DETECTION AND CLASSIFICATION DISEASE OF CITRUS FRUIT

GUIDED BY: [5]PROF.KUNAL R AHIRE

[1]PRATIK GOSAVI, [2]GANESH JADHAV, [3]MANALI PATIL, [4]JAGRUTI DAHIVADKAR

MET`S INSTITUTE OF ENGINEERING

***Abstract*: Citrus plants such as lemon are mainly affected by citrus canker disease which affects the fruit production of the plants. Early canker disease distinguishing proof is one of the troublesome answers for expanding the plant generation. Previous methods intend to recognize and order the infection malady precisely from the influenced leaf pictures by embracing picture handling methods to distinguish plant leaf sicknesses from computerized pictures. In proposed project, an image recognition method of citrus diseases based on deep learning is proposed. We built a citrus image data set including six common citrus diseases. The deep learning network is used to train and learn these images, which can effectively identify and classify crop diseases. In the experiment, we use Deep Learning model as the primary network and compare it with other network models in the aspect of speed, model size, accuracy. Results show that our method reduces the prediction time consumption and model size while keeping a good classification accuracy. Finally, we discuss the significance of using machine learning to identify and classify agricultural diseases in terminal, and put forward relevant suggestions.**

Keywords*: *Machine Learning, Image Processing, Segmentation, Deep CNN

Introduction

Agrarian efficiency is something on which economy profoundly depends. This is the one of the reasons that disease recognition in plants assumes a significant job in agribusiness field, as having disease in plants are very characteristic. In the event that appropriate consideration isn't taken here, at that point it causes genuine impacts on plants and because of which individual item quality, amount or efficiency is influenced. Recognition of plant sickness through some auto-programmed strategy is useful as it diminishes a huge work of observing in huge ranches of crops, and at beginning period itself it identifies the side effects of sicknesses for example at the point when they show up on plant leaves. Innovation helps individuals in expanding the generation of food. Anyway the generation of food can be influenced by number of factor, for example, climatic change, infections, soil fruitfulness and so forth. Out of these, disease plays major job to influence the generation of food. Agriculture plays a significant job in Indian economy. Leaf spot infections debilitate trees and bushes by intruding on photosynthesis, the procedure by which plants make vitality that supports development and guard frameworks and impacts survival**.**

Fruit trees play an important role in any state's economic development. One of the most well- known fruit plant species is the citrus plant, which is high in vitamin C and widely used in the Indian sub-Continent, the Middle East and Africa. Citrus plants are associated with many health advantages, as well as being used as a raw material in the agricultural industry for the production of several types of other Agri-products, including jams, sweets, ice cream, and confectionery, etc. Citrus, Pakistan's most important fruit crop, accounts for a significant portion of the country's horticultural exports

Literaturere Survey

• In 2016, NoaSchor, Avital Bechar ,Time a Ignat present an automated location framework for joined recognition of two significant dangers of nursery ringer pep- pers: Powdery buildup (PM) and Tomato spotted wither infection (TSWV). The framework depends on a controller which encourages arriving at different location presents. A few identification calculations are created dependent on head part in- vestigation (PCA) and the coefficient of variety (CV). Tests find out the framework can effectively identify the plant and arrive at the identification posture required for PM, yet it experiences issues in arriving at the TSWV discovery present.

• In 2016,Lucas G. Nachtigall and Ricardo M. Araujo ponders the utilization of Convolutional Neural Systems to naturally distinguish and characterize sicknesses, wholesome insufficiencies and harm by herbicides on apple trees from pictures of their leaves. This errand is basic to ensure a high nature of the subsequent yields and is at present to a great extent performed by specialists in the field, which can seriously constrain scale and include to costs..

• In 2016, Davoud Ashourloo, Ali Akbar Matkan planned for building up an un- earthly malady file that can distinguish the phases of wheat leaf rust malady at different DS levels. To meet the point of the investigation, the reflectance spectra (350–2500 nm) of tainted leaves with various side effect parts and DS levels were estimated with a spectroradiometer.

• In 2015, Aakansha Rastogi, Ritika Arora , Shanu Sharma proposed the framework which takes a shot at preprocessing, highlight extraction of leaf pictures from plant town dataset pursued by convolution neural system for grouping of ailment and suggesting Pesticides utilizing Tensor stream innovation. The principle two proce- dures that they use in our framework is android application with Java Web Services 4Detection and classification diseases in citrus fruit and Deep Learning. They have use Convolution Neural Network with various lay- ers five, four and three to prepare our model and android application as a UI with JWS for association between these frameworks.
• In 2014, Ms. Kiran R. Gavhale, Prof. UjwallaGawande,Mr. Kamal O.Hajari present about the picture handling methods utilized in performing early recogni- tion of plant illnesses through leaf highlights assessment. The goal of this work is to actualize picture examination and characterization methods for extraction and characterization of leaf maladies. Leaf picture is caught and after that handled to decide the status of each plant.
• In 2011, Peng Hui; Zhai Ruifang, present a A self-adaptive canny operator was developed to detect edges of growing citrus images. RGB color images were obtained and linear transformed into R-B chromatic aberration space at first. In R-B space, width of Gaussian filter fast calculated using integral images and the high and low threshold values obtained by OTSU algorithm were extracted to improve automatic edge detection.
• In 2020, Sivasubramaniam Janarthan present a a lightweight, fast, and accurate deep metric learning-based architecture for citrus disease detection from sparse data. In particular, we propose a patch-based classification network that comprises an embedding module, a cluster prototype module, and a simple neural network classifier, to detect the citrus diseases accurately. Evaluation of our proposed approach using publicly available citrus fruits and leaves dataset reveals its efficiency in accurately detecting the various diseases from leaf images. Further, the generalization capability of our approach is demonstrated using another dataset, namely the tea leaves dataset. Comparison analysis of our approach with existing state-of-the-art algorithms demonstrate its superiority in terms of detection accuracy (95.04%), the number of parameters required for tuning (less than 2.3 M), and the time efficiency in detecting the citrus diseases (less than 10 ms) using the trained model. Moreover, the ability to learn with fewer resources and without compromising accuracy empowers the practical utility of the proposed scheme on resource-constrained devices, such as mobile phones.
• In 2020, ChauChung Song, Present a automatic detection and image recognition of citrus diseases is presented that can help farmer find the disease and identify it from the captured images. This method use YOLO(You Only Look Once) algorithm which is an object detection model to detect and recognize the diseases from citrus leaf images. YOLO can realtime detect the disease and circle around it on the image and video. The dataset includes images of citrus leaf with two kinds of diseases: Citrus Canker, Citrus Greening.
• In 2020, Hui Zhang Present a the Mask R-CNN network framework. By adding multi-task branches, modifying model parameters, and designing multi-task loss function, it can realize multi-task detection of citrus in a complex environment. The mAP on the validation set of the model obtained after training is 91.56%, and it takes an average of 0.35s to detect a citrus image using GeForce GTX 1080 Ti. Through the comparative analysis of the detection effect and performance evaluation index F value of multi-task citrus under different maturity, quality, citrus quantity, and light angle, the experimental results show that the model can effectively and accurately detect the citrus with different maturity and quality in the environment of citrus fruit overlap, tree branch and leaf occlusion, light change and surface shadow.
• In 2019, Hu Xiaomei Present a Citrus picking robots have not been commercialized on a global scale. Based on the particularity of citrus fruit and fruit stem growth, a method of citrus picking point location based on structured light camera is proposed.
• In 2015, Jun Lu; Pengfei Wu, Present an automatic segmentation method to detect defects on citrus surface eroded by diseases and pests based on circularity threshold segmentation. A visible imaging system was built and citrus fruits were shot by this system. The chromatic aberration map of GB components was obtained, and a circularity threshold was used to separate defects from healthy regions on fruit surface. The erosion coefficient was used to quantify the erosion degree by diseases or pests. With respect to global Otsu segmentation method, the performance improvement of circularity threshold method in this paper was up to 15.58%. The algorithm can detect defects on citrus surface accurately, rapidly, and it had important significance in citrus grading, control of diseases and pests.

Motivation

Human experts play a crucial role in these complex multi-step architectures. Crop illnesses are a significant danger to plants growth; however their fast recognizable proof stays troublesome in numerous pieces of the world due to the absence of the fundamental foundation. This problem is overcome by blend of expanding worldwide computer infiltration and ongoing advances in neural science made conceivable by profound learning has made ready for system helped disease finding and suggesting required.

FLOW CHART

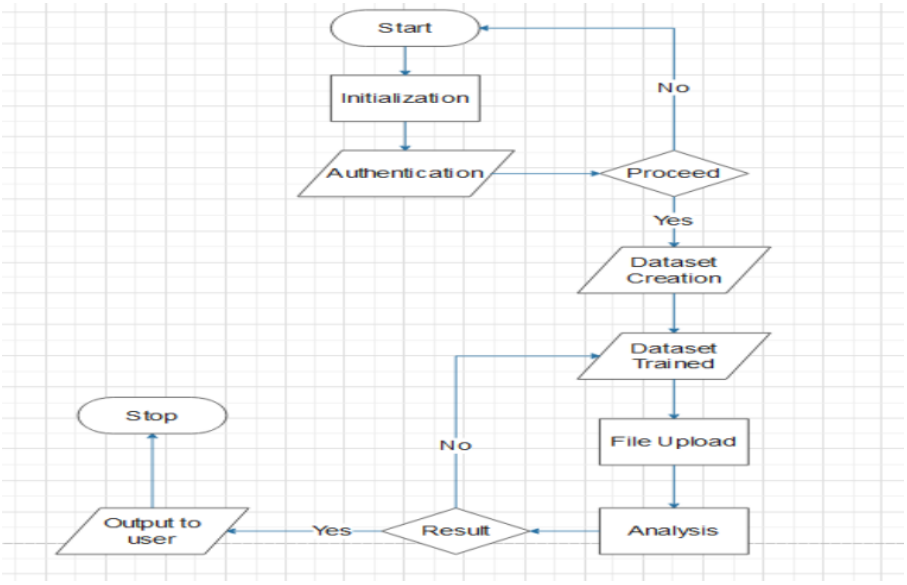


Fig -1: Flow Chart

Functional & Non-Functional Requirement

Functional requirements: may involve calculations, technical details, data manipulation and processing and other specific functionality that define what a system is supposed to accomplish. Behavioral requirements describe all the cases where the system uses the functional requirements; these are captured in use cases.

Nonfunctional Requirements: (NFRs) define system attributes such as security, reliability, performance, maintainability, scalability, and usability. They serve as constraints or restrictions on the design of the system across the different backlogs.

Functional requirements

- Registration
- User Login
- Creation of database: Users Mandatory Information

Design Constraints:

1. Database
2. Operating System
3. Web-Based Non-functional Requirements

Security:

1. User Identification
2. Login ID
3. Modification

Performance Requirement:

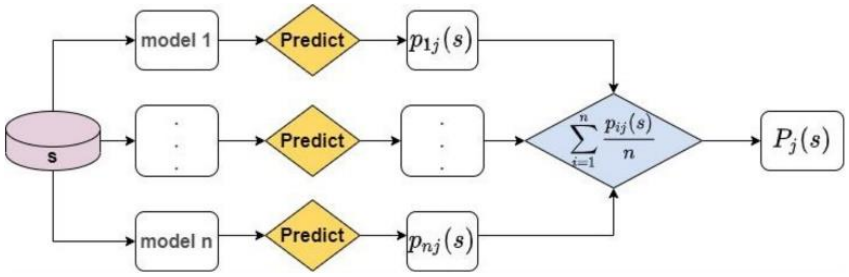
1. Response Time
2. Capacity
3. User Interface
4. Maintainability
5. Availability

Proposed Methodology

- The proposed method uses CNN model for classifying citrus fruit and leaf diseases into different classes, namely black spot, canker, early blight and late blight.
- The proposed deep learning model integrates a sufficient number of layers and parameters.
- The main purpose of proposed system is to detect the disease of citrus by using feature extract.
- User will register in the system and proceed for authentication stuff.
- Datasets Creation step is been done for analysis the fruit diseases.
- After that Dataset creation Process is done to trained the system to detect the fruit diseases.

- Then we are providing the a feature for user where he will upload the image of fruit in system , Then system will process the image and predict the output for the user.

Result Discussion



Conclusion

In this Work, the basic Convolutional Neural Network (CNN) architecture model will classify Citrus fruit and leaf diseases. Convolution Neural Network (CNN) architecture model is used to avoid the expensive training from scratch and to get higher efficiency with limited number of detests. The proposed work will be able to give a good accuracy where training accuracy and validation accuracy on the test data with small misclassifications on normal and very mild demented Multiple plant disease datasets of varying sizes may be used to improve the model's performance. In future the accuracy and the speed can be increased by use of Googles GPU for processing.

Reference

1. Ms. Deepa, Ms. Rashmi N, Ms. Chinmai Shetty " A Machine Learning Technique for Identification of Plant Diseases in Leaves " Proceedings of the Sixth International Conference on Inventive Computation Technologies [ICICT 2021]
2. Muhammad Sharifa, Muhammad Attique Khana, Zahid Iqbala, Muhammad Faisal Azama M. Ikram Ullah Lalib Muhammad Younus Javed " Detection and classification of citrus diseases in agriculture based on optimized weighted segmentation and feature selection." ELSEVIER, Volume 150, July 2018, Pages 220-234
3. MD. Nur Alam, Shahi Saugat, Dahit Santosh, Mohammad Ibrahim Sarkar, and Ahmed Abdulhakim Al-Absi "Apple Defect Detection Based on Deep Convolutional Neural Network. " Proceedings of International Conference on Smart Computing and Cyber Security, Lecture Notes in Networks and Systems 149
4. K. Srinivasan, K. Porkumaran and G. Sai Narayanan, "Intelligent human body tracking modelling and activity analysis of video surveillence system: A Survey", Journal of convergence in engineering technology and science, vol. 1, pp. 1-8, 2009.
5. Max Mignotte, "Segmentation by Fusion of Histogram based K-Means Clusters in different color space", IEEE Transactions on Image Processing, vol. 17, pp. 780-787, 2008.
6. D. Protopsaltou, C. Luible, M. Arevalo-Poizat and N. Magnenat-Thalmann, "A body and garment creation method for an internet based virtual fitting room", Proc. Computer Graphics International 2002 (CGI '02), pp. 105-122, 2002.
7. F. Cordier, H. Seo and N. Magnenat-Thalmann, "Made-tomeasure technologies for an online clothing store", IEEE Comput. Graph. Appl., vol. 23, no. 1, pp. 38-48, Jan. 2003.
8. K. Srinivasan, K. Porkumaran and G. Sai Narayanan, "Skin colour segmentation based 2D and 3D human pose modelling using Discrete Wavelet Transform" in Journal of Pattern recognition and image Analysis, Springer, vol. 21, pp. 740-753, 2011.
9. R. Brouet, A. Sheffer, L. Boissieux and M.-P. Cani, "Design preserving garment transfer", ACM Trans. Graph., vol. 31, no. 4, pp. 36:1-36:11, Jul. 2012
10. A. Urbaneja, T. G. Grout, S. Gravena, F. Wu, Y. Cen and P. A. Stansly, "Citrus pests in a global world" in The Genus Citrus, Amsterdam, The Netherlands:Elsevier, pp. 333-348, 2020.