

CROP LEAF DISEASE DETECTION WITH FERTILIZER RECOMMENDATION USING CNN ALGORITHM

Mr. SATHEESHKUMAR MCA, M.Phil

AUGUSTIN FELIX A, SARANRAJ M, SEVAKAMANIKANDAN S

Department of Computer Science and Engineering

University College Of Engineering, Thirukkuvilai

(A constituent College Of Anna University::Chennai and Approved by AICTE, New Delhi)

ABSTRACT

Early Disease Detection and pests are vital for higher yield and high-satisfactory of crops. With Reduction in Quality of the rural Product, Disease Plant can result in the big Economic Losses to the Individual farmers. In USA like India whose primary Population is worried in Agriculture It could be very vital to discover the sickness at early stages. Faster and precise prediction of plant sickness ought to assist decreasing the losses. With the Significant development and trends in Deep studying have given the Opportunity to enhance the overall performance and accuracy of detection of item and popularity system.

This Paper, specializes in locating the plant illnesses and decreasing the financial losses. We have proposed the deep leaning primarily based totally technique for photograph popularity. We have tested the 3 predominant Architecture of the Neural Network: Faster Region-primarily based totally Convolution Neural Network (Faster R-CNN), Region-primarily based totally Fully CNN(R-CNN) and Single shot Multibook Detector (SSD). System proposed withinside the paper can detect the distinct forms of sickness correctly and feature the cap potential to deal with complicated scenarios. And also extend the approach to recommend the fertilizers based on severity analysis with measurements. Validation end result display the accuracy of 94.6% which depicts the feasibility of Convolution Neural Network and gift the direction for AI primarily based totally Deep Learning Solution to this Complex Problem.

Keywords: Classification, Features extraction, Fertilizer Recommendation, Neural network approach Plant disease prediction

INTRODUCTION

Today's higher technology have enabled humans to offer the ok nutrients and meals had to meet the wishes of the world's developing population. If we speak approximately India unequivocally, 70% of the Indian humans is directly or through idea associated with the cultivating territory, which stays the finest location with inside the country. If we explore the wider Picture According to Research Conducted through 2050 standard yield advent can increase through at any rate 1/2 of setting greater weight at the interior and out driven and cultivating Sector. The more a part of the Farmers is bad and haven't any inclination in improvement which might also additionally incite hardships greater crucial than 1/2 of due to pests and illnesses of plant. Vegetables and end result are not unusual place gadgets and the fundamental agricultural things. Powerful dependence on engineered insecticides achieves the excessive substance content material which creates withinside the earth, air, water, and shockingly in our bodies antagonistically affect the environment. At present, the traditional approach of visible inspection in human beings through visible inspection makes it not possible to symbolize plant diseases. Advances in laptop imaginative and prescient fashions provide fast, normalized, and correct solutions to those problems. Classifiers also can be despatched as attachments all through preparation [5].

All you want is a web affiliation and a camera-ready cell phone. The famous commercial enterprise applications "I Naturalist" and "Plant Snap" display how that is possible. Both apps excel at sharing abilities with clients in addition to constructing intuitive on-line social communities. In Recent Years, Deep Learning has brought about tremendous overall performance in diverse fields like Image Recognition, Speech Recognition, and Natural Language Processing. The use of the Convocational Neural Network withinside

the Problem of Plant Disease Detection has excellent results. Convolutional Neural Network is identified because the quality method for Object Recognition. We Consider the Neural Architecture specifically quicker Region-Based Convolutional Neural networks (Faster R-CNN), Region-primarily based totally Convolution Neural Networks(R-FCN), and single-shot Multi box detector (SSD).



some disease affected leafs

Each of the Neural Architecture must be capable of be merged with any characteristic extractor depending at the application. Pre-processing of information may be very vital to fashions for correct overall performance. Many infections (viral or fungal) may be tough to differentiate regularly sharing overlap of symptoms.

II. LITERATURE SURVEY

Liu, Bin, et al. "Identification of apple leaf illnesses primarily based totally on deep convolutional neural networks. In this paper, Liu proposes a brand new version of deep convolution networks for correct prediction and identity in apple leaves. Model Proposed withinside the Paper can mechanically understand the special person trades with a completely excessive degree of accuracy. A overall of 13,689 pics have been created with the assist of picture processing technology like PCA oscillation. Apart from this new AlexNet primarily based totally neural community turned into additionally proposed through enforcing the NAG Algorithm to optimize the community. In destiny paintings to expect the apple leaf sickness, different Models of Deep Learning like F-CNN, R-CNN, and SSD may be implemented. This article [2] shows a brand new manner to categorise depart the use of the

CNN version and builds fashions through adjusting community intensity the use of Google Net. We assessed the effectiveness of every version primarily based totally on discoloration or leaf damage. The popularity charge finished is extra than 94%, although 30% of the leaves are damaged. In destiny research, we are able to searching for to perceive leaves connected to branches to increase a visible device which can mimic the strategies people use to perceive plant species. This Paper [8] additionally describes diverse techniques for Extracting the character of inflamed leaves and classifying plants Disease. Here we're the use of a Convolution Neural Network (CNN), Which includes diverse degrees which might be used for forecasting. That The entire technique is defined primarily based totally at the pics used for schooling and pre-treatment trying out and Image enhancement after which a schooling technique for CNN deep and optimizers. Use those pics we can exactly decide the processing technique and differentiate among Special plant illnesses. The reason of this paper [10] is to check proof of foliar sickness thermal, digital, and hyperspectral imaging research with diverse type strategies. The segmentation technique is carried out to perceive the specified areas. The technique allows isolate the favoured vicinity from the background. Based on the brink Value, grayscale picture, colour picture segmentation technique special.

Used to extract functions in addition to diverse strategies which include grayscale the matrix is used for related values, histogram intensity, etc. To Classification of sickness duplicate from holidays, synthetic neurons Maintenance vector networks and machines are utilized in renovation the vector engine offers the maximum first-rate effects for every kind Picture. On paper [8], RGB pics are transformed to grayscale pics the use of colour conversion. Various enhancement strategies which include histogram alignment and comparison adjustment are used to enhance picture quality. Different sorts of type traits are used here, e.g. B. Classification in keeping with SVM, ANN, and FUZZY. When extracting functions, special sorts of feature values are used; B. Textures, structures, and geometric elements. The ANN and FUZZY classifications may be used to perceive illnesses in unpeeled plants.

III. PROPOSED METHOD

Plants are liable to numerous sickness-associated issues and seizures. There are numerous reasons which may be characterised via way of means of their impact on plants, disturbances because of environmental situations along with temperature, humidity, immoderate or inadequate food, mild and the maximum not unusual place sicknesses along with bacterial, viral and fungal sicknesses. In the proposed system, we use the CNN set of rules to locate sickness in plant leaves due to the fact with the assist of CNN the most accuracy may be completed if the records is good, And we recommend fertilizer to affected leaves.

A. Dataset

We use Plant Village Dataset. The Plant Village dataset includes 54303 healthful and bad leaf snap shots divided into 38 classes with the aid of using species and disease. We analysed greater than 50,000 snap shots of plant leaves with allotted labels from 38 instructions and we attempted to an expecting the magnificence of diseases. We resize the photograph to 256×256 pixels and carry out optimization and version predictions in this compressed photograph.



Apple Scab

Potato Healthy



Tomato Bacterial Spot

Corn Healthy

B. Data Processing and Augmentation

Image augmentation performs a key function in constructing a powerful picture classifier. Though datasets can also additionally contain everywhere from loads to multiple thousand education examples, the

range may nevertheless now no longer be sufficient to build a correct version. Some of the numerous picture augmentation alternatives are flipping the picture Vertically / horizontally, rotating via diverse angles and scaling the picture. These augmentations assist boom the applicable records in a dataset. The length of every picture withinside the Plant Village dataset is determined to be 256×256 pixels. The records processing and picture augmentation are accomplished the use of the Keras deep-studying framework. The augmentation alternatives used for education are as follows:

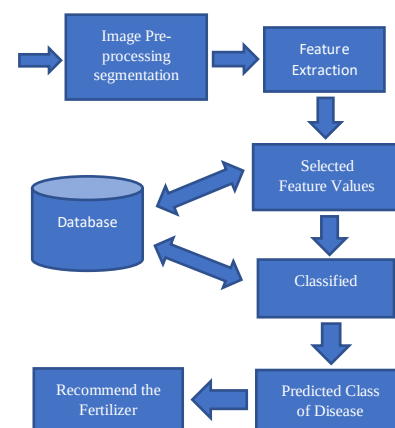
- Rotation - To rotate an education picture randomly over diverse angle.
- Brightness - Helps the version to evolve to version in lighting fixtures at the same time as feeding pixel of various brightness in the course of education .
- Shear - Adjust the shearing angle.

C. System Overview

Steps related to image processing to detect plant diseases

The complete system is split into 3 stages:

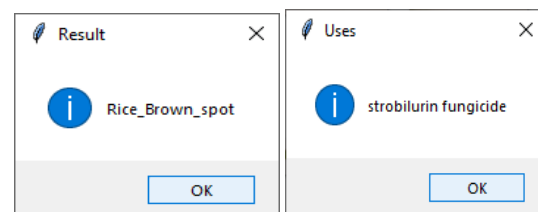
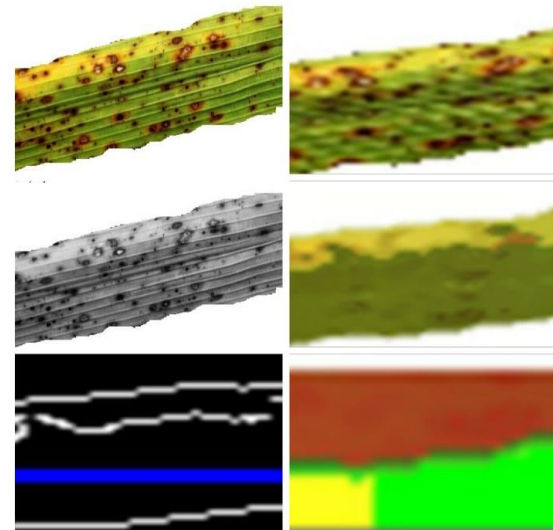
1. Input photos are first created with the aid of using an Android tool or uploaded to our internet software with the aid of using users.
2. Segmentation pre-processing consists of the system of photo segmentation, photo enhancement and sedation space conversion. First, the virtual photo of the photo is more suitable with a filter. Then convert every photo into an array. Using the medical call for Binarizes Diseases, every photo call is transformed to a binary field.



3. CNN classifiers are educated to perceive illnesses in every plant class. Level 2 effects are used to name up a classifier, that is educated to categorise diverse illnesses in that plant. If now no longer present, the leaves are labelled as "healthy".

IV. EXPERIMENTATION AND RESULT

We simplest decided on four hundred pics from every folder. Each picture is transformed into an array. In addition, we processed the enter report with the aid of using scaling the information factors from [0, 255] (picture minimal and maximum RGB values) to the vary [0, 1]. We then break up the dataset into 70% of the schooling pics and 30% for testing. Image generator items are created which carry out random rotations, movements, inversions, cultures and elements of our picture set. In the usual version we use a "remaining channel" architecture, however we additionally construct backend switches that support "first channel". Then we do Conv => Relu => Pool first. Our Conv layer has 36 filters with three x three middle and Relu activation (linear correction module). We practice batch normalization, most aggregation, and a 27% reduction (0.26). Dropout is a manipulate era used to lessen neural community readjustment with the aid of using stopping the correction of complicated collaborative records for schooling. This is a totally powerful approach for averaging neural community models. Then we create sets (Conv => Relu) * 2 => Pool blocks. Then only a collection of absolutely linked layers (absolutely linked layers) => Relu. We use Adam's Hard Optimizer for our version. Our community begins off evolved wherein we name version. Fit_generator. Our goal is to feature records, train - check records and the no.of epochs we need to train. For this challenge we used a fee for epochs of 26.



V. CONCLUSION

Protecting vegetation in natural farming isn't a smooth task. This relies upon on an intensive understanding of the crop being grown and viable pests, pathogens and weeds. In our device, a unique deep studying version has been developed primarily based totally on a unique architectural convolution community to discover plant illnesses via snap shots of wholesome or diseased plant leaves. The device defined above may be upgraded to a real-time video access device that lets in unattended plant care. Another issue that may be introduced to sure structures is a clever device that remedies identified ailments. Studies display that handling plant illnesses can assist boom yields through approximately 50%.

VI. REFERENCES

1. Liu, Bin, "Identification of apple leaf diseases based on deep convolutional neural networks"
2. Jeon, Wang-Su, and Sang-Yong Rhee. "Plant leaf recognition using a convolution neural network."

International Journal of Fuzzy Logic and Intelligent Systems 17.1 (2017): 26-34.

3. Amara, Jihen, Bassem Bouaziz, and Alsayed Algergawy. "A Deep Learning-based Approach for Banana Leaf Diseases Classification." BTW (Workshops). 2017.

4. Lee, Sue Han, et al. "How deep learning extracts and learns leaf features for plant classification." Pattern Recognition 71 (2017): 1-13.

5. Sladojevic, Srdjan, et al. "Deep neural networks-based recognition of plant diseases by leaf image classification." Computational intelligence and neuroscience 2016 (2016).

6. Lee, Sue Han, et al. "Plant Identification System based on a Convolutional Neural Network for the LifeClef 2016 Plant Classification Task." CLEF (Working Notes). 2016. 7. He, Kaiming, et al. "Deep residual learning for image recognition." Proceedings of the IEEE conference.

8. K.Padmavathi, and K.Thangadurai, "Implementation of RGB and Gray scale images in plant leaves disease detection – comparative study,"

9. Kiran R. Gavhale, and U. Gawande, "An Overview of the Research on Plant Leaves International Journal of Pure and Applied Mathematics Special Issue 882 Disease detection using Image Processing Techniques," IOSR J. of Compu. Eng.

10. Y. Q. Xia, Y. Li, and C. Li, "Intelligent Diagnose System of Wheat Diseases Based on Android Phone," J. of Infor. & Compu. Sci., vol. 12, pp. 6845-6852, Dec. 2015.

11. Wenjiang Huang, Qingsong Guan, JuhuaLuo, Jingcheng Zhang, Jinling Zhao, Dong Liang, Linsheng Huanand Dongyan Zhang, "New Optimized Spectral Indices for Identifying and Monitoring Winter Wheat Diseases", IEEE journal of selected topics in applied earth observation and remote sensing, Vol. 7, No. 6, June 2014

12. Monica Jhuria, Ashwani Kumar, and RushikeshBorse, "Image Processing For Smart Farming: Detection Of Disease And Fruit Grading", Proceedings of the 2013.

13. Zulkifli Bin Husin, Abdul Hallis Bin Abdul Aziz, Ali Yeon Bin MdShakaffRohaniBinti S Mohamed Farook, "Feasibility Study on Plant Chili Disease Detection Using Image Processing Techniques", 2012.

14. Mrunalini R. Badnakhe, Prashant R. Deshmukh, "Infected Leaf Analysis and Comparison by Otsu Threshold and k-Means Clustering",