International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

DETECTION AND CLASSIFICATION OF TANGERINE DISEASES USING IMAGE PROCESSING

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ABSTRACT: -

Early diagnosis of tangerine diseases is crucial because of the potential impact on the agriculture sector. In this work, we focus on using image processing to detect and analyse tangerine illnesses that are present in plant regions, as well as to save data about agriculture fields and characteristics in a database, from which it can be retrieved. Environment factors, minerals levels, insect populations, and other external influences all contribute to an increase in fruit illnesses. In plants, most of the leaves and tangerine are affected by diseases due to bacteria and virus. This technique is used to determine the infection on tangerine of the plants. In order to generate an automated database to examine the infections using proposed method. The database consists of data related to tangerine condition and the symptoms of diseases to be affected. Image processing and machine learning K-means and SVM algorithms are used to identify and catalogue the information gathered in the plant area.

Keywords: image processing, tangerine diseases, k-means algorithm, SVM, database

I. INTRODUCTION

Every civilization has relied on agriculture as its foundation. It is crucial to remember that more than 60% of India's population relies on agriculture for their survival. The spread of illnesses is a common factor in the decline in modern agriculture's ability to produce crops, tangerines, and vegetables. The disease has become a serious issue in a farming community. Diseases caused by bacteria and viruses harm many plant parts, including the leaves and tangerines. The goal of this method is to establish the plant illness that spreads to the leaves, tangerines, and stems. Create an automated database to study infections with the proposed method. The database contains information about plant leaves, tangerine conditions, and disease signs. Information on the specifics and identification of the tangerine symptoms of the disease detected using feature extraction. The image is compared to every single one in the database. The cell phone an application is created to handle the data and notify the farmers. so the difference in image quality between database images is an indication of tangerine illnes

II. LITERATURE REVIEW

[1]Asha R.PatilVarshaI.Patil, B.S.Panchbhai, "Detection of Plant Diseases Using Image Processing Tools". Asha R. PatilVarshaI.Patil. Int. Journal of Engineering Research and Application ISSN: 2248-9622, Vol. 7, Issue 4, (Part- 2) April 2017, pp.44-45. Analysis of plants disease is main goal for increase productivity of grain, fruits, vegetable. Detection of proper disease of plants using image processing is possible by different steps of it. Like image Acquisition, image enhancement, segmentation, feature extraction, and classification. RGB image is acquire and translate for processing and diagnosis of plant disease by CR Network. Segmentation is used for which and how many areas are affected by disease using k-clustering.

Future extraction by HOG algorithm, SOFM Classification is used for healthy and unhealthy plants.

[2]Pratik Agarwal, "AGROCLOUD-Open surveillance of Indian Agriculture via cloud"2016.International Conference on Information Technology(InCITe)- The Next Generation IT Summit. The Indian agriculture desperately is lagging behind in per hectare yield in almost all crops in comparison to other countries with respect to the population that is needed to be fed. The use of technology in agriculture may help in increasing the productivity and may improve the condition of Indian farmers and protection of their product. The major problem of Indian agriculture is of providing information to the farmers and storing the crop related information at some place for analyzing later. The present paper illustrates a scheme of keeping records on the progress of agriculture, its production and farmers in India, via Cloud, exclusively employed for the welfare of the farmer society and the agricultural practices, GDP, and the cloud being open to general public as well, for studies, and process transparency. The Indian agriculture desperately is lagging behind in per hectare yield in almost all rops in comparison to other countries with respect to the population that is needed to be fed. The use of technology in agriculture may help in increasing the productivity and may improve the condition of Indian farmers and protection of their product. The major problem of Indian agriculture is of providing information to the farmers and storing the crop related information at some place for analyzing later. The present paper illustrates a scheme of keeping records on the progress of agriculture, its production and farmers in India, via Cloud, exclusively employed for the welfare of the farmer society and the agricultural practices, GDP, and the cloud being open to general public as well, for studies, and process transparency.

[3]Athmaja S1, Hanumanthappa M2, "Applications of Mobile Cloud Computing and Big Data Analytics in Agriculture Sector- A Survey". International Journal of Advanced Research in Computer and Communication Engineering ICRITCS M S Ramaiah Institute of Technology, Bangalore Vol. 5, Special Issue 2, October 2016. The objective of this literature survey was to identify the applications of Mobile Cloud Computing and Big Data Analytics techniques in the agriculture sector. Related literature from IEEE journals and other international journals were collected and reviewed. A conclusion is made by proposing a new model that uses mobile cloud computing and big data analytics techniques together to meet several challenges that the farmers are facing today in the agriculture sector. The proposed model helps farmers in making optimal decisions on their agricultural production and thereby reducing the post-harvest wastage of their products.

[4] Wang-Su Jeon1 and Sang-Yong Rhee,"Plant Leaf Recognition Using a Convolution Neural Network" International Journal of Fuzzy Logic and Intelligent Systems Vol. 17, No. 1, March 2017, pp. 26-34

There are hundreds of kinds of trees in the natural ecosystem, and it can be very difficult to distinguish between them. Botanists and those who study plants however, are able to identify the type of tree at a glance by using the characteristics of the leaf. Machine learning is used to automatically classify leaf types. Studied extensively in 2012, this is a rapidly growing field based on deep learning. Deep learning is itself a self-learning technique used on large amounts of data, and recent developments in hardware and big data have made this technique more practical. We propose a method to classify leaves using the CNN model, which is often used when applying deep learning to image processing.

[5] Li Tan1,2†,Hongfei Hou1,Qin Zhang2."An Extensible Software Platform for Cloud-based Decision Support and Automation in Precision Agriculture". 2016 IEEE 17th International Conference on Information Reuse and Integration. Precision agriculture is a data-driven farming practice that uses intra-and inter- field information to optimize farming operations. The "brain" of precision agriculture is a decision support system (DSS) that acquires data from various sources, analyzes them, and recommends actions to farmers. Recently cloud computing has been used to improve the scalability and reliability of a DSS. Cloud- based DSSs present some major challenges for software design:(1) how can a cloud- based DSS process a diversified profile of intra-and/or inter-field data from various sources? (2) how can a loud-based DSS accommodate and support the diversity of farming operations? (3) how can a cloud- based DSS automate the entire decision process and control field devices directly? we proposed an extensible cloud-based software platform that integrated 3 novel components to address these questions: (1) a meta-model-based data acquisition and integration module that accepts data in different formats and semantics, (2) an adaptive software architecture supporting on-the-fly re- configuration of decision modules, and (3) software-defined control, a new software design paradigm we proposed for handling control diversity. It enables a DSS to control various field devices through unified software-defined interfaces. We implemented the platform in Agrilaxy, a cloud-based DSS, and deployed it on Amazon Web Services (AWS). An early version of Agrilaxy has been used in a USDA-sponsored project on canopy management for specialty crops.

III. OBJECTIVE

The objective of detecting and classifying tangerine diseases using image processing is to provide farmers with a reliable and efficient tool for early detection and management of diseases in tangerine crops. By analyzing images of tangerine leaves or fruits, image processing techniques can identify symptoms of diseases such as citrus canker, greening disease, or citrus black spot. This helps farmers take timely action, such as targeted treatment or removal of infected plants, to prevent the spread of diseases and minimize crop losses. Additionally, classification of diseases enables farmers to differentiate between various types of diseases, allowing for more precise and effective management strategies. Overall, the goal is to improve tangerine crop health, yield, and sustainability through the application of image processing technology

IV. SCOPE

Image Acquisition**:** Gathering high-quality images of tangerine leaves or fruits, either through manual photography or automated imaging systems such as drones or sensors.

Preprocessing: Cleaning and enhancing images to improve the accuracy of disease detection algorithms. This may involve tasks like noise reduction, color normalization, and image segmentation. Feature Extraction: Identifying relevant features or patterns in the images that are indicative of different diseases. This could include texture analysis, shape recognition, or color-based features.

Disease Detection: Implementing algorithms to detect the presence of diseases in tangerine crops based on the extracted features. This involves developing classifiers or deep learning models trained on annotated image datasets.

Classification: Once diseases are detected, categorizing them into specific types or classes (e.g., citrus canker, greening disease) using machine learning or pattern recognition techniques.

Decision Support System: Integrating the detection and classification algorithms into a user-friendly interface or system that provides actionable insights to farmers. This could include recommending treatment options, indicating areas of high disease prevalence, or predicting disease outbreaks.

Validation and Performance Evaluation: Assessing the accuracy, sensitivity, and specificity of the detection and classification system using validation datasets and performance metrics. Deployment and Integration: Deploying the developed system in real-world agricultural settings, potentially integrating it with existing farm management systems or decision support tools.

V. MOBILENET

With its lightweight convolutional neural network architecture, Mobile-Net is ideal for resource-constrained contexts such as mobile devices or edge devices. It is specifically built for mobile and embedded vision applications. You can develop a model that can accurately identify and classify various diseases by training Mobile-Net on a dataset of photos that include both healthy and diseased tangerines. This could help farmers identify and treat illnesses early on, increasing crop quality and productivity. It is a potential application to use Mobile-Net for image processing-based tangerine illness diagnosis and classification. Real-time inference on mobile platforms can benefit from the use of Mobile-Net, a lightweight deep learning model designed for embedded and mobile platforms. You may create a model that can precisely recognize and categorize different tangerine diseases from new photographs by training Mobile- Net on a dataset of images representing those diseases. In order to improve crop output and quality, farmers and agricultural specialists may find this especially helpful in promptly identifying and resolving possible problems with tangerine crops.

An input photograph of a diseased tangerine fruit or tree leaf is used to start the process.

Preprocessing: To improve features and lower noise, the input image is preprocessed. Regular preprocessing procedures encompass data augmentation, normalization, and scaling.

MobileNet Model: Classification and feature extraction are done using the MobileNet model. Convolutional neural network (CNN) architecture known as MobileNet is designed with portable and embedded devices in mind. It is composed of depthwise separable convolutions that preserve performance at a lower computational cost.

Feature extraction: To extract pertinent features, the input image is run through the MobileNet model. These qualities and patterns are symptomatic of many terminal illnesses.

identification: Regions of interest (ROI) in the picture that might include sick areas can be found using object identification techniques like sliding windows or region approaches.

Classification: Using a classification model trained on labeled data, the extracted features, or ROIs, are categorized into various illness categories. Depending on how complicated the categorization problem is, this model may be built using deep learning techniques or conventional machine learning algorithms.

Output: The system's final output lists the places where tangerine diseases have been identified along with the categories that correspond to them. This information is crucial for farmers and agricultural specialists to make informed decisions about how best to proceed.

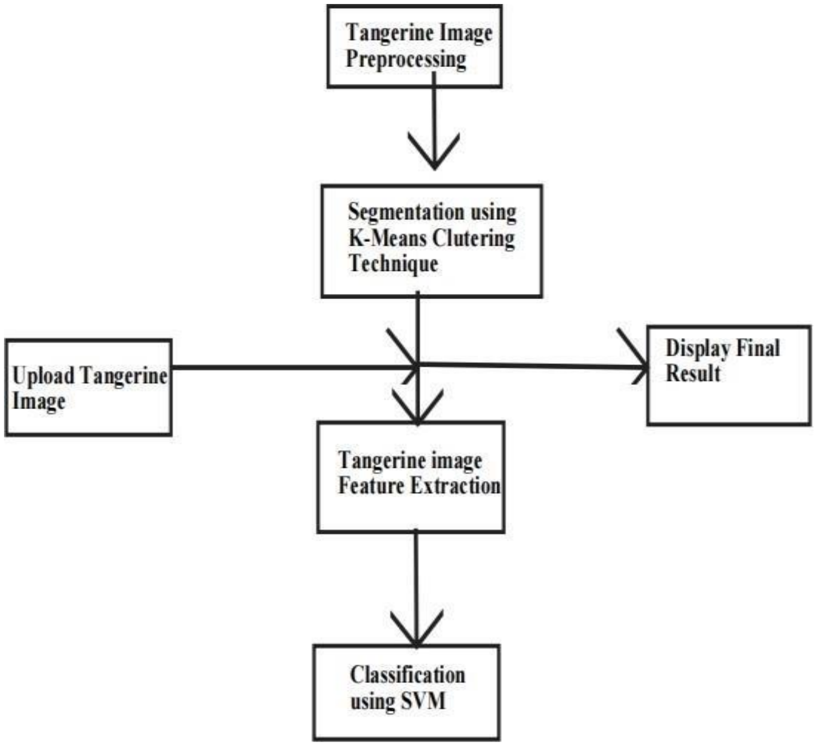


Fig-5.1 Flow Chart of process of MobileNet Algorithm

A pre-trained convolutional neural network called MobileNet may be trained to reliably recognize photos of tangerine illness using a dataset. The architecture of MobileNet is effective for embedded and mobile applications, which makes it appropriate for deployment on low-resource devices. This could help with early disease diagnosis and possibly lead to better crop management techniques for tangerines.

The process of optimizing a problem by genetic algorithms is a step-by-step scenario like as:
Step1: Load the input dataset.

Step2: Perform pre-processing on input data.
Step3: The input dataset is split into training and testing data.
Step4: Analysing the best objective function value.
Step5: Classify the data which is obtained from step4.
Step6: Following Step 3, 4, 5 for better solution.

VI. ATTRIBUTES

The attribute are the input variables initialized and trained in the MobileNet algorithms in the Convolutional neural network enhancement.

No	**Attribute**	**Description**
1	**Image height**	**Image height in numbers**
2	**Image width**	**Image width in numbers**

3	**Batch scale**	**Batch scale in numbers**
4	**Validation**	**Validation in decimal**
5	**Rescale**	**Rescale in decimal**

Table-6.1 Attributes

VII. ALEXNET

The deep convolutional neural network architecture known as AlexNet was created by Geoffrey Hinton, Ilya Sutskever, and Alex Krizhevsky. After emerging victorious in the 2012 ImageNet Large Scale Visual Recognition Challenge, it earned notoriety. It can be modified for object detection even if its main application is image categorization.

You may modify AlexNet by honing it on a dataset of tangerine photos annotated with various ailments in order to use it for the image processing-based detection and classification of tangerine diseases. After that, you might retrain the network to perform your particular task using methods like transfer learning. In order to locate and categorize the diseases in the photos, you might also need to use object identification algorithms like YOLO (You Only Look Once) or Faster R-CNN.

VIII. RESNET

An interesting use of technology is the use of ResNet for image processing-based infectious disease identification and categorization. ResNet, an acronym for Residual Neural Network, is a deep learning architecture that has demonstrated remarkable efficacy in tasks related to image recognition. Researchers are able to create models that reliably identify several tangerine-related disorders from photos by utilizing the ResNet architecture. This method can assist farmers in identifying and managing diseases early on, which will ultimately increase crop quality and output. It's a promising application of technology to enhance food production and agriculture.

IX. RESULTS AND DISCUSSION

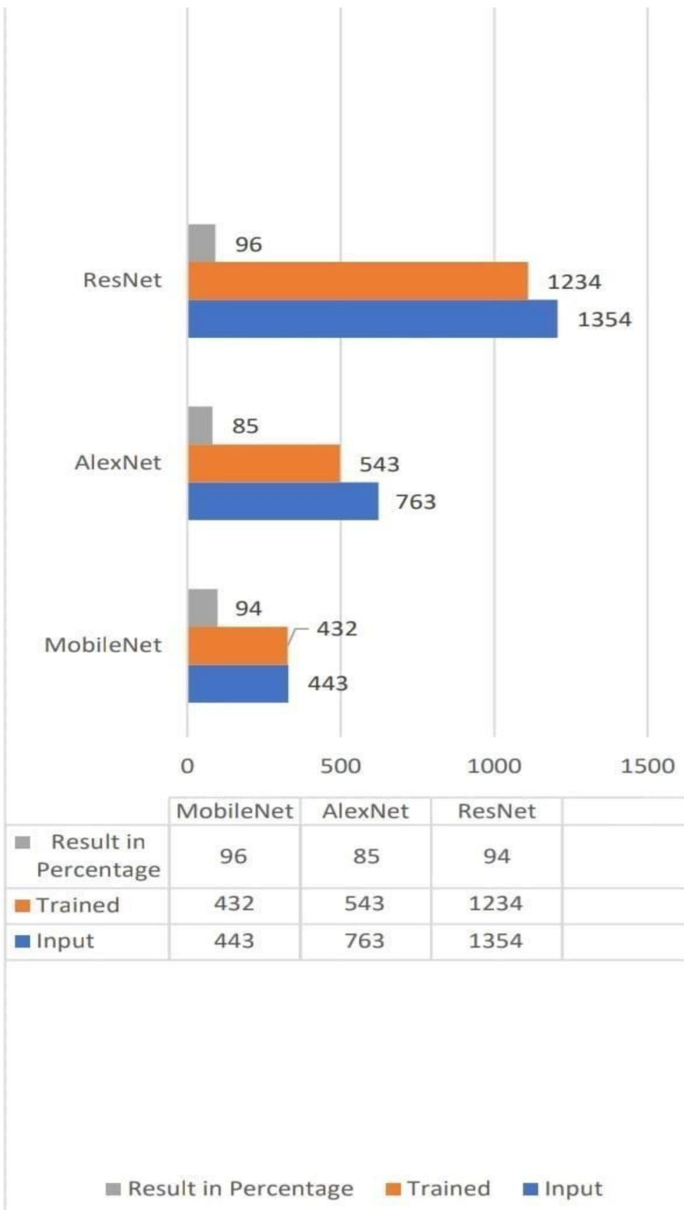
By using concepts of Convolutional Neural
Network algorithms (MOBILENET, ALEXNET, RESNET) the training phase of Convolutional neural networks is giving the best optimistic solution. By giving training to the attributes as Convolutional neural networks and incorporating the testing data analysis comparison among MOBILENET, ALEXNET, RESNET algorithms the tested results among MOBILENET, ALEXNET, RESNET are as:

Table-9.1 Result Analysis and Comparison of Convolutional Neural Network Algorithms

Parameters	**MobileNet**	**Alexnet**	**Resnet**
No of records (Taken)	**2564459**	**52,355,890**	**22176090**
No. of Records Tested	**4273839**	**52,486,098**	**34064550**
No. of input attributes	**2**	**2**	**2**

No. of Output attributes	**1**	**1**	**1**
Trained & Compiled data	**2252634**	**72,373,068**	**24066570**
Percentage of Optimization	**96**	**85**	**94**

Fig-9.2 Graphical Representation of Algorithms



X. CONCLUSION

To better evaluate agriculture data, eliminate hoardings, and foster the growth of a successful, secure, and peaceful farmer society in India, a cloud-based plan was developed to aid Indian farmers and agriculture. K-Means Algorithm and the SVM method were used for the picture classification and segmentation of tangerine. First, the various attributes of a small sample of tangerines were retrieved and used to segment their corresponding photos. Disease names are compared with feature values to determine which is most appropriate for a given image; once this is done, the disease is flagged in an alert box and can be sent as a message via a mobile app. An alert box displays the total number of samples, the percentage of correct predictions, the percentage of negative predictions that were correct, the accuracy, and the specificity

XI. REFERENCES

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4. Wang-Su jeonl and Sang-Yong Rhee, "Plant leaf Recognition using a Convolution Neural Network "International Journal of Fuzzy Logic and Intelligent System Vol 17, N0 .1, March 2017, pp.26-34
5. Li Tan1,2†, Hongfei Hou1, Qin Zhang2"An Extensible Software Platform for Cloud based Decision Support and Automation in Precision Agriculture".2016 IEEE 17th International Conference on Information Reuse and Integration. P. Deepan "Detection and Classification of Plant Leaf Diseases by using Deep Learning Algorithm "International Journal of Engineering Research and Technology (IJERT) ISSN:2278-0181 Published by, www.ijert.org.ICONNECT-2018