International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 10 Issue: 03 | Mar 2023 www.irjet.net p-ISSN: 2395-0072

Fruit Disease Detection And Fertilizer Recommendation

Prof. Sayed Rehan[1], Harshal Panse[2], Md. Uzman Quraishi[3], Gunesh Mohane[4], Vidhi Jaiswal[5], Haider Ali Qureshi[6], Anchal Daharwal[7]

[1]Professor, Computer Science and Engineering, A.C.E.T. Nagpur, Maharashtra, India
[2]BE Student, Computer Science and Engineering, A.C.E.T. Nagpur, Maharashtra, India

---

Abstract - *Fruit diseases cause great damage to the production, economy, quality and quantity of agricultural products. As 60% of India's economy relies on crop production, losses due to fruit diseases need to be controlled. Fruits need to be controlled from the very beginning of their life cycle to prevent these diseases. The traditional method used for this observation is visual observation, which requires more time, money and a lot of experience. Therefore, it is necessary to automate disease detection systems to accelerate this process. Fruit Disease detection systems must be designed using image processing techniques. Many researchers have developed systems based on various image processing techniques. This brief review examines the potential of fruit disease detection system methods to contribute to agricultural advancement.*

Key Words: Convolution Neural Network, Pre-processing, Data Augmentation, Fruit disease detection,

1. INTRODUCTION

Agriculture is an important source of economic development in India. About 70% of India's economy is dependent on agriculture. As a result, crop damage will lead to huge productivity losses and ultimately affect the economy. The leaves, the most sensitive part of the plant, show the first signs of disease. Crops must be monitored for disease from the first stage of their life cycle until they are ready for harvest. Initially, the method used to monitor plants for disease was traditional visual observation, a labor-intensive technique that required experts to manually observe crops. Several methods have been applied to develop automated and semi-automated plant disease detection systems in recent years. These systems have so far proven to be faster, cheaper and more accurate than traditional methods of manual observation by farmers. Therefore, this will encourage researchers to implement more intelligent technological systems to detect plant diseases that do not require human intervention. Fruit Disease detection systems must be designed using image processing techniques. Many researchers have developed systems based on various image processing techniques. This brief review examines the potential of fruit disease detection system methods to contribute to agricultural advancement.

CNNs could have their own applications in agriculture, including disease identification and quantification of affected regions. As a rule, the disease is detected by specialists with the naked eye. This method requires an enormous amount of time on a vast farm or land. Using convolutional neural networks for early recognition and detection of plant diseases will be effective in improving product quality. To develop such a precise image classifier aimed at diagnosis of diseases of Fruit, we need a large, processed and verified dataset containing various diseased and healthy fruit images.

1.1 Literature Review

In the paper — Detection of Plant Diseases the authors Prof. A. R. Bhagat Patil[1] , This paper proposes a CNN-based method for classifying plant diseases using leaves of diseased plants. Building these neural networks with high efficiency is a challenging task. Transfer learning can be used to increase efficiency. Inception v3 is essentially one of the available models that can classify images and can be further trained to identify other classes. Therefore, the use of Inception v3 can play a key role in obtaining fast and efficient plant disease identifiers. Classifying the data set using the contour method also allows the training set to be selected so that the model is adequately trained on all features. This provides better feature extraction than random classification of the data set. Optimal results were obtained using the method shown in the article. Therefore, the introduction and use of these plant disease classification methods can reduce agricultural losses.

In the paper — Plant Leaf Diseases Detection Using Image Processing Techniques the authors K.Narsimha Reddy, B.Polaiah, All diseases cannot be detected in one way. After studying the classification method above, we came to the following conclusion. The k-nearest neighbor method is probably the simplest of all test case class prediction algorithms. An obvious drawback of k-NN methods is the time complexity of prediction. Also, neural networks accept noisy inputs. However, it is difficult to understand the structure of the algorithm in neural networks. SVMs have proven to be competitive with the best machine learning algorithms available in classifying high-dimensional datasets.

In the paper — Plant Disease Detection using CNN the authors Kushal M U , Mrs. Nikitha S , Artificial intelligence algorithms for automatic diagnosis of these diseases. The input layer, convolutional layer, main encapsulation layer

and digitcap layer are used to justify the encapsulation network model. We create architectural variants of CNNs (CNN learned from scratch, MobileNet, VGG16 and ResNet50) for comparison with capsule network models. This study is limited to 10 types of tomato leaf diseases, and future work will include developing robust network capsule models capable of handling diseases in various plant species.

In the paper — Agriculture Plant Disease Detection by using Image Processing the authors Priyanka L. Kamble , Anjali C. Pise, An image processing-based approach useful for plant disease detection is proposed. This article describes various imaging techniques for different plant species that have been used to detect plant diseases. It uses four methods: image acquisition, image preprocessing, image segmentation, and image feature extraction.

In the paper — Detection and Classification of Plant Diseasesthe authors Mr. N.S. Bharti, Prof. R.M. Mulajkar, Therefore, the application of K-means clustering using neural networks (NNs) was implemented to cluster and classify diseases affecting plant leaves. Recognition of leaf diseases or leaf diseases is the main goal of the proposed approach. Therefore, the proposed algorithm was tested against five diseases affecting plants. They are ash mold, cotton mold, early burn, late burn, and micro whiteness. Experimental results show that the proposed approach is an accurate one that can support accurate foliar disease detection with low computational cost.

In the paper — Plant Disease Detection Techniques the authors Gurleen Kaur Sandhu, Dr. Rajbir Kaur, This article reviews and summarizes various image processing methods for detecting plant diseases that have been used by many researchers over the past few years. The main methods used are BPNN, SVM, K-means clustering, Otsu algorithm, CCM and SGDM. This method is used to determine whether a leaf is healthy or diseased. Various challenges arise from this process, including automating the detection system using complex images. 4 0,6 0,8 1 1,2 1,4 1.6 1.8 2 SVM classifier Naive Bayes time (seconds) -> Running time Running time obtained under outdoor lighting and intense environmental conditions. This review article concludes that these disease detection methods, in addition to some limitations, demonstrate the efficiency and accuracy with which systems designed for foliar disease detection can be implemented. So much can still be done in this area to improve existing work.

2. PROPOSED SYSTEM

In the proposed system we use the CNN algorithm for the fruit disease detection because by using the CNN we can achieve the maximum accuracy if the dataset is good. In this proposed system we capture the image by using the camera module and then process it and get the prediction whether fruit is diseased or not and the name of the disease. Here dataset is taken and the data is preprocessed before training and then the data is trained. Here the images of the diseased fruit are in separate folder because we can easily train the model and predict the model if it is in this type and the trained data is separated into two ways: one for validation and another for verification that is into training and testing data that to in the 80:20 ratio. After the data is trained a model is generated and then we use the camera to capture the picture of the image and then we use the CNN algorithm and the given trained model for the prediction of disease.

2.1 Module 1 : Front End

In this module the user either registers or logs in. After logging in, the user opens the interface. In this interface you can get information about the Fruit buddy website. This user has 3 options:

1. Take a photo
2. Disease information
3. Fertilizers & pesticides

2.2 Module 2 : Collection of Data

In this module, developers collect data about different fruits and then combine the data to create a new data set.

2.3 Module 3 : Image Preprocessing

The aim of pre-processing is an improvement of the image data that suppresses unwilling distortions or enhances some image features important for further processing. Resize and rescaling the images.

2.4 Module 4 : Model Building (CNN)

Convolutional Neural Networks **(**CNNs or convnets**)** are a subset of machine learning. It is one of many types of artificial neural networks used for different applications and data types. A CNN is a type of network architecture for deep learning algorithms specifically used for image recognition and pixel data processing tasks.

2.5 Module 5 : TF(TensorFlow) Serving

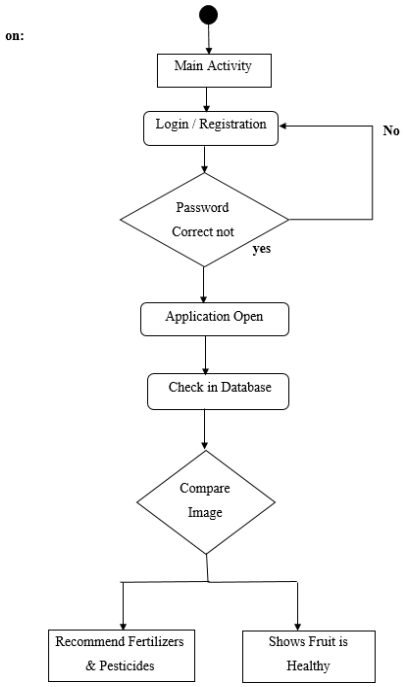
"TensorFlow Serving is a flexible, high-performance machine learning model serving system designed for production environments. TensorFlow Serving makes it easy to deploy new algorithms and experiments while maintaining the same server architecture and API.

2.6 Module 6 : Image Data Generation for Testing

In this module, users can take pictures using gallery or camera access to identify diseases and recommend fertilizers and pesticides. Then split the image into different kernels and create vectors containing the kernels. Compare the built-

in vectors to the trained built-in vectors to get the result. Developer-created datasets are divided into classes based on disease names. This data is trained on Jupiter Note Book using the Python language. Data set developers use a variety of Python libraries for training. Use 80% of the data for training, 10% for validation, and 10% for testing.

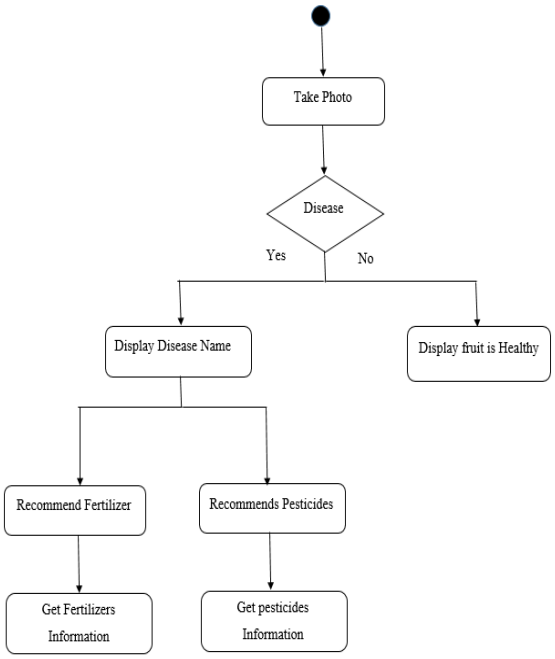
2.7 Developer Side Action:



1) Users log in to the website by first opening the website and then creating an account.
2) The developer then checks the user ID and password of the user in the database.
3) If the password is incorrect, the user is redirected to the login page.
4) If the password is correct user redirect to an interface.
5) After opening an interface user getting a 3 option that is –
   a) Take a photo
   b) Disease information
   c) Fertilizer & pesticides.
6) If user want to detect fruit disease, he will take picture from gallery and mobile camera.
7) The developer checks the data and compares this image to the trained image to show the results.
8) If the fetus is not infected with any disease, the developer shows that the fetus is healthy.

When a fruit is infected with a disease, the developer provides the disease name, fertilizer, and pesticide.

2.7 User Side Action:



After login, user take a picture from gallery or camera to detect disease. After some time the user will receive the disease name and fertilizer. If the user wants to get more information about diseases, fertilizers and pesticides, there is an option in the interface to check information about fertilizers and pesticides.

3. CONCLUSION

We conclude that using fruit disease detection methods and fertilizer recommendations, we can provide fertilizers and pesticides for detecting specific fruit diseases. In this project, we use CNN, image preprocessing and TF service to display accurate results. In the future we will add more fruits and crates for users' suggestions/reviews. If implemented correctly, this future enhancement could scale to the success of this project.

REFERENCES

[1] Prof. A.R. Bhagat “Detection of Plant Diseases the authors” Volume 7, Issue 07, 2020

[2] K.Narsimha Reddy , B.Polaiah "Plant Leaf Diseases Detection Using Image Processing Techniques" Volume 12, Issue 3, Ver. II (May - June 2017)

[3] Kushal M U , Mrs. Nikitha S "Plant Disease Detection using CNN" Volume 10 Issue V May 2022

[4] Priyanka L.Kamble, Anjali C. Pise "Agriculture Plant Disease Detection by using Image Processing" vol 7 issue 1 May 2016

[5] Mr. N.S. Bharti, Prof. R.M. Mulajkar "Detection and Classification of Plant Diseases" Volume 02 Issue 02 May-2015

[6] Gurleen Kaur Sandhu, Dr. Rajbir Kaur "Plant Disease Detection Techniques"