International Journal of Research in Engineering, Science and Management
Volume-3, Issue-6, June-2020
www.ijresm.com | ISSN (Online): 2581-5792

Detection of Leaf Disease and Pesticides Recommendation Using CNN

Santhosh Reddy[1], Madhura G. Prasad[2], M. Mamatha[3], P. Sanhitha[4*], E. Shilpa[5]
[1]*Assistant Professor, Department of Computer Science and Engineering, Sai Vidya Institute of Technology, Bangalore, India*
[2,3,4,5]*Student, Dept. of Computer Science and Engineering, Sai Vidya Institute of Technology, Bangalore, India*
*Corresponding author: sanhithap.7@gmail.com

***Abstract*: India is facing many problems in agriculture. Crop production is one of the major problems in India, to enhance the production and detect the disease in the leaf we are using this technique. Leaf gives the information about quality and quantity of the agriculture yield based on the condition of the leaf. So, we decided to use leaf to solve many problems facing by the farmers. In our project we are proposing a system that works on pre-processing, leaf image's feature extraction. These leaf images are from plant village dataset. Then we use CNN for disease detection and also for pesticide recommendation. This is mainly done by tensor flow technology. So here we have used different layers of convolution neural network such as convolution, pooling layer and fully connected output layer. Our results give the high accuracy and effective using tensor flow. Recommendation of pesticides is an important updation compared to previous application.**

***Keywords*: Leaf Disease, Pesticides, CNN.**

1. Introduction

India is an agricultural country and depends on agriculture for around 70% of the total population. Farmers can select various crops for cultivation and also pesticides for them. Any disease to anything makes it weak. In the same way plant becomes weak when leaf has diseases and plant growth is also affected. Therefore, monitoring plants is an important role in cultivation of plants. In early days, this was performed manually by the person with expertise in this area. This requires a huge amount of effort and considerable processing time as well.

We propose image processing methods for detecting plant disease. Firstly, the Symptoms of the disease in the plants are observed on the leaves, stem and fruit. The disease can be detected by using the plant leaf. In our project we have implemented image processing technique for the identification of plant disease and to increase the yield in agriculture production. Plant disease identification is a key in preventing yield losses. Plant disease studies signify the study of patterns is seen on the plant visually. Health monitoring and identification of diseases on plants is very important for sustainable farming. Manual control of the plant diseases is very difficult. It requires huge amount of work and an expertise to detect the disease. This process also requires more processing time. Therefore, image processing technique is used for detection of plant disease.

2. Methodology

There are so many methodologies to perform the disease detection. The most effective till date was using Artificial Neural Network and K-means. We in this project mainly use Convolution Neural Network for the detection of the diseases. The pesticide recommendation is also a part of this project. Automatic system designing is not at all required. The very important tasks here are detecting or distinguishing the leaf as healthy leaf or unhealthy leaf. If it is an unhealthy leaf, then name of the disease should be displayed. The quick recommendation of pesticides is given then and there.

Most of the pesticides used by the farmers are hazardous to humans. However, farmers can keep track on the leaves daily. This helps preventing diseases at early stage and there is no need of spraying hazardous chemicals or pesticides. If some leaves are affected, then the pesticides recommended through this application can be used which are handy and not harmful.

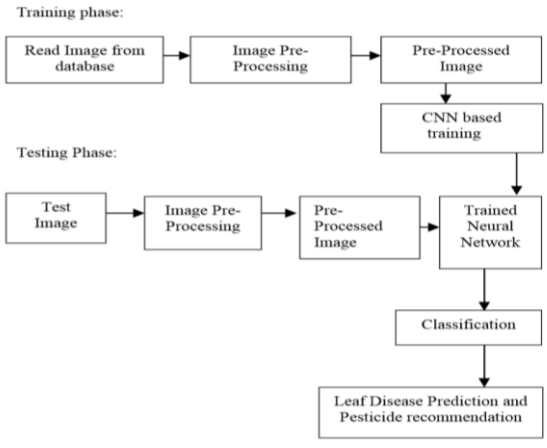

Fig. 1. System architecture

Detecting diseases and recommending pesticides are the tasks performed but the other important task is to perform these as fast as possible. Therefore, we are using 5 layered

Convolution Neural Network (CNN). There are some layers which we use to build CNN. They are

- Convolutional layer or CONV
- Activation layer or ACT or RELU
- Pooling layer or POOL
- Fully-connected layer or FC
- Batch normalization layer or BN
- Dropout layer or DO

The block diagram (Figure 1) shows the system architecture.

A. Image Acquisition

In training phase, the image is selected from the database. In testing phase, the image can be taken from the camera at real time, but in this application, a specific folder on laptop is present and from that image will be collected and sent to the algorithm to analyze that selected image.

B. Image Pre-Processing

Image pre-processing is a technique which is used to resize the selected image into given dimension. Here we resize the image into 200 x 200 dimensions. This is important because all the leaves in database should be of same size which makes detection easier. We use colored images so there will be no need for color conversion. After pre-processing, the processed image will be sent to the algorithm for testing purpose and training purpose.

C. Convolutional Neural Network

When pre-processing is completed, Convolution Neural Network is used for training intent. Then we get a trained model. Tensor flow helps in writing CNN. An image is obtained after pre-processing, that image is classified by this trained model. There are mainly two outcomes, one is healthy leaf and the other is unhealthy leaf. If it is a healthy leaf, the analysation is displayed. If it is an unhealthy leaf, then we get a respective name of the disease. Through this disease name the pesticides are recommended. This process helps farmers in an easy way to detect and prevent diseases. Therefore, the disease percentage also decreases.

D. Digital image processing

This image processing technique has many advantages than analogue image processing. Digital image processing helps boosting the image data (features) by suppressing some undesirable distortions.

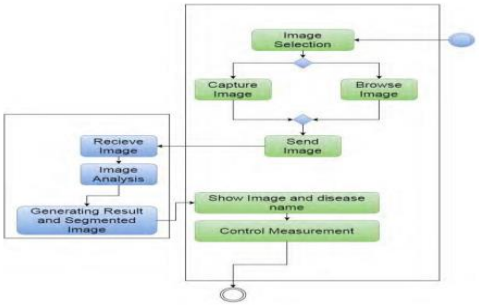

Fig. 2. Procedures of image processing

After the image is pre-processed the images should be stored in a folder. The process to store the image is shown below (Figure 3).

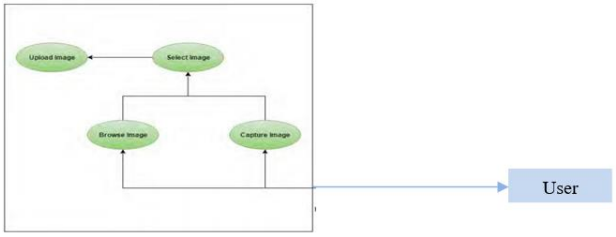

Fig. 3. Storing the images of healthy leaves

For any project testing is important to know how accurately the results are provided. Checking whether the disease provided is correct and the efficiency of the application for different images is also an important task. For each disease provided, the pesticides recommended should also be accurate enough. Therefore, the testing is done step-by-step.

- Unit Testing.
- Integration Testing.
- Validation Testing.
- User Acceptance Testing.
- Output Testing.

After all training and testing process, the application provides most accurate information about the diseases and also recommending the pesticides. The images are mainly taken from Plant Village dataset. Those images are already trained and placed in a folder as mentions earlier. Once the disease name is detected it is used as a key to search pesticide for it and displayed with 95% accuracy. Here are some of the diseases and their pesticides for prevention of these diseases.

Table 1
Diseases and their pesticides

Name of the disease	Name of the pesticide
Apple black rot	Neem oil
Potato early blight	Fontelis Endura
Tomato yellow leaf curl virus	Liquid nitrogen
Cherry powdery mildew	Organic compost

3. Conclusion

The proposed framework presumes that AI (ML) is a basic methodology for accomplishing reasonable and powerful arrangements. The leaf malady pictures are ordered utilizing convolution neural system. It separates a leaf into infected or non-sick leaf with most elevated level of exactness. The primary two procedures we use in framework is android application with Java Web Administrations and Profound Learning. Convolution Neural System is used with various layers 5, 4 and 3 to prepare the model and android application as a UI with JWS for collaboration with these frameworks.

According to the leaf ailment, the sickness pictures are grouped using Convolution Neural System. This system has 5-layer, 4-layer and 3-layer model. The results show that the CNN

model has all 3 layers prepared for 10, 15, 20 ages. As should be obvious from charts that the most elevated precision accomplished for 5-layer model with 95.05% for 15 ages and most elevated approval exactness accomplished is for 5-layer model 20 ages utilizing tensor stream. It additionally shows the near examination outline for generally speaking exactness. It additionally centers on the appropriate pesticides to be suggested.

References

[1] Pranali K. Kosamkar, V.Y.Kulkarni, Krushna Mantri, Shubham Rudrawar, Shubhan Salmpuria, Nishant Gadekar "Leaf disease detection and recommendation of pesticides", 2018 Fourth ICCUBEA 2018.

[2] Monzurul Islam, Anh Dinh, Khan Wahid, Pankaj Bhowmik "Detection of Potato Diseases Using Image Segmentation and Multiclass Support Vector Machine", IEEE 30th Canadian Conference on Electrical and Computer Engineering (CCECE), 2017.

[3] Dheeb Al Bashish, Malik Braik, and Sulieman Bani-Ahmad, "A framework for detection and classification of plant and stem diseases", International Conference on Signal and Image Processing, 2010.

[4] Aakansha Rastogi, Ritika Arora, Shanu Sharma "Leaf Disease Detection and guarding using computer vision Technology & fuzzy logic", IEEE-IC on Signal processing and Integrated network, 2015.

[5] Santanu Phadikar and Jaya Sil, "Rice Disease Identification using Pattern Recognition", Proceedings of 11th International Conference on Computer and Information Technology, 2008.

[6] Neethu K., P. Vijay ganesh, "Leaf Disease Detection and Selection of Pesticides using Artificial Neural Network", International Research Journal of Engineering and Technology (IRJET), 2017.