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Leaf Syndrome Detection using CNN

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ABSTRACT

Plant disease is an ongoing challenge for smallholder farmers, which threatens income and food security. These days crops are being affected by various types of bacteria and fungi which leads to huge menace to food patronage. It is very difficult to identify these diseases, because of the paucity of the basic infrastructure. But the recent revolution in smartphone penetration and computer vision models has created an opportunity for image classification in agriculture. Convolutional Neural Networks (CNNs) are considered state-of-the-art in image recognition and offer the ability to provide a prompt and definite diagnosis. Using a dataset that includes different types of ailing and healthy plant leaflet images, we train a Deep Neural Network (CNN) to diagnose tomato crop diseases. This model achieves a good accuracy with remedies provided to particular disease. This approach creates a path for wireless-based tomato crop analysis towards AI solutions for small holder farmers.

1. INTRODUCTION

Agriculture is an important part of ourcountry as about 70% of the population depends on the farming for their living. Due to loss in prediction, many farmers attempt suicides which is a serious issue. Plants are susceptible to various disease-related disorders and seizures. There are various causes which can be characterized by their effect on plants, disturbances due to environmental conditions such as temperature, humidity, excessive or insufficient food,light. The most common diseases suchas bacterial, viral and fungal diseases. An approach in this case is use of CNNs in plant disease classification. However, with the help of disease detection these difficulties willprevent.

A formal definition of deep learning is- neurons Deep learning is a particular kind of machine learning that achieves great power and flexibility by learning to represent the world as a nested hierarchy of concepts, with each concept defined in relation to simpler concepts, and more abstract representations computed in terms of less abstract ones. In human brain approximately there are 100 billion neurons, all together this is a picture of an individual neuron and each neuron is connected through thousands of their neighbours. The question here is how it recreates these neurons in a computer. So, it creates an artificial structure called an artificial neural net where we have nodes or neurons. It has some neurons for input value and some for-output value and in between, there may be lots of neurons interconnected in the hiddenlayer.

There are several ways to detect plant pathologies. Some diseases do not have any visible symptoms, or the effect becomes noticeable too late to act, and in those situations, a classy analysis is obligatory. However, most diseases generate some quite manifestation within the visible spectrum, therefore the eye examination of a

trained professional is that the prime technique adopted in practice for disease possess good observation skills in order that one can identify characteristic an unsuitable diagnosis since unprofessional gardeners and hobbyists could have more difficulties determining it than knowledgeable plant pathologist. an automatic system designed to assist identify plant diseases by the plant's appearance and visual symptoms might be of great help to amateurs within the gardening process and trained professionals as a confirmation system in diseasediagnostics.

EXISTING SYSTEM

Identification of crop diseases is a challenge in many areas of the world because of a lack of infrastructure and as a result proper treatment of crops is much more difficult. Some diseases cannot be detected with eyes, or those appear only when it is too late to act upon them. Due to loss in prediction, many farmers attempt suicides which is a serious issue.

- Plants are susceptible to various disease-related disorders andseizures.
- There are various causes which can be characterized by their effect on plants, disturbances due to environmental conditions such as temperature, humidity, excessive or insufficient food, light.
- The most common diseases such as bacterial, viral and fungal diseases.
- Traditional methods to identify and detect plant diseases are time-consuming

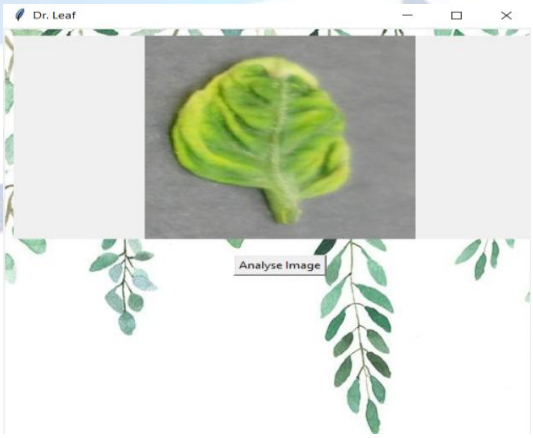
2. PROPOSEDSYSTEM

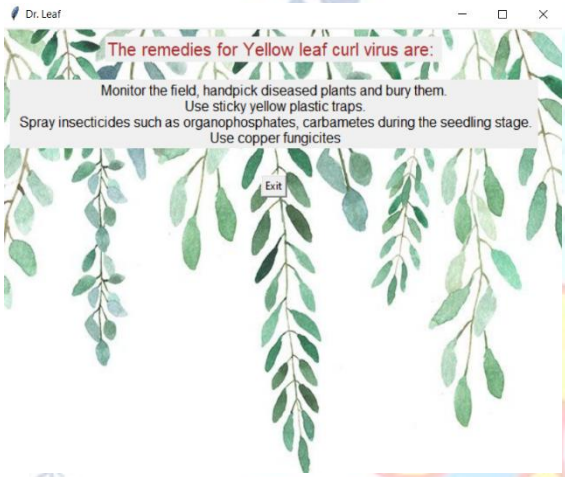
It is very difficult for farmers to identified various diseases in plants. The estimated annual crop losses due to plant diseases at worldwide is $60 Billions. The traditional tools and techniques are not very useful since it takes up lots of time and manual work. However, with the help of disease detection these difficulties willprevent. We use the CNN algorithm to detect disease in tomato plant leaves because with the help of CNN the maximum accuracy can be achieved if the data is good.CNN classifiers are trained to identify diseases in each plant. These results are used to call up a classifier, which is trained to classify various diseases in that plant. If not present, the leaves are classified as "healthy". It displays disease detection with remedies provided. Mainly focuses tomato diseases are yellow leaf curl virus, bacterial spot, late blight.

3.IMPLEMENTATION (modules)

The main modules are tkinter, CNN, opencv, tensorflow, numpy etc.. Using tkinter and tensorflow the user interface is created and CNN acts as a model to perform classification. Opencv and numpy are used for resizing and arranging arrays to reshape the image size. As this is desktop-based application, tkinter plays major role to create user interface. In the interface, fields can be open photo, analyze image and if disease is present we provideremedies also. We trained the CNN model with the images and tested through test folder images. Hence, the result can be either diseased or healthy followed by a remedy if it is diseased leaf. This gives accuracy upto 92% as it works on only tomota leaf. In future there can be chances of inserting different plant leaves and display its nutrient level.

SAMPLE SCREENS





4. CONCLUSION

Protecting crops in organic farming is not an easy task. This depends on a thorough knowledge of the crop being grown and possible pests, pathogens and weeds. In our system, a special deep learning model has been developed based on a special architectural convolution network to detect plant diseases through images of healthy or diseased plant leaves. To detect and classify diseases of various plants, an accurate and successful method should be used and this can be done by this Convolutional Neural Networks. By using this we can easily detect the disease and can protect our tomato plants from infections. We would like to conclude that the project we took up will stipulate the actual perception behind detecting disease of the tomato plants.

5. FUTURE SCOPE FOR FURTHER DEVELOPMENT

Future work can be extended in this system by improving the accuracy level, detecting different plant leaf diseases, detection of nutrient level for a plant. Some plant leaf disease detection automatic techniques are beneficial for large work of monitoring in farm of crops disease detection. We can also add more classes of leaves and disease type. The state of the plants can be tracked around the clock using hyper spectral imaging. Following this works, the farmers can be benefitted, and their worries of damaging the crops can be reduced.

Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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