveyed as a potential early ailment discovery device for tomato crops in business nurseries [6].Cultivators dependably need palatable and simple counsel from specialists. To get the guidance from a specialist framework, it ought to have enough information about the space. Assembling enough information and speaking to it in a machine reasonable arrangement is tedious and troublesome occupation. Likewise, speaking to every single sort of information is as yet an exploration issue. Since, a solitary picture merits a thousand words, it will be a smart thought to gain learning likewise in pictures instead of just content. Picture is a simple method for correspondence with no limit of language. Subsequently there is a requirement for structure a specialist framework with substance-based picture recovery which could procure and convey the learning via looking through the picture having the comparable highlights that is sought by the client. In the introduced work, a framework is created to analyze sicknesses in harvests by coordinating the transferred picture of an infecteiseaased plant from the corpus of pictures. Three strategies viz. CEDD, Auto Color Correlogram and FCTH are tried and the outcome is introduced. The programmed picture-based infection determination in yields may help cultivators in early identification of maladies and misfortunes because of the picture pervasion can be diminished. [7]

The paper proposed and assess a structure for discovery of plant leaf diseases. Studies demonstrate that depending on unadulterated bare eye perception of specialists to distinguish such diseases can be restrictively costly, particularly in creating countries. Giving quick, programmed, shoddy and exact picture preparing based answers for that task can be of extraordinary sensible essentialness. The proposed system is picture preparing based and is made out of the accompanying fundamental strides; in the initial step the current pictures are portioned utilizing the K-Means strategy, in the second step the divided pictures are gone through a pre-prepared neural system. As a test bed, we utilize a lot of leaf pictures taken from Al-Ghor area in Jordan. Our test results demonstrate that the proposed methodology can altogether bolster precise and programmed recognition of leaf maladies. The advanced Neural Network classifier that is based on statistical classification perform well and could effectively identify and group the tested disease with an precision of around 93%.[8].

The strategies of machine vision are broadly connected to agricultural science, and it has extraordinary point of view particularly in the plant security field, which at last prompts crops management. The paper depicts a product model framework for rice disease detection dependent on the infected pictures of different rice plants. Pictures of the tainted rice plants are caught by digital camera and prepared using image growing, image segmentation systems to recognize diseased plant parts. At that point the infected parts of the leaf have been utilized for the classification purpose using neural network. The strategies developed in this framework are both image processing and soft computing technique applied on number of unhealthy rice plants[9].Recognition of harmful viruses and bacteria in plant material, vectors or normal supplies is important to guarantee safe and sustainable agriculture. The strategies accessible have advanced significantly over the last few years to accomplish quick and solid recognition of pathogens, extraction of the target from the sample being critical for detection optimizing. For viruses, test arrangement has been improved by imprinting or squashing plant material or bug vectors onto various membranes. To improve the sensitivity of methods for bacterial recognition, an earlier advancement venture in fluid or solid medium is advised. Serological and molecular procedures are right now the most fitting when high quantities of tests need to be analyzed. Specific monoclonal as well as recombinant antibodies are accessible for some plant pathogens and have added to the specificity of serological identification. Molecular location can be advanced through the automatic purification of nucleic acids from pathogens by robotics or columns. [10]

Diseases in plants cause significant creation and monetary misfortunes in agrarian industry around the world. Observing of wellbeing and discovery of maladies in plants and trees is basic for economical horticulture. To the best of our insight, there is no sensor financially accessible for constant evaluation of wellbeing conditions in trees. Right now, exploring is most generally utilized instrument for observing worry in trees, which is a costly, work concentrated, and

tedious procedure. Sub-atomic methods, for example, polymerase chain reaction are utilized for the distinguishing proof of plant ailments that require point by point testing and handling system. Early data on harvest wellbeing and infection recognition can encourage the control of illnesses through appropriate administration techniques, for example, vector control through pesticide applications, fungicide applications, and ailment explicit concoction applications; and can improve efficiency. The present survey perceives the requirement for building up a fast, cost effective, and dependable wellbeing checking sensor that would encourage progressions in agribusiness. It depicts the at present utilized advancements that can be utilized for building up a ground-based sensor framework to help with observing wellbeing and maladies in plants under field conditions. These innovations incorporate spectroscopic and imaging-based, and unpredictable profiling-based plant infection discovery techniques. The paper thinks about the advantages and impediments of these potential techniques [11].

The accurately detection and classification of the plant disease is very important for the successful cultivation of crop and this can be done using image processing.This paper discussed various techniques to segment the disease part of the plant. This paper also discussed some Feature extraction and classification techniques to extract thefeatures of infected leaf and the classification of plant diseases.[12]

DESIGN AND METHODOLOGY

"Study and development of an advanced soft computing-Based leaf disease identification system for plants"

Methodology/ Experimental Design:

1. **Knowledge gathering and elicitation**- First phase of the project is planned with the acquisition of domain knowledge from experts. Meeting and discussions with agricultural experts will help to gather the current detection mechanisms, difficulty in identification methods, symptoms of leaf diseases.

a. Selecting plants and leaf diseases that need an efficient-automated identification mechanism

2. **Dataset collection**- Collecting leaf images for the selected number of diseases from different sites. This will be done based on the opinion of agricultural domain experts.

3. **Selection of advanced soft computing models** - Reviewing the literature to select some good soft computing techniques that were successful in disease identification using images; say for deep learning methods.

4. **Training**-Building the selected models with the collected dataset.

a. Hyper parameter tuning and selection of the best suitable model for the leaf image identification, based on cross validation performance.

5. **Testing**- Testing the optimized model using unseen sample

6. **Generalization Testing**-Verification using the end user.

Figure 1 shows steps for plant disease identification and classification

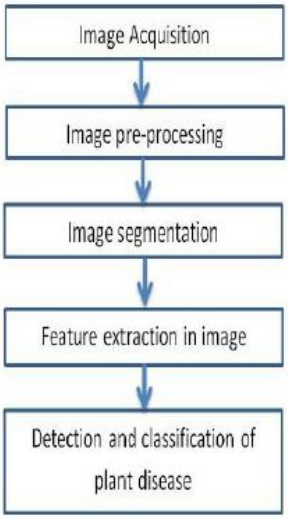

Figure 1: steps for plant disease identification and classification

3.PROPOSED SYSTEM

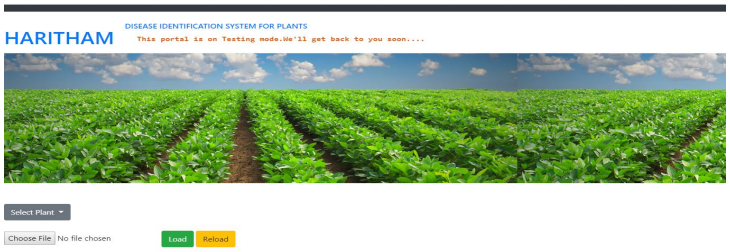

Figure 2: Website for plant disease classification

The design mainly consists of a website and a machine learning convolution model. The proposed system is a website for users where one can upload the pictures of tomato plants specifically its leaves. For classification we have built a pre trained machine learning convolution model based on a dataset of 9 categories of tomato plant diseases. When a user selects the choice for classification in the website, the pre trained model is loaded and input image is fed into the model. Results are displayed on the website based on the classification output from the model. If there are no diseases

identified then the image is shown as healthy. Figure 2 shows the website for plant disease classification .

4. DATA SET

In this paper used Village dataset released by kaggle and github [5]. It's a dataset of diseased plant leaf images and corresponding labels. We analyze 54,306 images of plant leaves, which have a spread of 38 class labels assigned to them. Each class label is a crop-disease pair, and we make an attempt to predict the crop-disease pair given just the image of the plant leaf[3].

5. CONCLUSION

Early detection of leaf diseases in plants plays an instrumental role in the agricultural sector of our state. Plants are highly prone to diseases that affect its growth, which in turn affects the ecology and economy. In order to detect a plant disease at very initial stage, use of automatic disease detection technique would be advantageous. The symptoms of plant diseases are conspicuous in different parts of a plant such as leaves, stem etc. Current system involves manual detection of plant disease using leaf images, which is a tedious job. Hence, our objective is to develop computational methods that automate the disease detection in plants using leaf images. Advanced soft computing methods like deep learning, has proven its success in image recognition and detection tasks in vast areas. This project proposes an efficient and advanced soft computing based diagnostic system [3], for identifying certain plant leaf diseases commonly found in Kerala state. The proposed system expected to produce results as accurate and fast detection system than manual detection.

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