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A Survey on Identifying Leaf Disease using Machine Learning, Deep Learning Concepts

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ABSTRACT

As we all know that agriculture is to the backbone of the nation and crops play a very important role in our day to day lives by producing us with nutritional and valuable ingredients. The polluted environmental conditions are affecting the crops by several diseases and the farmers are finding it difficult to detect these diseases at the beginning stages. So, assessing of the crop conditions is significant. The evolving image easy-sweetening technologies can be employed and the techniques like machine learning, deep learning is proposed. this project focuses on the crop condition assessment with the help of the leaf images. Leaves that are healthy and leaves that are diseased are captured using cameras from the actual- time environment. The images given by the user undergoes the classification techniques where it detects if the leaf is diseased or not. Thus, the proposed system helps the farmers with the difficulties faced in crop cultivation and helps the crop to increase in production.

Keywords*:-Image classifications, image segmentation, soft computing, image enhancement.*

INTRODUCTION

India is well known for agriculture that meaning most of the people are occupied by the agriculture trade. The agriculture industry act as a vital role within the economic sector. Most of the plants are infected by various plant life and microorganism diseases. The techniques like machine learning, image processing techniques, deep learning algorithms, etc can be used to diagnose plant diseases by identifying the diseased and healthy crops. Machine learning techniques are one of the major concepts applied in today's life for the cultivation of the crops. The leaf image of the plants is taken as input to be analysed by these techniques.

The symptoms that are shown on the infected leaf is processed with the image processing technique. It is one of the main process for the identification of diseases. There are many types for detection which depends on the stages of the disease. The Machine learning algorithms improves automatically through every training and experiences which avoids being programmed explicitly, unlike various existing languages. The user provides training dataset to the system that helps it to get trained.

LITERATURE SURVEY

Multilayer CNN for the Classification of mango leaves infected by Anthracnose Disease.

Mango plants are most normally infected by Anthracnose disease (a fungal infection). This work makes use of an MCNN model (deep learning model) to search out the anthracnose disease. Healthy and infected leaf images are employed in this method.

Maize leaf Disease identification based on Feature Enhancement and DMS-Robust Alexnet.

Maize leaf disease will have several symptoms which will be identified and diagnosed solely by trained specialists. Due to the lack of data concerning the diseases, the farmers are not able to diagnose the disease in the early stages. The input image of the leaf is tested to spot the diseased sports with the assistance of the shapes and color-texture for the diseases.

Bacterial Foraging Optimization Based Radial Basis Function Neural Network (BRBFNN) for identification and classification of plant leaf diseases: An Automatic Approach Towards Plant Pathology

This paper is employed for the classification of the leaf disease and identification of plant leaf disease automatically by using BRBFNN image segmentation is performed according to the color-texture and shapes of the image.

1. Traditional method
2. Soft computing method

Traditional method balances thresholding, the cluster method, the edge-based and the region-based methods, whereas the soft-computing compromises and genetic algorithm, the fuzzy logic and neural network. In this paper soft-computing is placed into use. That does not require human input actions whereas the task is automated.

Automated Blast Disease Detection for Paddy plant leaf- A Colour Slicing Approach

This project aims to detect Paddy leaf affected with the blast disease at the early stage. The algorithm is intended to find the damaged portion of the leaf affected with blast disease. During this project RGB to HSI and color- slicing algorithm are used. Colour slicing is one of the positive outcome methods for the identification of the region of colours that is selected.

Implementation of Prototype for Detection and Diagnosis of Cotton Leaf Diseases using a Rule-Based System for Farmers

This paper embodies to diagnose the disease in cotton leaves and identification of the leaf disease. This work personifies the developing of the Android app by using a template-matching technique. In early stages, farmers detect the infection of the disease by their experience, and because of less information on the disease, the farmers fail to predict with 100% accuracy. Now by the employment of technology one will easily detect the disease infected on the leaves.

Detection of The Unhealthy Region of Plant Leaves Using Texture Features

Detecting the plant diseases automatically is a vital role as it may provide advantages in monitoring the large field of crops and it automatically discovers the symptoms of diseases within the early stages. In this paper, the entire process is done in 4 main steps where firstly the given leaf image is converted to an RGB image by the colour transformation. Next, the green pixels are marked and removed by the segmentation method by using a distinctive threshold value. Later the texture features are filtered and are passed through the classifiers

METHODOLOGY

Multilayer CNN for the Classification of Mango Leaves Infected by Anthracnose Disease.

- The healthy and non-healthy leaves are captured in real-time, 80% of the captured images are used for training the data set and 20% of the images are used for testing.
- The captured pictures are preprocessed using a histogram and resized with the central-square crop process.
- Later those pictures are labelled and separated for training and testing.
- Next, we tend to train the CNN model

with the assistance of training images.
- An MCNN model is processed for identifying the leaf affected by Anthracnose disease.
- The model is motivated by ALEXNET architecture, that has 6 convolution layers which follows a rectified-linear unit (ReLU), and then the three max-pooling layers, and finally the two fully connected layers last acting for the output layer.
- When the training process is completed, we test the model with the testing images.
- The primary task of the model is to spot the given input leaf may be a mango leaf or not and so proceed to seek out whether the given leaf is diseased or not.
- Then the accuracy is measured for each the training and testing process.

Gaps identified
- Identifies just one mango leaf disease.

Maize Leaf Disease Identification Based on Feature Enhancement and DMS-Robust Alexnet

In the paper, leaf image is taken and examined by their color, texture, and form by that it will specify the diseased spots within the leaf image.
Here they have divided the method into 4 processes:

Lesion features-enhancement and dms robust AlexNet.

CNN is one of the best algorithms for extracting high- level features from the given input but the CNN basic networks are very deep to train for a lesser amount of train data it's not easy to get the last number of maize diseases images to handle the problem, a noble DMS- Robust ALEXNET on the concept of Alex-net backbone architecture is processed

Graphics gathering

The obtained disease sample is completely uneven in the deep learning and these uneven samples can have an effect on the accuracy of modelling to overcome this, these 5 common ways that is used to augment a small number of sample data, a tiny number of a sample data then the horizontal flip and vertical slip, horizontal-vertical flip and random-rotation first factory transformation.

Feature Enhancement of Maize leaf lesion

The image processing is a required function, it has the below advantages:
- The task related feature information is enhanced.
- The irrelevant data is removed to the maximum extent.
- The reliability of image recognition is improved.

The WT-VIR algorithm is employed for enhancement
The DMS Robust ALEX-NET
The network structure has 5 convolution layers, a multiscale convolution module and three fully connected layers.
Gaps identified
- Lacks to spot the leaf at the initial state.

Bacterial Foraging Optimization Based Radial Basis Function Neural Network for Identification and Classification of Plant Leaf Diseases: An Automatic Approach Towards Plant Pathology
- This paper is employed to identify and classify the plant leaf disease by BRBFNN.
- Image processing is employed for characterising the region by marking the objects within the given image.
- Soft computing technology is employed for image processing to try do it automatically without any human help.
- Bacterial foraging algorithm (BFO) is one among the methods under soft computing that has the capability of mimicking and multioptimal

functions, BFO is a powerful tool to dead start the weight of RBFNN.
- The cedar apple rust, the leaf curl and the common rust and late blight, leaf spot and early blight too are the disease to be known on all common plant leaves.

Gaps identified
- Missing of environment-friendly recovery measures of the known disease.
- Lacks to spot the leaf at the initial state.

Automated Blast Disease Detection from Paddy Plant Leaf - A Color-Slicing Approach
- This paper is employed to spot the blast disease in Paddy plant leaf.
- This paper uses a colour slicing technique that uses high-quality input images to find disease spot and damaged position of the leaf.
- The Infected region should have a clear view with the help of the RGB and HSI domain which helps in the detection of the blast disease.

Gaps identified
- Requires high-quality image input.

Implementation of Prototype for Detection & Diagnosis of Cotton Leaf Diseases using a Rule-Based System for Farmers
- This paper makes use of a Rule-based system that applied human-made rules are applied to store, manipulate, and sort the data.
- The template matching technique (comparing the images to identify the disease) is used, it is a method that is used to find small parts of a picture which matches the template image.
- A bunch of questions will be asked to the farmer that is the user, based on the symptom factors which is in the bipolar format, and based on this calculation detection of the disease takes place.
- In some critical cases when the system cannot be able to reach any end result, it saves the data given by the user to the administrator, that data will be manually evaluated by the experts of the cotton leaf diseases which will then be updated in the application.

Gaps identified
- User needs to give input-data during the time of the segmentation in the existing system.

Detection of the unhealthy region of plant leaves using texture features

This paper is to test 10 species of plants namely banana, jackfruit, beans, etc.
They make use of RGB image acquisition, which is to create a digitally encoded representation of the visual characteristics of an object, Such as the physical or interior structure of an object.
- Changing the input image from RGB to HSI format.
- Finding the green pixels, detecting the marked green pixels
- Getting useful segments
- Comparing the texture features using the color-co-occurrence method

Gaps identified
- Uses less data that is 200 images for 10 different species of plant.
- Missing if environment-friendly recovery measures of the identified disease.

CONCLUSION AND FUTURE SCOPES

Plants are served as the basic need for all living organisms. Plants suffer from different kinds of diseases same as humans or other living species. Such diseases affect the growth of the plant, flower, fruit, and leaf, etc. As computer vision with machine learning advances in solving several plants leaves disease problems, experts and scholars from the above-mentioned papers have worked using different machine learning, deep learning

techniques like MCNN model to classify the diseased leaves from fungal disease, the image enhancement, and DMS Robust Alex net is used to detect the infected leaf, BRBFNN methods are used to identify and classify the leaf diseases, etc. where all these above-mentioned journals and conference papers give accurate information on the input provided.

In the future, these works can be extended by working on large datasets, providing environmentally friendly recovery measures of the disease identified, accurate information of the disease, during the segmentation there will be on use for a user input which was lacking in one of the above papers.

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