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Implementation of Leaf Disease Detection

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Abstract: The proposed system helps in identification of leaf disease and provides remedies that can be used as a defense mechanism against the disease. This project is about collecting images of various infected, good and seems to be infected plant leaf. Then apply image processing on the images. Convolution Neural Networks CNN mostly prefer neural networks for image analysis and predict infected plants using Deep Learning + Image Processing. In image processing phase, The input imagewill go through several steps like - Image Acquisition, Image Enhancement, We have used the Python Django web framework to develop secure and maintainable website. Apart from this, Python libraries like OpenCV, Keras, and TensorFlow are usedto predict leaf diseases with 80% accuracy.

I. INTRODUCTION

The primary occupation in India is agriculture. India ranks second in theagricultural output worldwide. Here in India, farmers cultivate a great diversity of crops. Various factors such as climatic conditions, soil conditions, various diseases, etc affect the production of the crops.

The existing method for plant disease detection is simply naked eye observation which requires more man labor, properly equipped laboratories, expensive devices, etc. And improper disease detection maylead to inexperienced pesticide usage that can cause development of long term resistance of the pathogens, reducing the ability of the crop to fight back.

The plant disease detection can be done by observing the spot on the leaves of the affected plant. The method we are adopting to detect plant diseases is image processing using Convolution neuralnetwork(CNN).

II. LITERATURE REVIEW

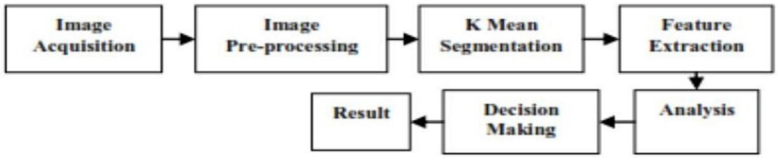
The Early Leaf Disease Detection System only detects leaf disease and does not predict pesticide for infection.

This project deals with a new type of early detection of pests systems. Images of the leaves affected by pests are acquired by using a digital camera. The leaves with pest images are processed for getting a gray colored image and then using image segmentation, imageclassification techniques to detect pests on leaves.

The image is transferred to theanalysis algorithm to report the quality. The technique evolved in this system is both image processing and soft computing. The image processing technique is used to detectthe pests and soft computing technique is used for doing this detection over a wide population.

We have added more features like an online purchase link for pesticide and the farmer can access system in different languages like English, Marathi etc.

III. METHODLOGY



A. Image Acquisition

First step in image acquisition is to capture the leaves using mobile phone ordigital camera. These stored images of the leaves from the database are load by specifying the path.

B. Image Pre-processing

Pre-processing improves the quality of the image by removing unsought distortions. Clipping the images based on the region of interest (ROI), image smoothing and contrast enhancement are done here. Figure 3 shows the images after performing image enhancement.

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C. Image Segmentation

Image segmentation is the method of dividing an image into different sub images.Here we use K-mean segmentation technique which uses hue estimation method fordividing and clustering the image. Since the green colour of the leaves is normal, we do not consider them. We select the cluster image showing the infected area for feature extraction. Figure 4, below shows the segmented images of the leaves.

D. Feature Extraction

Interesting part of an image from where the required informations are extracted is called as feature extraction. The dimension of the region of interest (ROI) will be smaller than the original image. Gray level cooccurrence matrix (GLCM) is one of the best methods for texture analysis.

E. Classification

Leaves are affected by diseases caused by fungi, bacteria and viruses. Sometime insects also damage the leaf which appears as leaf spot disease. The infected part of the leaf will vary in size and colour, depending on the stage and organism involved.

F. Result Analysis

Segmented image texture analyses are used for classifying the infection as Anthracnose, Cercospora Leaf Spot and Bacterial Blight

IV. IMPLEMENTATION DETAILS

The system is developed using Python Django Webframe-work to connect Front end and Back end. For Front end, we used html, css, js etc. and for Back end , weused python and machine learning concepts.

A. Platform

"Python" is used as the developmentplatform. It includes libraries which are necessary to run the code. The libraries usedare-TensorFlow,Keras,OpenCV. The software platform used for the implementation purpose .

B. Google Collaboratory

Google provides a no-cost cloud service application relying on Python Jupyter Notebook. Training code is written on google collaboratory.

C. Pycharm

Pycharm is a dedicated Python Integrated Development Environment (IDE) providing a wide range of essential tools for python developers.

D. Python Django

Django is a high-level Python web framework that **enables rapid developmentof secure and maintainable websites**. Built by experienced developers, Django takes care of much of the hassle of web development, so you can focus on writing your app without needing to reinvent thewheel.

V. CONCLUSION

A large part of the Indian population relies on agriculture, hence it becomes very essential to detect and recognize the leaf diseases that result in losses, since agriculture is critical to the growth of the economy. This project based on a deep learning approach called CNN is utilized to build differentplant leaf disease identification, detection and recognition systems. This approach utilized a minimum set of layers to identify the diseases of seven classes. The neuralnetwork is trained with the Plant Village dataset. A Graphical User Interface is designed for this system. This GUI permits the user to choose the images from the dataset. Users can select any image from the dataset and the image gets loaded, following which the prediction of the disease will be shown on the User Interface. Convolutional neural network, trained for identifying and recognizing the plant leaf disease, could classify and predict the diseases correctly for almost all the images with few anomalies thus and obtained 94.8% accuracy.

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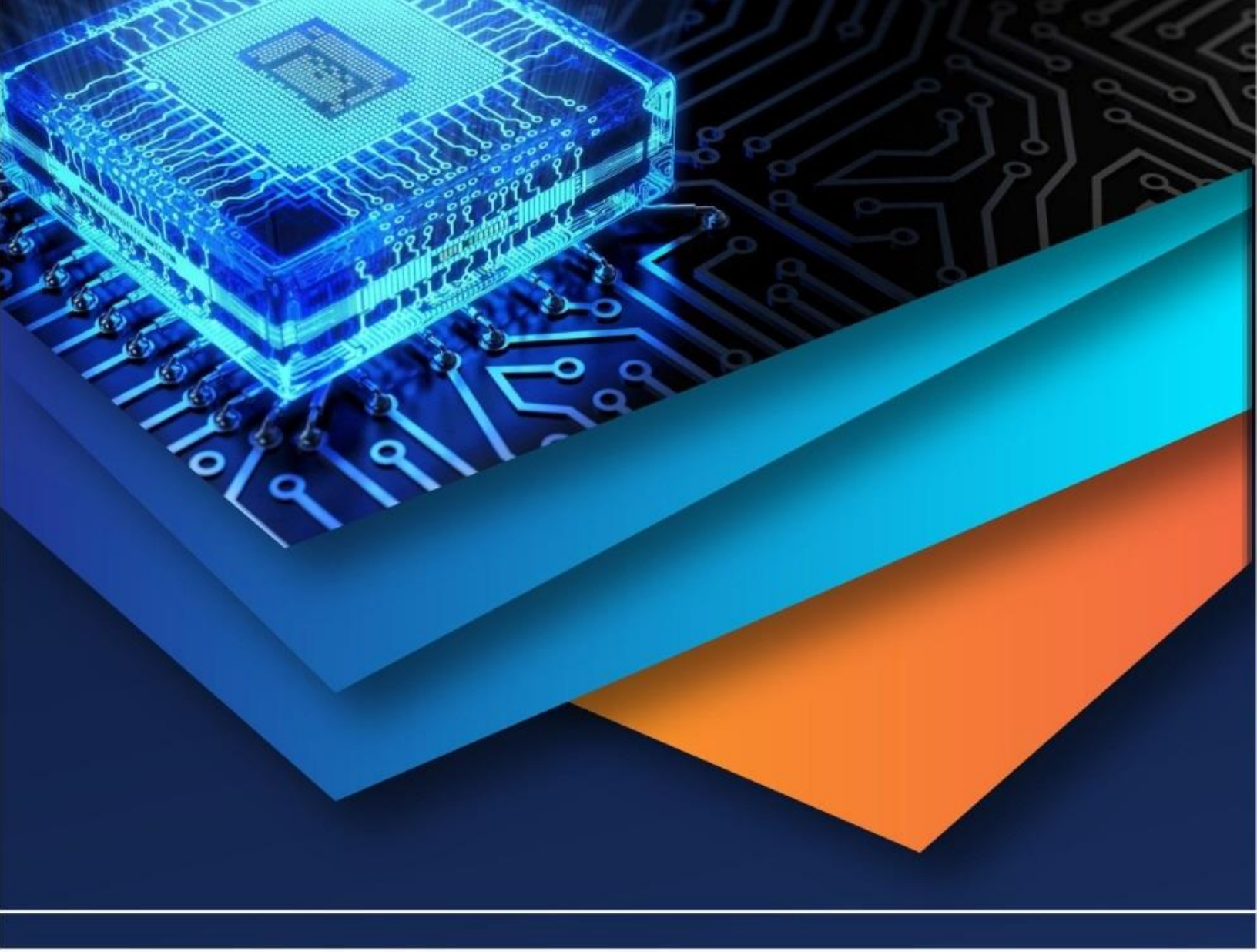

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