DISEASE RECOGNIZING AND INSPECTING VARIOUS PLANT ECOSYSTEMS

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Abstract: The country's economy highly depends on its agricultural productivity That is why disease detection in plants plays a significant role in the agriculture field as having a disease in plants are quite normal. If we don't take good care of this, then it will cause serious effects on plants and due to which respective product quality, quantity or productivity is affected. This paper presents a way for early detection of leaf diseases in plants based on some vital features extracted from its leaf images. In the proposed system, the image of leaves is captured and compared with images in the database of the leaves that are pre-stored in the device memory. This detection may be resolved by laboratory analysis, however this a process that is often time-consuming and expensive.

Index Terms: Image processing, Image acquisition, Image segmentation.
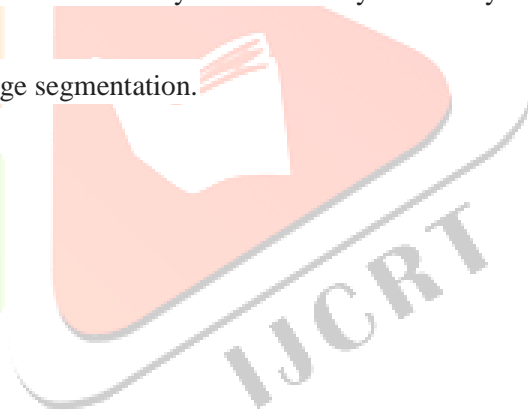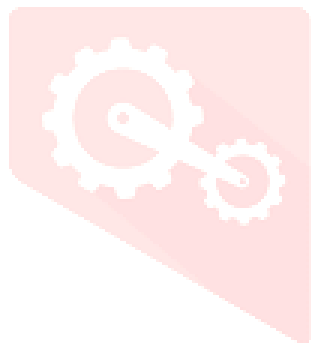
I. INTRODUCTION

Agriculture is the most important sector of Indian Economy. Indian agriculture sector accounts for 18% of India's GDP. Agriculture provides employment to over 50% of the population. Traditionally, the application of fertilizers for the plants was done in manual manner. Sometimes, due to over application of chemical fertilizers, the plants may get damaged resulting in reduced crop yield. Due to this contamination, other members of the ecosystem viz. water, air, soil, animal and human health are also affected. This approach is time consuming and expensive. The application of fertilizers should be judicially managed in order to maintain essential sustainability. In this paper we are proposing an efficient method to overcome the traditional method which has been used from years.

II. EXISTING SYSTEM

The existing method for plant disease detection is simply naked eye observation by experts through which identification and detection of plant diseases is done. For doing so, a large team of experts as well as continuous monitoring of plant is required, which costs very high when we do with large farms. There is need for developing   technique such as automatic plant disease detection and classification using leaf image processing techniques. This technique would be useful for farmers and would save their time and energy.

III. PROPOSED SYSTEM

We are proposing a system named DRIVE which stands for Disease Recognizing and Inspecting Various Plants. Our system, with help of Image Processing and tensor Flow method will recognize whether the plant is affected by a disease or not. Our system will take an input image and process it. The processed image will be compared with thousands of images stored in the dataset and prediction would be made. We will get the result of the type of disease the particular plant and keeping the plant ecosystem healthy and nutritionally rich. Also, the system will help in increasing the productivity of crops for the farmers. We're using Django framework and Bootstrap to deploy the Web Application

IV. SYSTEM ARCHITECTURE

Below, we are presenting the system architecture for the proposed system. The architecture helps in explaining each and every segment of the system in more detailed manner.
It explains how each part of the software is being implemented.

Advantages of the proposed system:

- Saves time and energy.
- Reduction in loss of crops due to disease.
- Would avoid contamination of plants due to overuse of fertilizers.
- Maintains the nutritional value of the soil.
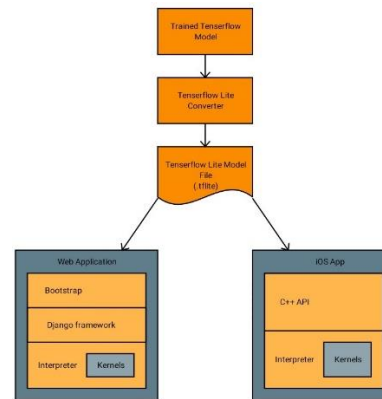- Increases productivity.

Fig1. System Architecture

V. IMPLEMENTATION

Algorithms Used:

A. Convolutional Neural Network:
Convolutional Neural Networks (CNN)   is one of the variants of neural networks used heavily in the field of Computer Vision. It derives its name from the type of hidden layers it consists of. The hidden layers of a CNN typically consist of convolutional layers, pooling layers, fully connected layers, and normalization layers.

B. Deep Neural Network:
A deep neural network (DNN) is an artificial neural network (ANN) with multiple layers between the input and output layers. The DNN finds the correct mathematical manipulation to turn the input into the output, whether it be a linear relationship or a non-linear relationship.

VI. MATHEMATICAL MODEL

Errors in Machine Learning

1. Mean Absolute Error or MAE:
An error basically is the absolute difference between the actual or true values and the values that are predicted.
Mae = **True values – Predicted values**

2. Mean Squared Error or MSE:
MSE is calculated by taking the average of the square of the difference between the original and predicted values of the data.
MSE=

$$\frac{1}{N} \sum_{i=1}^{n} (\text{actual values} - \text{predicted values})^2$$

Here N is the total number of observations/rows in the dataset

3. Root Mean Squared Error or RMSE:
RMSE is the standard deviation of the errors which occur when a prediction is made on a dataset. This is the same as MSE (Mean Squared Error) but the root of the value is considered while determining the accuracy of the model.

4. R Squared:
It is also known as the coefficient of determination. This metric gives an indication of how good a model fits a given dataset. It indicates how close the regression line is to the actual data values. The R squared value lies between 0 and 1 where 0 indicates that this model doesn't fit the given data and 1 indicates that the model fits perfectly to the dataset provided.

VII. EXPERIMENTAL RESULTS

We are successful in predicting the disease of various plant ecosystems. Our system will take an input file and compare it with all the image in our dataset, it will be able to predict the disease of that selected plant and display it.
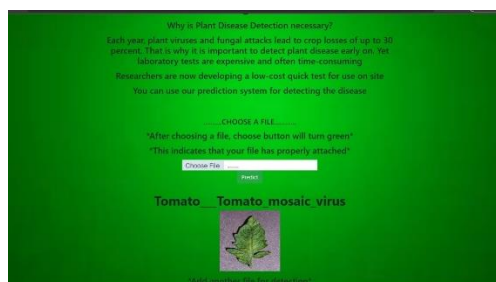

Fig 2.

Fig 3.

VIII. CONCLUSION

We have proposed a system for detecting different disease in various plants. We are using the concept of image processing to identify the infected plants. Once the disease is detected, an appropriate amount of fertilizer will be sprayed on the plant. It will help to maintain the nutrient value of the soil as well as the plant. Effective implementation of our system would save time and energy of the farmers and would increase the overall productivity of the crops.

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