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Crop Disease Identification and Guidance Using ML

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Abstract---*The project Present leaf characteristics analysis using image processing used at agricultural field automatic leaf characteristics detection in agricultural is essential one in monitoring large field crops and does automatically detects symptoms of leaf characteristics as soon as they appear In the decision-making system utilizes image content characterization and supervised classifier which is a type of neural network and image processing technique involves pre-processing features and extraction and classification of stages at the process and input will be resized hear the colour and texture features are extracted for neural training and classification. Mean ,standard, deviation of HSV colour space are the features of colour energy contrast homogeneity and correlation are the features of texture this will be used to classify the test image automatically to detect the leaf characteristics. For this automatic classify and will be used for classification based on learning with some training sample of the same category. In this network it will use tangent sigmoid function has kernel function finally the results show that the used classifier provides minimum error during training and better accuracy in classification.*

Keywords--- Convolutional Neural Network, Augmentation, Image Pre-processing and Labelling

1. Introduction

The project presents leaf characteristics analysis using image processing techniques for automated vision system used at agricultural field. In agriculture research of automatic leaf characteristics detection is essential one in monitoring large fields of crops, and thus automatically detects symptoms of leaf characteristics as soon as they appear on plant leaves. The proposed decision making system utilizes image content characterization and supervised classifier type of neural network. Image processing techniques for this kind of decision analysis involves pre-processing, feature extraction and classification stage. At Processing, an input image will be resized and region of interest selection performed if needed. Here, color and texture features are extracted from an input for network training and classification. The idea of Machine learning is to predict the future from past data. Machine learning focuses on the development of Computer Programs that can change when exposed to new data and the basics of Machine Learning, implementation of a simple machine learning algorithm using python. It feed the training data to an algorithm, and the algorithm uses this training data to give predictions on a new test data.

Fig. 1. Process of machine learning

Machine learning can be roughly separated in to three categories. There are supervised learning, unsupervised learning and reinforcement learning. Supervised learning program is given to both the input data and the corresponding labelling to learn the data that has to be labelled by a human being beforehand. Unsupervised learning has no labels. It is directly fed to the learning algorithm. This algorithm has to figure out the clustering of the input data. Finally, Reinforcement learning dynamically interacts with its environment and it receives positive or negative feedback to improve its performance. Deep learning is a subset of machine learning in artificial intelligence that has networks capable of learning unsupervised from data that is unstructured or unlabelled. Also known as deep neural learning or deep neural network. 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.

2. Existing System

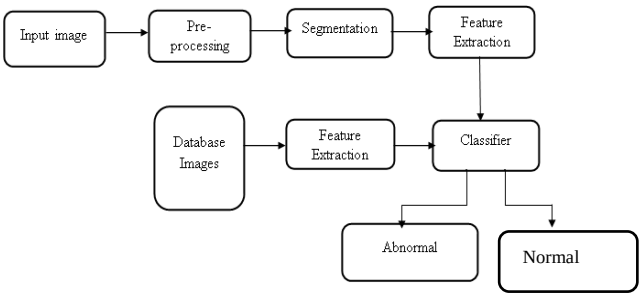
Computer-aided ship detection methods have been enormously freed up human resources and typically including two steps: using classifiers for classification and localization and extracting image features. These methods can produce stable outcome under calm sea conditions. However, when a distortion such as waves, clouds, rain, fog, and reflections could happen, the extracted low-level features are not robust. Apart from, manual selection of these features is time-consuming and strongly dependent on the expertise and

characteristics of the data itself. Present methods, based mainly on pesticides and resistant crop varieties, control many damaging organisms effectively but have important limitations. Vulnerability to the emergence of tolerant strains of pest or pathogen is probably the most severe; chemical methods are also often insufficiently selective and very wasteful. Dependence on these methods will continue, however, and it is therefore essential to seek ways of minimizing their deficiencies

3. Proposed system

Segmentation is the process of partitioning a digital image into multiple segments (sets of pixels, also known as super pixels). The goal of segmentation is to simplify and/or change the representation of an image into something that is more meaningful and easier to analyze. Image segmentation is typically used to locate objects and boundaries (lines, curves, etc.) in images. More precisely, image segmentation is the process of assigning a label to every pixel in an image such that pixels with the same label share certain visual characteristics. It Provide the Guidance for the identified disease and the result of image segmentation is a set of segments that collectively cover the entire image, or a set of contours extracted from the image (see edge detection). There are many techniques that are presently being utilized to make computer based vision Leaf classification system based on, Hybrid spatial features involves color features and texture descriptors Neural Network (NN) Classifier Each of the pixels in a region is similar with respect to some characteristic or computed property, such as color, intensity, or texture. Adjacent regions are significantly different with respect to the same characteristic(s) when applied to a stack of images, typical in medical imaging, the resulting contours after image segmentation can be used to create 3D reconstructions with the help of interpolation algorithms like marching cubes.

Architecture diagram



A Module Description

A. DATASET

An appropriate dataset is required at all stages of object recognition research, starting from the training phase to evaluating the performance of recognition algorithms. A total of 500 images are collected from different sources, such as the Plant Village and Google websites, including different periods of occurrence of leaf diseases, which are divided into different categories. There are 8 categories representing infected leaves and a category representing healthy leaves.

"Apple___Apple_scab", "Apple___Black_rot", "Apple___Cedar_apple_rust", "Apple___Healthy","Corn_(maize)___Cercospora_leaf_spot Gray_leaf_spot", "Corn_(maize)___Common_rust_","Corn_(maize)___Healthy", "Corn_(maize)___Northern_Leaf_Blight", "Grape___Black_rot, "Grape___Esca_(Black_Measles)", "Grape___Healthy", "Grape___Leaf_blight_(Isariopsis_Leaf_Spot), "Potato___Early_blight", "Potato___Healthy", "Potato___Late_blight", "Tomato___Bacterial_spot","Tomato___Early_blight", "Tomato___Healthy", "Tomato___Late_blight", "Tomato___Leaf_Mold","Tomato___Septoria_leaf_spot", "Tomato___Spider_mites Two spotted_spider_mite", "Tomato___Target_Spot", "Tomato__Tomato_Yellow_Leaf_Curl_Virus", "Tomato___Tomato_mosaic_virus"

these are the main diseases investigated in this study.

All images downloaded from different sources were cleaned by a developed Python script that applied a comparison procedure. The script removed duplicates by comparing the images' metadata: name, size and date. After automated removal, the images were assessed several times by human experts

B. AUGMENTATION

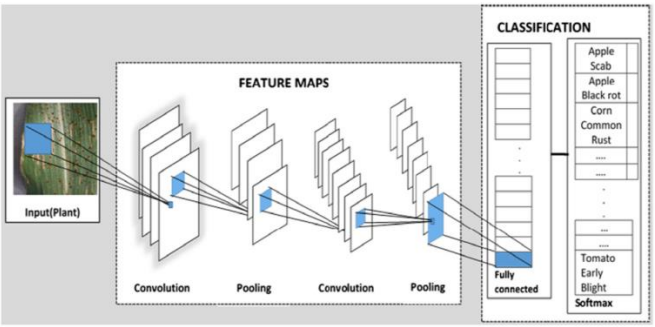
Training CNNs requires substantial data. The more data the CNNs has to learn, the more features it can obtain. Since the original leaf image dataset collected in this study is not sufficient, it is necessary to expand the dataset by different methods to distinguish the different disease categories. After the original images are initialized, additional versions are created by rotating the images 9, and; by mirroring each rotated image; by cutting the centre of the image by the same size; and by converting all processed images to grey scale. The dataset is expanded by the above methods, which helps in reducing over - tting during the training stage.

C. IMAGE PREPROCESSING AND LABELLING

To improve feature extraction and increase consistency, the images in the dataset for the deep CNNs classier are pre-processed before the model is trained. One of the most significant operations is the normalization of image size and format. In this study, all images are resized to 224 224 pixels and32 32 dots per inch, which are automatically computed by Python scripts based on the OpenCV framework. In the interest of corning the accuracy of the classes in the dataset, agricultural experts examined leaf images grouped by a keyword search and labelled all the images with the appropriate disease acronym. It is well known that it is essential to use accurately classed images for the training and validation dataset…

D. Convolutional Neural Network

Transfer learning method is a widely used training method of convolution neural network. By loading the weights of Inception blocks pre-trained on Image Net data set, the model will has a better weights initialization before starting the gradient optimization. Moreover, considering the huge difference between the fundus images data set and Image Net dataset, none of layers in weight-sharing Inception blocks are frozen.



Conclusion

The decision process starting from a data collection and processing image processing and finally convolutional neural network model building and evaluation along with the best accuracy on public test set begins the higher accuracy score as a result provide great insight about the detection of leaf disease at the early detection of leaf disease is very important for the agriculture to reduce its impact and to take the necessary prevent remedies for avoiding it experience in the future there for the prediction model is presented to improve the accuracy of occurrence of leaf disease with scope of early detection under the age of artificial intelligence

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