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RESEARCH ARTICLE

GOSSYPIUM PLANT DISEASE DECTECTION AND PREDICTIONS

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Abstract

India is the leading country in the world which produce Cotton. Cotton crops are damaged due to early fall off leaf or leaf will get infected due to diseases. Various climatic conditions like scorching temperature in crop field and also some pesticides will be required within time, numerous diseases like bacterial blights, alternaria, etc can be detect by multiple system through soil monitoring. After disease detection, will be provided to the farmers using various deep learing algorithms and IoT-based system. The deep CNN model is developed to perform cotton plant disease detection using infected and healthy cotton leaf images by collecting images through the complete process used in training and validation for image pre-processing; augmentation and fine-tuning. Different test cases were accomplished to check the performance of the created model and make this new system economical and independent. This newly created system gives accuracy as efficient as possible for cotton plant disease detection and restrains by improving crop production, this paper provides an innovative path to researchers for developing a cotton plant disease identification system.

Keywords: Internet of Things, Convolutional Neural Networks

Introduction

Agriculture is primary source of livelihood of Indian economy where almost 70% of the population depends on agriculture among which 82% farmers are small and marginal. The yield of the crop is be conditional on healthier and wholesome growth but there are many reasons behind it due to which growth

of crop affected continuously. Plant disease is on the biggest reasons behind this however, this is difficult for the farmers to detect the diseases with naked eyes. Therefore, recognition of disease at early stage will secure much crop loss. Leaf is that part of plant which affect the crop yield if it get affected, visible symptoms will help in defection of diseases and plant pathologists can suggest a suitable pesticides.

In early era to detection of disease it can be recognized by using microscope after taking leaf sample of sufficient facilities and that time proper technology is not available than farmers have to come to expert, which is much time consuming. Therefore, the automation in diseases and detection help the farmers to overcome this problem.

India is the leading country in the world which produce cotton and in India, Gujarat is the largest producer followed by Maharashtra. Cotton crops are mutilate due to early fall off leaf which are infected with the disease. It also affect by various climatic conditions like scorching temperature in crop field & some pesticide will be also required within a time. Numerous disease like bacterial blight, Alternaria, etc. can be detected by multiple systems through soil monitoring.

After identification of problems with its solutions, it provide to the farmers using various machine learning alongwith Ms and IOT-based system which is very useful technique to save the crops.

Methodology

This paper proposed a cotton plant disease recognition system using deep learning having different steps as follows: Collecting dataset, pre-processing dataset, training the Convolutional Neural Network model (CNN) for identification and detecting types of leaf diseases, validation of model through the result.

Dataset:

Image Acquisition

All the images were collected from day-to-day survey from the IoT-based system camera and sensor implemented on crop field and infected survey areas that we used for training hence to differentiate the leaves from the surrounding, then train the deep neural network.

The main objective of this study is to chance for the network by increasing appropriate features when using more augmented images. The main purpose of applying augmentation is to reduce overfitting during the training stage. In image augmenta- tion, numerous transformation techniques such as affine transformation, prospective transformation, rotation are used.

Image Preprocessing and labeling

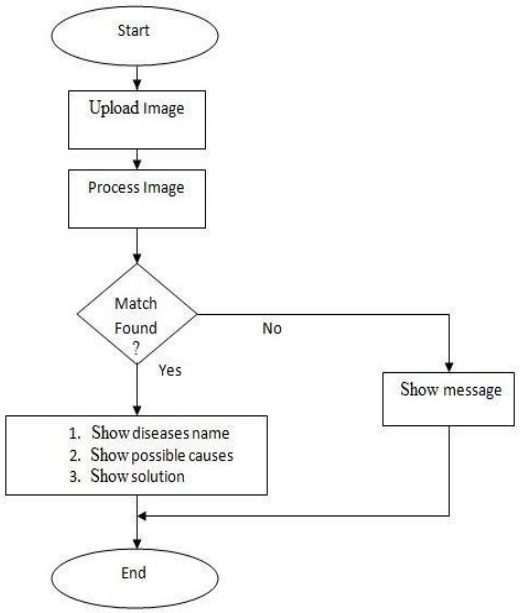
Images in the dataset may be in different formats, quality, and resolution, for better feature extraction. Hence, the images need to be preprocessed, less than 500 pixels will not be considered as valid images for the dataset. The rest will be resized to 256 × 256 in order to reduce the time for training.

Neural Network Training

In this step, to train the deep convolutional neural network (CNN) to make an image classification model, there are numerous deep learning frameworks like Python library Numpy ,matplotlib, keras ,tensarflow.Also, apart from this, there is an open-source deep learning framework containing opencv,flask. Also for the prediction of the model, we need to compute the F1 score for the test's accuracy. Classification model's performance and libraries such as OpenCV.. You will train the model for 10 iterations , you should see the accuracy to be around 98.0%.

The input test image is acquired and pre-processed and then it is converted into array form for comparison. The selected database is properly segregated and pre-processed and then renamed into proper folders. The model is appropriately trained by CNN and then organization takes place. The correlation of the test image and the trained model take place superseded by the display of the outcomes. If there is an imperfection or disease in

the plant the model displays the disease along with the remedy.

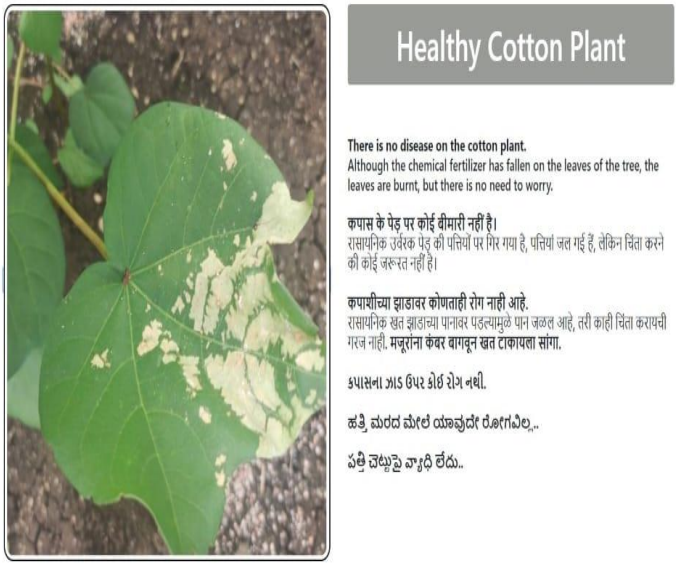


Concluding remarks and open problems

Nearly 60 million people in India are directly or indi- rectly connected to production of cotton crop out of which 20% to 30% is lost due to various diseases. Accurate disease detection with its corresponding stage can help to mitigate some of this production loss. This paper is a part of ongoing research for development of agro-advisory open architecture. It showcase Grey Mildew detection which is one of the prominent disease in the northern part of Gujarat state. The proposed work successfully detects this disease with its stage from unconstrained images CNN classifiers and multiple training sets. The algorithm can be used for generalized disease detection if proper set of training images are available. In future we plan to extend this work to multi-class detection of four to five most commonly occurring cotton plant diseases in the state of Gujarat. The challenge is that many disease share similar symptoms during initial stages so more robust features are required for their detection. One of the main issues plaguing the research in this direction is lack of available labeled data set in unconstrained conditions. However, current plan is to collect such data set for various disease stage from the cotton fields during next crop season.

Data Availability

The dataset is available in the public repository: Mendeley Data-Cotton Leaf Dataset.



Conclusions

This paper addresses how the disease analysis is possible for the cotton leaf diseases detection, the analysis of the various diseases present on the cotton leaves can be effectively detected in the early stage before it will damage the whole plant, initially we can be able to detect 3 diseases on the cotton leaves by the methodology of Eigen feature regularization and extraction technique.

The result obtained as shown in figure 8 and 9. Motivates us to detect more possible diseases on the leaf of cotton plant. The idea utilized here is having more success rate, than that of the other feature detection methods. Also from this method about 90% of detection of Red spot i.e. fungal disease is detected, it is most dangerous disease, it can highly affect the productivity of the cotton plant in more extent. And if it detects in early stage we can say that, we able to make better productivity.

Here the model presented can able to detect the disease more accurately, The Viderbha Region of Maharashtra state is main producer of cotton, where if this model is applied, we can say that, we can archive good productivity by preventing the various diseases present on the leaves of cotton plant.

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