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MIRCHI LEAF DISEASE DETECTION

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ABSTRACT

The system utilizes image processing and machine learning to detect leaf diseases early, aiding in improved agricultural productivity. Given that agriculture is central to India's economy and supports a large portion of the population, crop diseases can severely impact farmers' livelihoods. To address this, a robot equipped with image processing and machine learning—trained with feature extraction and segmentation using the CNN algorithm—identifies plant diseases. An Android application is used to control the robot, managing its operations to help mitigate this critical issue.

INTRODUCTION

Early detection of plant diseases is crucial for improving crop yield and minimizing economic losses in agriculture. Diseases like black measles, black rot, and bacterial spot hinder plant growth and quality, leading farmers to rely on expensive pesticide treatments that harm plants and the environment, increasing production costs. Manual detection by experts is common, but advancements in computer vision and AI now enable automated disease detection

from raw images, providing a more efficient and eco-friendly solution for managing plant health and pest infestations.

LITERATURE SURVEY

The papers by R. S. Borkar and P. A. Kharat, and K. Srinivas and M. S. Reddy, focus on detecting chili leaf diseases using advanced techniques. Borkar and Kharat employ image processing methods such as Gaussian filtering, K-means clustering, GLCM feature extraction, and SVM classification for early disease identification, aiming to improve crop yield. In contrast, Srinivas and Reddy utilize deep learning, specifically CNN architectures like VGG16, and augment local farm datasets for enhanced disease detection accuracy, with performance evaluated using precision, recall, and F1-score metrics.

EXISTING SYSTEM

Various techniques are employed in Mirchi leaf disease detection, including image processing and computer vision to extract features from leaf

images, while machine learning and deep learning algorithms, particularly Convolutional Neural Networks (CNNs), are used to identify disease patterns. Transfer learning enhances performance, especially with limited labeled data. The creation of large, annotated datasets is critical for training models, and hyperspectral imaging enables non-destructive, large-scale crop monitoring. IoT devices and sensor networks provide real-time data collection, while mobile apps and decision support systems offer accessible disease detection tools for farmers. Interdisciplinary collaboration across agronomy, plant pathology, and technology fields is vital to advancing detection methods.

PROPOSED SYSTEM

The process begins with data acquisition by collecting a diverse set of Mirchi leaf images, including both healthy and diseased leaves. These images are then preprocessed by resizing and standardizing to ensure compatibility with the model. The dataset is split into training, validation, and test sets to maintain balanced representation. A suitable model, such as a convolutional neural network (CNN), is selected and developed based on efficiency and resource availability. The model is trained on the training set and evaluated on the validation set. Once trained, the model is deployed in a real-world application for disease detection, with continuous monitoring and improvement based on user feedback.

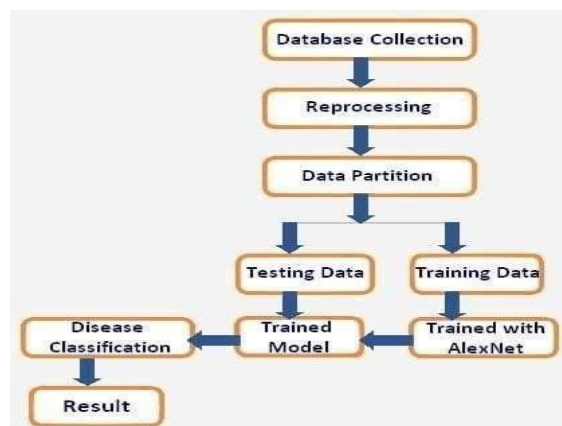
SOFTWARE REQUIREMENTS

1. Operating System: Windows Family.
2. Version: Python 3.9
3. Programming Language : Python.

HARDWARE REQUIREMENTS

1. Processor : RYZEN AMD5
2. Speed : 1.1 GHz (min)
3. RAM : 8GB RAM & above

BLOCK DIAGRAM



The Mirchi Leaf Disease Detection using Image Processing and Machine Learning system works by capturing images of mirchi (chili) plant leaves using a camera or smartphone, which are then preprocessed to enhance quality and remove noise. Image processing techniques like color space conversion, segmentation (e.g., using K-means or thresholding), and feature extraction (e.g., texture, color, and shape features) are applied to isolate diseased regions. These extracted features are fed into a machine learning classifier (such as SVM, Random Forest, or CNN) trained on labeled datasets of healthy and diseased leaf images. The model analyzes the input and accurately classifies the leaf condition—such as leaf curl, powdery mildew, or bacterial spot—enabling farmers to take timely corrective actions. The system can be deployed as a mobile or web app for field use.

CONCLUSION

This project offers a low-cost, user-friendly, and automated end-to-end solution for early, accurate crop disease diagnosis and outbreak awareness using deep Convolutional Neural

Networks (CNNs). By leveraging the high-performing "Inception" model on a cloud-based platform accessed via a mobile app, it enables real-time disease classification. A collaborative model continuously enhances accuracy by retraining on user-uploaded, geo-tagged images, which also support disease density mapping. With scalable cloud infrastructure, the system efficiently handles diverse disease categories, improves with more real-life data, detects early symptoms, and distinguishes between similar diseases, making it highly practical for real-world deployment.

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