CROP DISEASE DETECTION USING PYTHON

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Abstract:

Agriculture is the backbone of Indian economy. Farming is no easy, which involves a lot of steps to successfully cultivate a crop . In today's world the productivity of agricultural crops are reduced, the major reason for this is farmers may sometime may not be aware of the exact amount of fertilizers and pesticides need for the crops .The excess or reduced amount of fertilizers and pesticides may reduce the production of crops or the quality of crops. Because of this, the price of products is highly increased .Our project aids this hectic situation using a simple application in android mobile which uses image processing system.

Key words:

Image acquisition, detect diseases, CNN Libraries, diseased leaf

Introduction:

In today's environment, the market rate of most vegetables, fruits, and pulses is elevated due to a decrease in the amount of productivity. And also middle-class peoples are suffering a lot with this price hike. Maybe our paper would not aid the entire issue, it may help in increasing productivity. In past days or even in present days, the disease of the crop is identified by the farmers or by an inspector in bare eyes. If the disease is a known one then that's ok, but if the disease is new or similar to known diseases then it takes 2-3 days to predict the disease. And these days there is research going on in developing an application for disease prediction. And more specifically that we have an idea of designing an application to predict the diseases affected on leaves.

Our application is entirely user-friendly, just an image of the affected leaf will do all the needs. The application will inturn return the amount of fertilizer and pesticide required for that crop. By doing so it doesn't take days to detect the disease. And also we hope that the productivity rate of the particular crop does not fall ever. We hope that our paper will answer the question of the productivity fall hypothesis. "Farming is no easy", let's help farmers increase productivity and middle-class people stay unaffected by the price hike. **Existing methodology:**

1. Existing system:

This project is for the farmers who require high detailed knowledge and experience to deduct the actual crop disease with the help of the naked eye and to use the right proportion of fertilizer to cure the disease. Since the disease in the below figures almost look similar it becomes difficult for the farmer to identify.

Fig. 1: Early blight and Bacterial leaf spot

So to prevent the above said situation i.e for correct guidance for which fertilizers to use , to identify the diseases correctly and to distinguish two similar diseases we use ARTIFICIAL NEURAL NETWORKS(ANN).

I. ANN: ANN helps us with the correct identification of the crop disease along with the right fertilizer quantity to cure that disease. But we cannot do it with the help of a single ANN. So many ANN is stacked one above the other to form multi layers inbetween the input layer and the output layer which is known as HIDDEN LAYERS. The more series of hidden layers the more complex operations can be done.

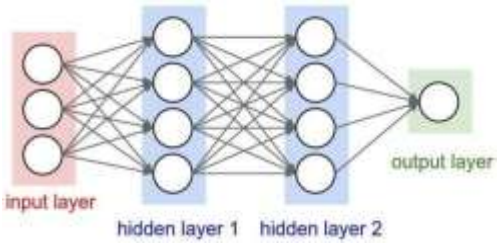

Fig. 2: ANN layers

The hidden layer can perform identifications of features from the data given and the output layer combines all recognized features and make predictions.

2. Adopted Methodology:

In this project image acquisition is done hence Convolution neural network is used to make image recognition more efficient. The layers of CNN are:

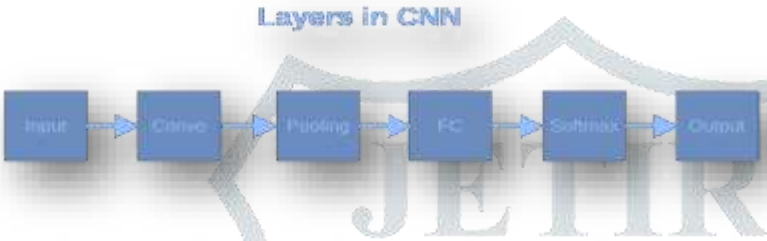

Fig. 3: CNN Layers

i. Input layer: The input layer in CNN should contain the diseased crop image .The image is represented in three dimensional matrix and it should be reshaped into a single column .This is the beginning layer of CNN , which brings the initial data into the system for further processing by successive layers of neural network.

ii. Convolutional layer: The image gets extracted within this layer so it is called as feature extractor layer. Shallow features such as edges, lines, and corners are extracted by the low –level convolutional layer and the high-level convolution layer adsorb abstract features from the input of low-level features. In this layer filter or kernel is used to perform convolution on data to produce the feature map.

iii. Pooling layer : This layer reduces the dimension of the feature maps. Max pooling is an operation in which the maximum value in each region of the feature map is calculated and the results are down sampled. The most prominent feature is highlighted. It also discards all the features that doesn't make any difference. The entire matrix is flattened into a vector like vertical one.

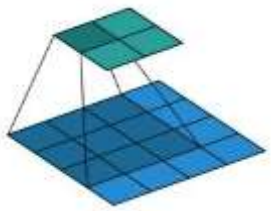

Fig. 4: Pooling layer

iv. Fully connected layer: It complies the data which are extracted by the previous layers to form final output. The flattened output from the pooling layer is fed as the input to the Fully Connected layer to generate the output . Finally, we have an activation function such as softmax or sigmoid to classify the outputs.

v. Output: The output is an three dimensional matrix. The batch size is the same as input batch size but the other 3 dimensions of the image might change depends upon the kernel size, values of filter and the type of padding we use .

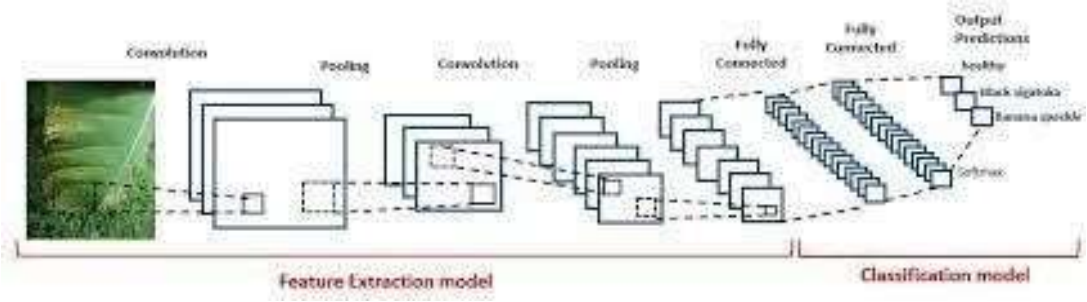

Fig. 5: Execution of each layer **Operation:**

We build an application for farmers to detect the disease of crops at earlier stage and also to tell the amount of fertilizers and pesticides needed for that specific crop. The procedure in which we have done the above is explained further. Till now the diseases are detected in bare eyes of either farmers or inspectors, if the disease is a well known one then there is no problem, but if it is unknown then it takes 2-3 days to find the disease. By this time the disease will become severe. In order to overcome such difficulty we put forth our paper. The farmer must install the application in an android mobile and take a picture of the leaf of the affected crop. And he must upload it in the application. Once the farmer does this a unique id(code) is sent to the farmer's application which he can use in future to retrieve the fertilizer and pesticide amount. The image received from the farmer, then reaches the cloud database and by using CNN libraries (Keras and Tensor Flow which are well-known open-source libraries used for developing Machine Learning, Deep Learning and Artificial Intelligence projects) the image acquisition is done and recognised. A huge dataset is stored in drive formerly. The image acquired from the farmer, is uploaded in the database and compared with predefined dataset and the disease is detected. As soon as the disease is detected the particular data from the dataset which contains the amount of fertilizers and pesticides needed for that particular crop is retrieved. The retrieved information is sent to the farmer's application. By using the unique id(code) assigned before, the farmer can view the disease name, cause of the disease and as said before the amount of fertilizers and pesticides needed for that specific crop. With these details he can now increase his cultivation.

Block Diagram:

The block diagram below is an internal block diagram of CNN

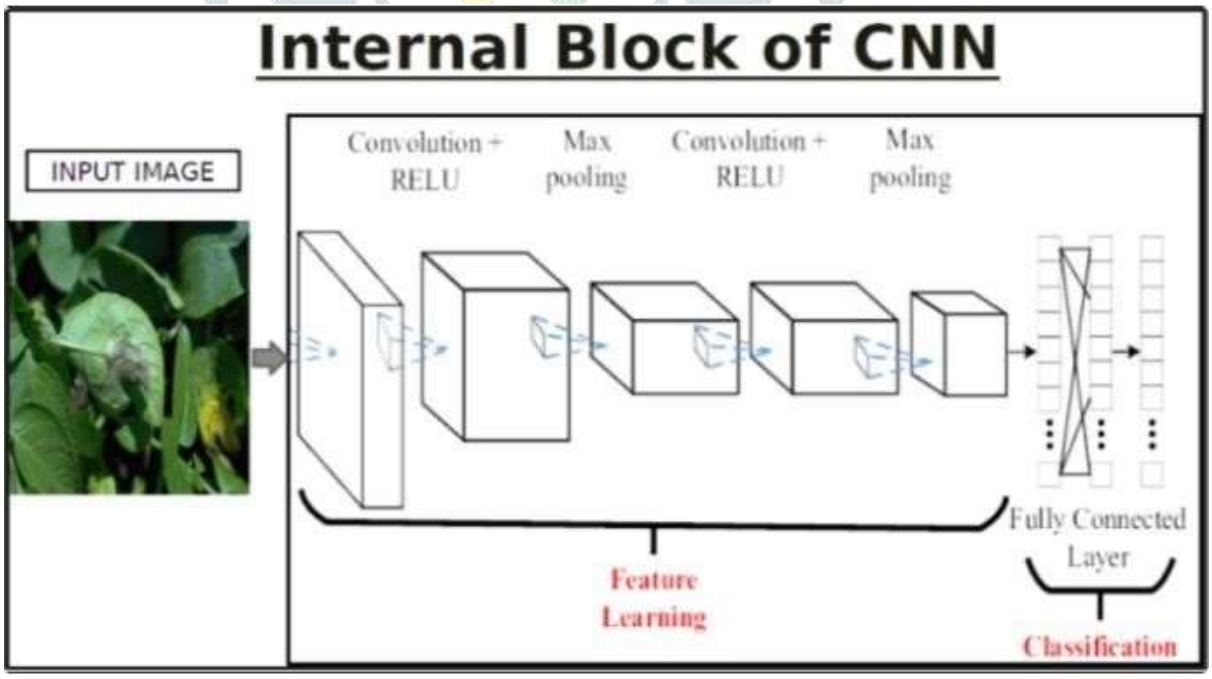

Fig. 6: Internal block diagram of CNN

The block diagram below is the overall operation block diagram

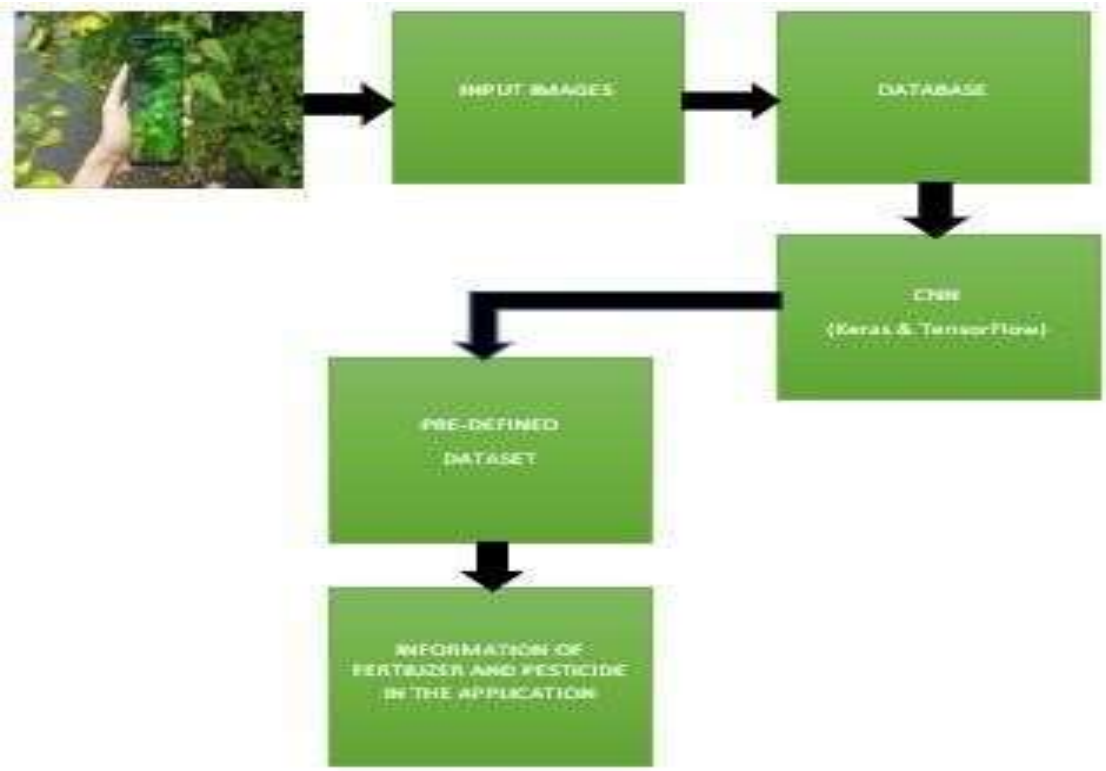

Fig. 7: Overall Operational Block Diagram

Advantages:

Our idea will

1) Detect the disease at an early stage.
2) Increase the productivity of crops.
3) Maintain the soil fertility by providing the right amount of fertilizer.
4) Decrease the demand for the product in market.

Future works:

We have an idea of implementing the same product of disease detection with appropriate sensor or suitable hardware product. We have an idea of extending the dataset to various crops to increase the yield. We can also move from crops to plants and trees as an advancement.

Conclusion;

The detection and classification of the floral disease must be accurate as it will be helpful in crop cultivation.This can be achieved using image processing. In this paper we've discussed the technique for segmenting plant's diseased part.We've also discussed the technique to extract the features of infected leaf and its parts. We conclude that by using these methods of image processing ,we can easily detect and provide solution to the plant disease. Like the medical assistance given to human, plants too need equal care and support. Save the plants and save lives.

References:

1) Dr.K.Thangadurai, K.Padmavathi, "Computer Vision image Enhancement For Plant Leaves Disease Detection", 2014 World Congress on Computing and Communication Technologies.

2) Indian Council of Agricultural Research", Available : https://www.apsnet.org/publications/imageresource/ Pages/Fi00158.aspx

3) Konstantinos P. Ferentinos: Deep Learning models for plant disease detection and Diagnosis. Computers and electronics in ariculture(2018)

4) HiteshwariSabrol ,Satish Kumar Recognition of Tomato Late Blight by using DWT and Component Analysis IEEE Conference2017.

5) Detection of leaf diseases and classification using digital image processing2017 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS)