Crofting Hybrid Robot

Dr. Ranjit K N[1], Ms. Archana K[2], Ms. Geetha R S[3], Ms. Meghana C[4].

[1] *Associate Professor & Head, Dept. of Computer Science and Engineering, Maharaja Institute of Technology Thandavapura, Mysore, Karnataka, India*

[2,3,4,5] *Students, Dept. of Computer Science and Engineering, Maharaja Institute of Technology Thandavapura, Mysore, Karnataka, India*

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Abstract - *Farmers face difficult in identifying if any kind of disease infects the plants and also adding adequate and type of fertilizers to soil is crucial. Finding the amount of [N-nitrogen, P-phosphorus, K-potassium] levels in soil requires time consuming process of collecting soil sample and taking it to nearest city LAB to get tested there is a requirement for a modern robot which can do both the task of finding the plant disease and also finding the NPK concentration of soil.*

Key Words: Detect plant disease, determine NPK value Machine learning, Android application, Digital Image Processing.

1 INTRODUCTION

India is mainly an agricultural country. Agriculture is the most important occupation for most of the Indian families. Over 60% of India's land area is arable making it the second largest country in terms of total arable land. Most of the farming in India is monsoon dependent–if monsoon is good, the entire economy is upbeat and when the monsoon fails, everyone everywhere takes a hit to some extent. Green revolution began in India with an objective to give greater emphasis on Agriculture. Significant increase in the production of food crops, the productivity of land increased tremendously giving huge economic boost to the nation Irrigation which consumes more than 80% of the total water use in the country needs a proper overall if the country has to improve agricultural output and boost the overall economy. Irrigation water is becoming a scarce commodity. Thus, proper harvesting and efficient utilization of water is of great importance.

The primary occupation in India is agriculture. India ranks second in the agricultural output worldwide. Here in India, farmers cultivate a great diversity of crops. Various factors such as climatic conditions, soil conditions, various disease, etc. affect the production of the crops. The existing method for plants disease detection is simply naked eye observation which requires more man labor, properly equipped laboratories, expensive devices, etc.

And improper disease detection may lead to inexperienced pesticide usage that can cause development of long-term resistance of the pathogens, reducing the ability of the crop to fight back. The plant disease detection can be done by observing the spot on the leaves of the affected plant. The method we are adopting to detect plant diseases is image processing and using Convolution neural network to detect plant disease.

Overview

India is a land of Agriculture mainly known for growing variety of crops. Around half of the population in India depends on agriculture. Diseases to the crops may affect the livelihood of the farmers. In order to overcome this major problem, a robot that detects the leaf disease using image processing and Machine learning is deployed. It involves inspection of plant by a medical professional this is time consuming and also it is expensive and also farmers do predict diseases of plants based on their experience but they are not right all the time and they are only familiar with very common diseases.

Plant disease detection is a very important research content in the field of machine vision. It is a technology that uses Rover to capture the leaf images and detect whether there are infected by the disease or not. And also it helps to determine the [NPK] Nitrogen, Phosphorus, Potassium content value in the soil.

Problem Statement

There is no automated version to detect plant disease and to measure NPK of soil.To determine the amount of NPK [N-nitrogen, P-phosphorus, K-potassium] in soil and can give suggestions to improve soil fertility. Farmers face difficult in identifying if any kind of disease infects the plants and also adding adequate and type of fertilizers to soil is crucial. Finding the amount of NPK in soil requires time consuming process of collecting soil sample and taking it to nearest city LAB to get tested there is a requirement for a modern robot which can do both the task of finding the plant disease and also finding the NPK conversation of soil.

2. SYSTEM ANALYSIS AND DESIGN

2.1 Machine learning techniques: This section discusses various machine learning techniques used for classification and has been used for this system. The results of all these models have been compared to find the best model for the system.

Convolution Neural Networks: A CNN Convolution neural network is perhaps the most widely applied method for extracting reasonable information from huge datasets. The convolution and pooling layers are then passed through in several steps to obtain global features from the input data. Finally, the extracted characteristics are passed to the fully connected layer where classification is performed in this layer.
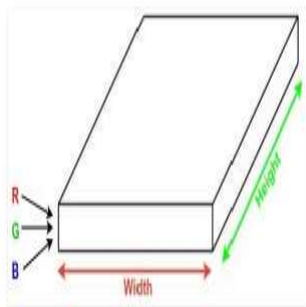
Now imagine taking a small patch of this image and running a small neural network on it, with say, k outputs and represent them vertically. Now slide that neural network across the whole image, as a result, we will get another image with different width, height, and depth. Instead of just R, G and B channels now we have more channels but lesser width and height. his operation is called Convolution.
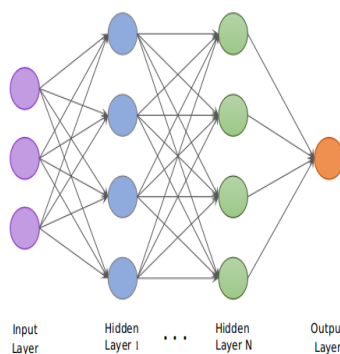

Figure 6.2: Convolution Neural Networks

Neural Network: An Artificial Neural Network (ANN) is an information processing paradigm that is inspired by the way biological nervous systems, such as the brain, process information. The key element of this paradigm is the novel structure of the information processing system. It is composed of a large number of highly interconnected processing elements (neurons) working in unison to solve specific problems.

ANNs, like people, learn by example. An ANN is configured for a specific application, such as pattern recognition or data classification, through a learning process. Learning in biological systems involves adjustments to the synaptic connections that exist between the neurons. This is true of ANNs as well.
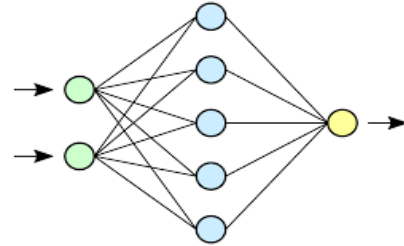

Figure 6.3: Neural Network

3. IMPLEMENTATION

Image Acquisition:

Image Acquisition is the first step in any image processing system. The general aim of any image acquisition is to transform an optical image (real-world data) into an array of numerical data which could be later manipulated on a computer. Image acquisition is achieved by suitable cameras. We use different cameras for different applications. In this Project, the webcam is used for the image acquisition where the user face is captured.

Image Preprocessing :

Image pre-processing is the term for operations on images at the lowest level of abstraction. These operations do not increase image information content but they decrease it if entropy is an information measure.

There are 4 different types of Image Pre-Processing techniques and they are listed below.

1. Pixel brightness transformations/ Brightness corrections
2. Geometric Transformations
3. Image Filtering and Segmentation
4. Fourier transform and Image restauration

Contrast enhancement is an important area in image processing for both human and computer vision. It is widely used for medical image processing and as a pre-processing step in speech recognition, texture synthesis, and many other image/video processing applications.

There are two types of Brightness transformations and they are below:

1. Brightness corrections
2. Gray scale transformation

Image segmentation is a commonly used technique in digital image processing and analysis to partition an image into multiple parts or regions, often based on the characteristics.

By machine Learning Algorithms, the App was predicting the future results: Out of Logistic Regression, CNN have the highest accuracy in our case. It includes a sequence of inquiries commonly used to predict plant diseases and get precautions displayed on the LCD screen by using rover. A user- friendly interface is created where the user can determine the NPK value. And also we can predict the yield of the crop based on the Land size. If the plant is infected the Precautions will be displayed on the LCD screen it should be displayed on the google collab notebook.

Fig-3: Model of crofting hybrid robot

Fig-4:Plant disease identification and precautions
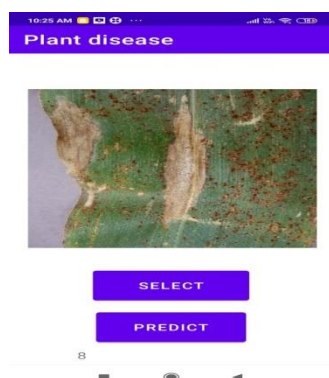
Fig - 4: Showing Plant disease in then android app

CONCLUSIONS

In this project, a Convolution Neural Network was constructed to identify plant diseases automatically. Our developed model can distinguish between 38 classes of both healthy leaves and disease affected leaves. The entire method has been narrated specifically. Model performances have been analyzed through comparison with few other transfer learning models along with suitable graphs. With the increasing depth of CNN model, more image data is required for the best generalization of the model. For that reason, after preprocessing the data, we enlarged the dataset through the process of augmentation. Finally, It's probably due to the nature of the leaves. The images of some species are very close to each other and share very similar shape, color, and texture. So, sometimes it is very hard for networks to correctly predict the true labels. Now a days, smart mobile devices facilities us in terms of easy access and the flexibility in uses. Mobile camera can be used to capture these leaves of plant. A precise plant diseases detection model implemented in those smart phones will help farmers to recognize the plant diseases in a very short time through a convenient way. Farmers will be able to make decision own self. And, it will have a golden impact on the progress of agriculture.

For the future enhancement, providing more functionalities and control to the application. Developing the robots in large number so that farmers will be benefited by our project. Alerting the farmer when the disease crop is formed. Perdition of the crop yield based on the area and also considering climatic changes, soil fertility and other parameters.

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REFERENCES

[1] A Novel Method of Plant Leaf Disease Detection Based on Deep Learning and Convolutional Neural Network Xulang Guan.

[2] Deep Neural Networks Based Recognition of Plant Diseases by Leaf Image Classification Srdjan Sladojevic,1 Marko Arsenovic,1 Andras Anderla,1 Dubravko Culibrk,2 and Darko Stefanovic1.

[3] Transfer Learning Based Plant Diseases Detection Using ResNet50 Ishrat Zahan Mukti, Dipayan Biswas.

[4] CNN based Leaf Disease Identification and Remedy Recommendation System Suma V R Amog Shetty, Rishab F Tated, Sunku Rohan, Triveni S Pujar.

[5] A Deep CNN Approach for Plant Disease Detection Fatma MARZOUGUI, Mohamed ELLEUCH, Monji KHERALLAH.

[6] Plant Leaf Disease Detection and Classification based on CNN with LVQ Algorithm MelikeSardogan, AdemTuncer, YunusOzen.

BIOGRAPHIES

Dr. Ranjit K N
Associate Professor & Head Dept, of CS&E MITT Awarded Doctorate for Specialization in Digital Image Processing. And a trustee Of MIT Institution.

Archana K, Student of Maharaja Institute of Technology Thandavapura, Mysore. Pursuing Bachelor of Engineering Degree in Computer Science and Engineering.

Geetha R S, Student of Maharaja Institute of Technology Thandavapura, Mysore. Pursuing Bachelor of Engineering Degree in Computer Science and Engineering.

Meghana C, Student of Maharaja institute of technology Thandavapura , Mysore. Pursuing Bachelor of Engineering Degree in Computer Science and Engineering.