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UTILIZATION OF THE CNN ALGORITHM AND RASPBERRY PI DEVICE FOR DETECTING PLANT LEAF DISEASES

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ABSTRACT

Plants are often affected by diseases, which can result in decreased productivity and increased use of chemicals. While human observation is commonly used to identify diseases in plants, this method is not always accurate. As a result, researchers have turned to machine learning algorithms such as support vector machines (SVMs) to improve disease prediction accuracy. However, even with a good dataset, SVMs are only 70% accurate. In this paper, we propose using Raspberry Pi for disease identification in plants, utilizing convolutional neural networks (CNNs) to process images. By analyzing multiple focal points, CNNs can accurately identify diseases in plant leaves, which can have significant benefits for agricultural productivity. Using this method, we can achieve a disease identification accuracy of up to 90% with a good dataset. Overall, our approach offers an effective and low-cost solution to identify plant diseases and improve agriculture yields.

Keywords—*component Face recognition, Attendance Project, Open CV, Face Detection System, Deep learning, Video Analysis*

I. INTRODUCTION

Agriculture is a significant sector in India, providing livelihood to many people. Farmers use various cultivation techniques to increase their yield and production. However, with industrialization, many are moving away from agriculture due to low productivity. Traditional methods of identifying plant diseases by observing leaves may not always be accurate. The entire leaf may be affected when the plant is fully infected. To sustain agriculture and improve farmers' profits, we must adopt modern technology. By utilizing the latest technology, farmers can increase their productivity at a low cost and improve the quality of their crops. This will not only benefit farmers but also save the environment by reducing pollution from harmful chemicals. Proper disease identification can also reduce the cost of using chemicals, save time, and increase profits. Therefore, we should bring technology into agriculture, using camera and machine learning algorithms to identify plant diseases accurately. This approach can significantly increase agricultural productivity and promote sustainable farming practices.

II. LITERATURE REVIEW

Several studies have employed image processing techniques and machine learning algorithms to detect and classify plant leaf diseases. Sannakki et al. used a neural network-based approach with grape leaf images and utilized anisotropic diffusion and k-means clustering for image segmentation. The results were evaluated using a confusion matrix with true positive and false positive parameters. Kutty et al. also used a neural network structure with watermelon leaf images and extracted color features using the RGB color model. The overall performance was evaluated using an AUC estimate of 0.5 on the ROC curve, with a 75.9% accurate classification result.

Gavhale and Gawande conducted a review of image processing techniques for plant disease interpretation, including BPNN, SVM, KNN, and SGDM. Xia and Li proposed an Android-based wheat disease

diagnostic program that employs image segmentation and feature extraction with the HSI color space and co-occurrence matrix of gray level. Khirade et al. divided the plant leaf disease detection process into five stages: image acquisition, preprocessing, segmentation, feature extraction, and disease classification, using RGB leaf image shift and k-means clustering for image segmentation. Rothe et al. proposed pattern identification techniques for cotton leaf diseases using complex form-based segmentation.

Overall, these studies demonstrate the potential of image processing and machine learning for efficient and accurate detection and classification of plant leaf diseases.*C. Health monitoring*

An individual cannot take care of his/her health during working hours. Due to emotion detection, the illness of employees can be noticed through team-related health.

The main objective of this health monitoring is to observe and record the employee's health to support their family and avoid unnecessary medical leave. And also, notifies the hospital in case of an emergency. So, every individual doesn't fear for their health and completed their work properly and on time also, maintain health and a perfect lifestyle.

III DISEASES

Camera Module

The camera module is connected to the Raspberry Pi to capture an image. There are two methods to connect the camera to the Raspberry Pi, either through a USB cable or by using the 15 pin headers for the interface.

Raspberry Pi

The Raspberry Pi serves as a microprocessor and receives the captured image from the camera. It identifies plant leaf diseases by utilizing OpenCV and CNN algorithms for identification. Its compact size, about the size of a credit card, makes it easy to carry anywhere.

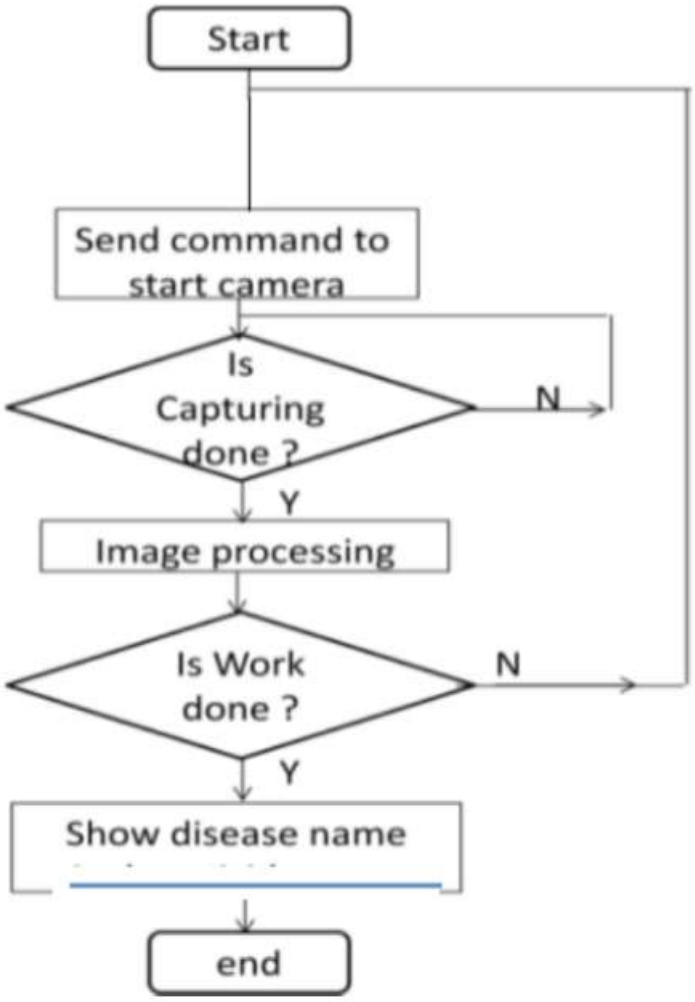
Screen for Presentation

The screen displays the name of the plant disease and its confidence level.

CNN and OpenCV

OpenCV is an open-source computer vision library used to read and process the leaf image captured by the camera. On the other hand, CNN stands for convolutional neural network, which is used to train the model with the sample dataset of diseased leaves. This algorithm predicts whether the leaf is infected or not and displays the type of disease.

IV Flow Diagram:



V Conclusion

In summary, the proposed system for plant leaf disease detection using CNN and Open CV with Raspberry Pi has been successful in accurately identifying the diseases and displaying the results on the device in a short amount of time. In the future, using drones for field identification and a server for additional handling could further streamline the process. The ultimate objective of this project is to improve crop yield and prevent plants from being affected by diseases, which can be achieved by accurately detecting and diagnosing plant leaf diseases.

VI RESULT

The purpose of this project is to identify the type of plant disease from the provided image. The image undergoes a segmentation process and the resulting converted image is displayed in Figure 6, along with a grayscale version of the same image. The final image is the one that has undergone feature extraction. It shows the plant's illness and helps in accurately identifying the disease.

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