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Literature Review for Cotton Leaf Disease Identification

Ankita Mandgaonkar, Aakanksha Bele, Pooja Dhole, Roshan Kubde, Shubham Jairaj, Mr. A.R. Welekar
Computer Engineering, Bapurao Deshmukh Collage Of Engineering, Sewagram, (Wardha), Maharashtra, India

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ABSTRACT: Plant diseases are generally caused by pest, insects, pathogens and decrease the productivity to large scale if not controlled within time. Agriculturists are facing lose due to various crop diseases. It becomes tedious to the cultivators to monitor the crops regularly when the cultivated area is huge that is in acres. The proposed system provides the solution for regularly monitoring the cultivated area and provides the automated disease detection using remote sensing images. The proposed system intimates the agriculturist about the crop diseases to take further actions. The objective of the proposed system is to early detection of diseases as soon as it starts spreading on the outer layer of the leaves. The proposed system works in two phases: the first phase deals with training data sets. This includes, training both healthy and as well as diseased data sets. The second phase deals with monitoring the crop and identifying the disease using Canny's edge detection algorithm ,how the disease analysis is done for the leaf diseases detection is addressed, the analysis of the different diseases that are present on the leaves can be effectively detected in the early stage before it will damage the whole plant.
Keywords—Cotton leaf disease, convolutional neural network (CNN), Convent , image detection.

I. INTRODUCTION

Agriculture is one of the most prime occupations of India. Cotton known as "White Gold" could be a major agricultural crop in India and plays a dominant role within the industrial and agricultural economy of the country. Cotton in Republic of India provides direct livelihood to six million farmers and regarding forty-fifty million folks square measure utilized in cotton trade and its process. Indian cotton cultivation is additionally riddled with many attended doubts relating to crop cultivation, protection, picking, transportation and storehouses.

In recent days, huge amount of loss in quality and quantity of cotton yield due to different diseases affecting the plant. Disease classification could be a vital step, which may be helpful in early detection of insects, controlling of diseases, increase in productivity etc. Early disease detection will assist the control of disease through correct management approaches such as spraying of pesticide, fungicide etc., which will improve production. Employing people in cotton disease classification task in quiet laborious and time consuming. Here, an automatic cotton disease classification technique and cotton stages using the idea of convolution neural network (CNN) is proposed.

II. CONVOLUTIONAL NEURAL NETWORKS

A **Convolutional Neural Network (ConvNet/CNN)** is a Deep Learning algorithm which can take in an input image, assign importance (learnable weights and biases) to various aspects/objects in the image and be able to differentiate one from the other. The pre-processing required in a ConvNet is much lower as compared to other classification algorithms. While in primitive methods filters are hand-engineered, with enough training, ConvNets have the ability to learn these filters/characteristics.

The architecture of a ConvNet is analogous to that of the connectivity pattern of Neurons in the Human Brain and was inspired by the organization of the Visual Cortex. Individual neurons respond to stimuli only in a restricted region of the visual field known as the Receptive Field. A collection of such fields overlaps to cover the entire visual area.

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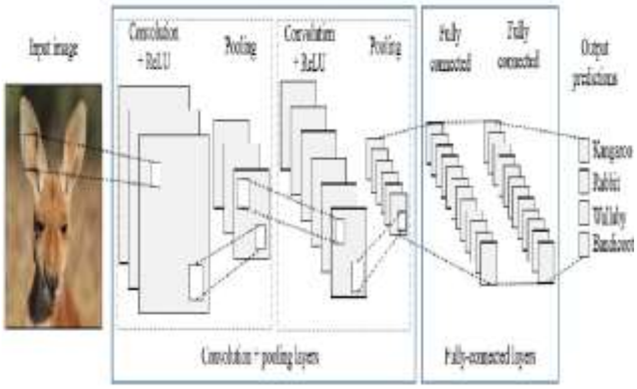

Fig. 1: Architecture of ConvNet/ CNN

A. CONVOLUTIONAL LAYER

Fig.1 shows the convolution which is the first layer to extract features from an input image. Convolution preserves the relationship between pixels by learning image features using small squares of input data. It is a mathematical operation that takes two inputs such as image matrix and a filter or kernel. Convolution of an image with different filters can perform operations such as edge detection, blur and sharpen by applying filters.

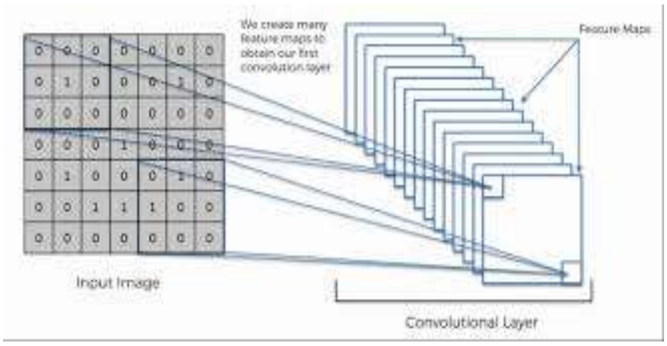

Fig. 2.: Concolutional Layer

B. POOLING

Pooling layers section would reduce the number of parameters when the images are too large. Max pooling take the largest element from the rectified feature map. The objective is to down-sample an input representation (image, hidden-layer output matrix, etc.), reducing its dimension lity. This is shown in Figure 3.

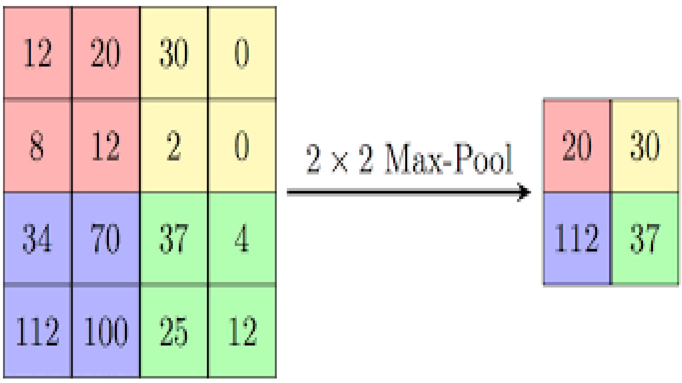

Fig. 3: Pooling

C. FLATTENING

Flattening is the process of converting all the resultant 2 dimensional arrays into a single long continuous linear vector. It gets the output of the convolutional layers, flattens all its structure to create a single long feature vector to be used by the dense layer for the final classification. This is shown in Fig 4.

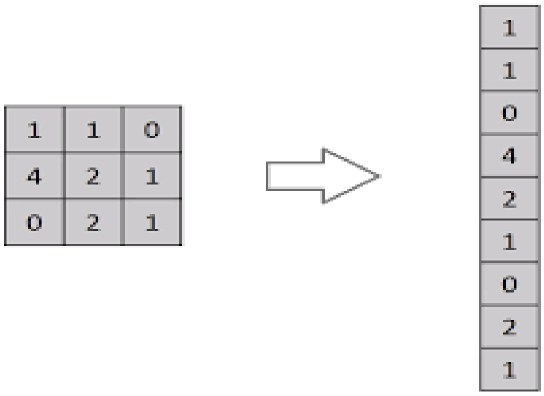

Fig.4: Flattening

D. FULLY CONNECTED

Fig 5 shows the hidden layers inside a Convolutional Neural Network w are called Fully Connected Layers. These are a specific type of hidden layer which must be used within the CNN. This is used to combine the features into more attributes that predict the outputs more accurately.

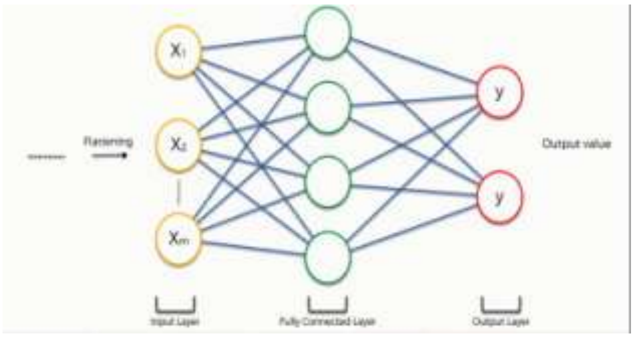

Fig. 5: Fully Connected

E. VGG16 KERAS MODEL

VGG16 model, with weights pre-trained on ImageNet.

This model can be built both with 'channels_first' data format (channels, height, width) or 'channels_last' data format (height, width, channels). The default input size for this model is 224x224.

ARGUMENTS

- include_top: whether to include the fully-connected layer at the top of the network.
- weights: one of None (random inializaon) or 'imagenet' (pre-training on ImageNet).
- input_tensor: oponal Keras tensor (i.e. output of layers.Input()) to use as image input for the model.
- input_shape: oponal shape tuple, only to be specified if include_top is False (otherwise the input shape has to be (299, 299, 3) . It should have exactly 3 inputs channels, and width and height should be no smaller than 71. E.g. (150, 150, 3) would be one valid value.
- pooling: Oponal pooling mode for feature extractor when include_top is False .
  - None means that the output of the model will be the 4D tensor output of the last convoluonal block.
  - 'avg' means that global average pooling will be applied to the output of the last convoluonal block, and thus the output of the model will be a 2D tensor.
  - 'max' means that global max pooling will be applied. classes: optional number of.

- classes to classify images into, only to be specified if include_top is True , and if no weights argument is specified.

F. RESULTS

A KERAS MODEL INSTANCE.COTTON LEAVES DISEASE CLASSIFICATION MONITERING

Farms through camera traps is an effective and reliable method in natural observation as it can collect a large volume of visual data naturally and inexpensively. The cotton leaves data, which can be fully automatic captured and collected from camera traps, however, is a burden for biologists to analyze to detect whether there exists leaves in each image, or identify which disease the objects belong to. Making this costly, time-consuming manual analyzing process automated thus could dramatically reduce a large amount of human resource and quickly provide research findings.

G. AUTOMATICALLY IDENTIFYING, COUNTING AND DESCRIBING COTTON LEAVES IN CAMERA-TRAP IMAGES WITH DEEP LEARNING

Having accurate, detailed, and up-to-date information about the location and behaviour of leaves disease in the farm/field would revolutionize our ability to study and conserve ecosystems. This project investigates the ability to automatically, accurately, and inexpensively collect such data, which could transform many fields of biology, ecology, and zoology into “big data” sciences. Motion sensor “camera traps” enable collecting Cotton leaves pictures inexpensively, unobtrusively, and frequently. However, extracting information from these pictures remains an expensive, time-consuming, manual task. We demonstrate that such information can be automatically extracted by deep learning, a cutting-edge type of artificial intelligence. We train deep convolutional neural networks to identify, count, and describe the behaviours of cotton leaves in the large number of image of keras dataset. Our deep neural networks automatically identify disease in cotton leaves with over 93.8% accuracy, and we expect that number to improve rapidly in years to come. More importantly, if our system classifies only images it is confident about, our system can automate cotton disease identification for 99.8% of the data while still performing at the same 97.6% accuracy as that of crowd sourced teams of human volunteers, saving more than 8.4 years (at 40 hours per week) of human labelling effort (i.e. over 17,000 hours) on this 3.2-million-image dataset.

H. CONCLUSION

Here ,how the disease analysis is done for the leaf diseases detection is addressed, the analysis of the different diseases that are present on the leaves can be effectively detected in the early stage before it will damage the whole plant. Here the technique presented can able to detect the disease more accurately, we can say that, we can archive good productivity by preventing the different diseases which are present on the leaves of plant using weather dataset. The usage of classification and feature extraction processes has enhanced the performance of the system which provides better results.

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