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DEEP LEARNING: UNVEILING PLANT DISEASES

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ABSTRACT: Agriculture is an extremely vital aspect of human life. Almost 60% of the population lives in agricultural areas, either directly or indirectly. Every day, farmers refuse to enhance crop output since the previous system lacks tools for detecting diseases in various crops in an agricultural context. Crop diseases must be identified immediately since they have an impact on the growth of the plants affected. Many Machine Learning (ML) models have been used to detect and categorize agricultural illnesses. However, new breakthroughs in a subset of ML known as Deep Learning (DL) appear to have the potential to significantly improve the accuracy of this field of study. In the proposed method, a convolutional neural network and a deep neural network are employed to reliably and effectively recognize crop disease indicators. Several efficiency measures are also utilized to evaluate these methods. This article talks into great length regarding the DL models that are used to determine the appearance of agricultural diseases. A number of research gaps are also uncovered, which can help scientists figure out how to detect plant illnesses even before symptoms appear. The proposed method will be used to develop convolution neural network-based technology for detecting plant leaf diseases.

Keywords: Plant Disease Detection, Deep Learning, Convolution Neural Network, OpenCV.

1.INTRODUCTION

India is rapidly becoming more industrialized, although farmland played an important role in its early development. Agriculture is struggling to keep up with demand due to the world's rapid population growth. Horticulture should be taught to children so that they realize its importance. Climate change, fewer pollinators, farm pests, insufficient hydration, and other factors continue to threaten food security. Crop disease reduces both the quantity and quality of food grown.Crop diseases are harmful for small-scale farmers whose livelihood depends on farming safely, as well as for global food security. The advantage is that crop diseases may be maintained under tight surveillance by detecting them as soon as they appear on the crops. Because of the advancements in the internet and computer vision, we can now provide a relevant answer to this issue. A plant disease misdiagnosis costs a lot of time, money, production, and quality. To grow plants successfully, you must monitor their progress. Fungi, a lack of water, insects, and weeds are just a few of the environmental factors that can harm crops. Because of these concerns, growers must exercise caution in order to increase production. This research assists us in focusing on the crop's visually appealing attributes. Artificial intelligence developments have made it feasible to detect diseases in photographs of plants that have not been processed. Deep learning, which is based on neural networks, is used. Deep learning has the advantage of being able to extract features from photos in real time. The neural network learns how to extract features during planning. CNN, which is a multi-layer feed-forward neural network, is the most well-known deep learning model.

2.PROBLEM STATEMENT

Agriculture is a critical component of India's economic growth. Farming employs approximately half of all workers in India. India produces the most pulses, rice, wheat, spices, and spice items in the world. Farmers' economic growth is determined by the quality of the items they produce, which is determined by how well their plants grow and produce. As a result, detecting plant diseases is critical in gardening. Plants are susceptible to diseases that prevent them from growing, affecting the farmer's

ecosystem. When a plant disease is discovered early on, it is advisable to employ an automated disease monitoring approach. Diseases can appear on numerous sections of a plant, including the leaves. Using photographs of leaves to diagnose plant diseases takes a long time. To automate the process of identifying and classifying illnesses using leaf pictures, computational algorithms must be developed.

3.EXISTING SYSTEM

Plant professionals can currently identify and diagnose plant illnesses by simply looking at the plants with their own eyes. In this scenario, the suggested method can be utilized to keep track of vast crop fields. Farmers in other nations also lack access to appropriate instruments and are unaware that they can speak with specialists. This means that seeking professional counsel takes more time and costs more money. That's when the proposed method for keeping track of a large number of plants comes in help.

Disadvantages of Existing System

- Disease forecasting can only be done by humans, and it is a time-consuming and space-consuming procedure.
- Aside from that, the price is exorbitant.

4.PROPOSED SOLUTION

The primary purpose of this research is to identify plant diseases. Plant illnesses are discovered using the segmentation, feature extraction, and classification stages. photographs of leaves from various plants are shot with a digital camera or something similar, and the photographs are then used to classify the damaged region on the leaves. The proposed structure employs a Convolution neural network and a Deep neural network to detect ill plants. In this work, open-source, low-cost software is utilized to offer a method for reliably identifying plant illnesses.

Advantages

- OpenCV can assist you in analyzing images and videos. Identifies comparable images using a low-cost camera.

5.LIST OF MODULES

- Image acquisition.
- Image pre-processing.
- Image enhancement.
- Image segmentation.
- Image analysis
- Feature extraction.
- Disease classification.

Image Acquisition:

The first step is to obtain data from a publicly accessible source. The image is what is used in the additional processing. We chose the most common image domains, such as.bmp,.jpg, and.gif, so that our solution can operate with any format. The camera transmits real-time photo feeds. Because most leaves are a mix of red and green, a white background is offered for deeper research, better visibility, and easy image analysis. This approach photographs cotton using a photographing instrument. The photograph was captured in such a way that there is no distortion. Strong sunshine would have ruined the image if it had been taken there..

Image Pre-processing:

Image pre-processing refers to the use of computer techniques to process digital photographs. We can tell what kind of plant it is by looking at the photo using a specific program. With a certain application, we employ a similar strategy for processing and finding images. The clarity of the image is critical in this procedure because the algorithm would not function without it.

Image Enhancement:

Fig.1. plant that is ailing

Image Segmentations:

Image enhancement is the process of making adjustments to digital photographs so that they seem better when displayed or used in other image processing. Any of the following can be used to

enhance a photograph:

- Histogram Equalization.
- Noise removal using filters.
- Unsharp mask filtering.
- Decorrelation stretch etc.

Setting up pixels, often known as "picture objects," is a method of dividing a digital image into numerous portions. Image segmentation makes it easier to recognize and analyze images by dividing them into discrete portions that may be viewed separately. All of the distinct pieces are the same in terms of color, texture, and strength.

Fig.2. Leaf image segmentation

Image analysis

In this stage, image segmentation is utilized to locate the area of interest. A segmentation method known as "region-based segmentation" is used to distinguish between healthy and diseased sections of a plant leaf based on color.

Feature Extraction:

Feature extraction is a component of the dimensionally reduced machine learning process, which divides and reduces a huge amount of raw data into smaller groupings. This phase is critical when we have a large amount of data and need to save time and money while also preventing mistakes. Function extraction selects and combines components to create functions. This allows for the best feature to be extracted from very huge data sets.

Disease Classifications:

It is a method for detecting plant illnesses using our expert deep learning model. A digital camera or equivalent device should be used to photograph the infected plant's leaf. The image was scanned using OpenCV. The sort of plant is then discovered. When it discovers it, it determines what kind of disease the plant has.

6.CONCLUSIONS

The suggested strategy keeps a constant check on the farmland. Crop diseases are detected early on using CNN and DNN algorithms. Machine learning approaches were employed to train the model, which aids in disease decision-making. The farmer is instructed to employ pesticides to eradicate diseases that spread rapidly. The suggested concept could be improved in the future by include new services, such as a local open market, chemical price lists, and neighboring public marketplaces.This study looks at a number of alternative techniques to mark diseases in crops, in addition to a method for dividing photos that could one day be used to automatically find and name diseases on plant leaves. Bananas, beans, jackfruit, lemons, mangoes, potatoes, tomatoes, and sapota are among the living objects employed to test the proposed process. So the difficulties that these plants have in common were investigated. The best results were obtained with very little computer work, demonstrating that the proposed method is effective for detecting and classifying agricultural ailments. This approach also has the advantage of detecting plant illnesses early on, if not immediately. To improve the sorting process, you might employ deep neural networks and convolution neural networks.

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