CNN-based Leaf Disease detection

ECE5268-Theory of Neural Networks

sudharshanMaddipalli/CNN-based-leaf-disease-decection (github.com)

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INTRODUCTION

- Plant diseases are a serious concern in agriculture, as they may affect crop quality and productivity. A wrong diagnosis of these diseases can have disastrous consequences, including significant crop destruction and soil erosion. Disease diagnosis has historically depended on manual visual examination, a labor-intensive and subject to error procedure that drives up production costs and restricts early intervention initiatives.

- We propose a novel approach to these issues such as automated plant leaf disease identification through the use of deep learning methods. Our method simplifies the process of disease categorization by utilizing convolutional neural networks (CNNs), even under difficult circumstances such as uneven lighting and complex backgrounds. Our early findings confirm the effectiveness of this strategy, providing farmers with a trustworthy instrument to identify and manage illnesses in their early phases, protecting crop health and agricultural output.

EXISTING SYSTEM

- In the field of agriculture, identifying leaf diseases is still an essential task, but it doesn't come without difficulties, including labor-intensive manual processes and the requirement for a high level of knowledge.
- Moreover, the existing approaches are not focused on the identification of mulberry leaves, They did not increase the detection rates and accuracy of disease severity classification.
- Additionally, there is a clear lack of disease area classification and segmentation, which is essential for accurate illness measurement and efficient control measures. In Order to further controlled leaf disease diagnosis and support sustainable agriculture practices, these gaps must be filled.

- As a result, machine learning techniques have become more popular and provide a means of automatically identifying diseases in plant leaves. These techniques allow for efficient illness classification by examining morphological characteristics as well as important attributes including color, intensity, and size. The presentation provides an overview of the current state of plant disease detection by examining number of machine learning methods used to identify diseases in different kinds of plant leaves.

PROPOSED SYSTEM

- The aim of this project is to provide a user-friendly and simple deep learning method that can be utilized by people with different programming skills. Appropriate disease classification is achieved through the utilization of Convolutional Neural Network (CNN) techniques in the suggested methodology. Our approach's flexibility and accessibility are made apparent when we confirm its effectiveness through thorough experimental analysis. A wide range of leaf photos from different plant species suffering from common diseases including Leaf Blister, Clubroot, and Aster Yellows are included in our dataset. To enable precise classification, every illness category is carefully arranged into a reference image database. Further, the system is designed to consistently use input photos for testing and classification, guaranteeing reliable performance in a variety of scenarios and requirements of users.

Sample Leaves :

METHODOLOGY

- In our methodology, we begin by capturing leaf images as input, which undergo preprocessing to enhance image quality and remove unwanted distortions, ensuring optimal feature processing.
- Later, we utilize feature extraction methods to extract important features from the preprocessed leaf images, like texture, color, and shape, so that disease classification may be done efficiently.

Database Integration:

- We use a large variety of photos from our database, including both healthy and diseased leaves, to teach the system to recognize different leaf situations. The method uses neural network classification to identify abnormal and normal leaves, allowing for more focused examination of defect areas.

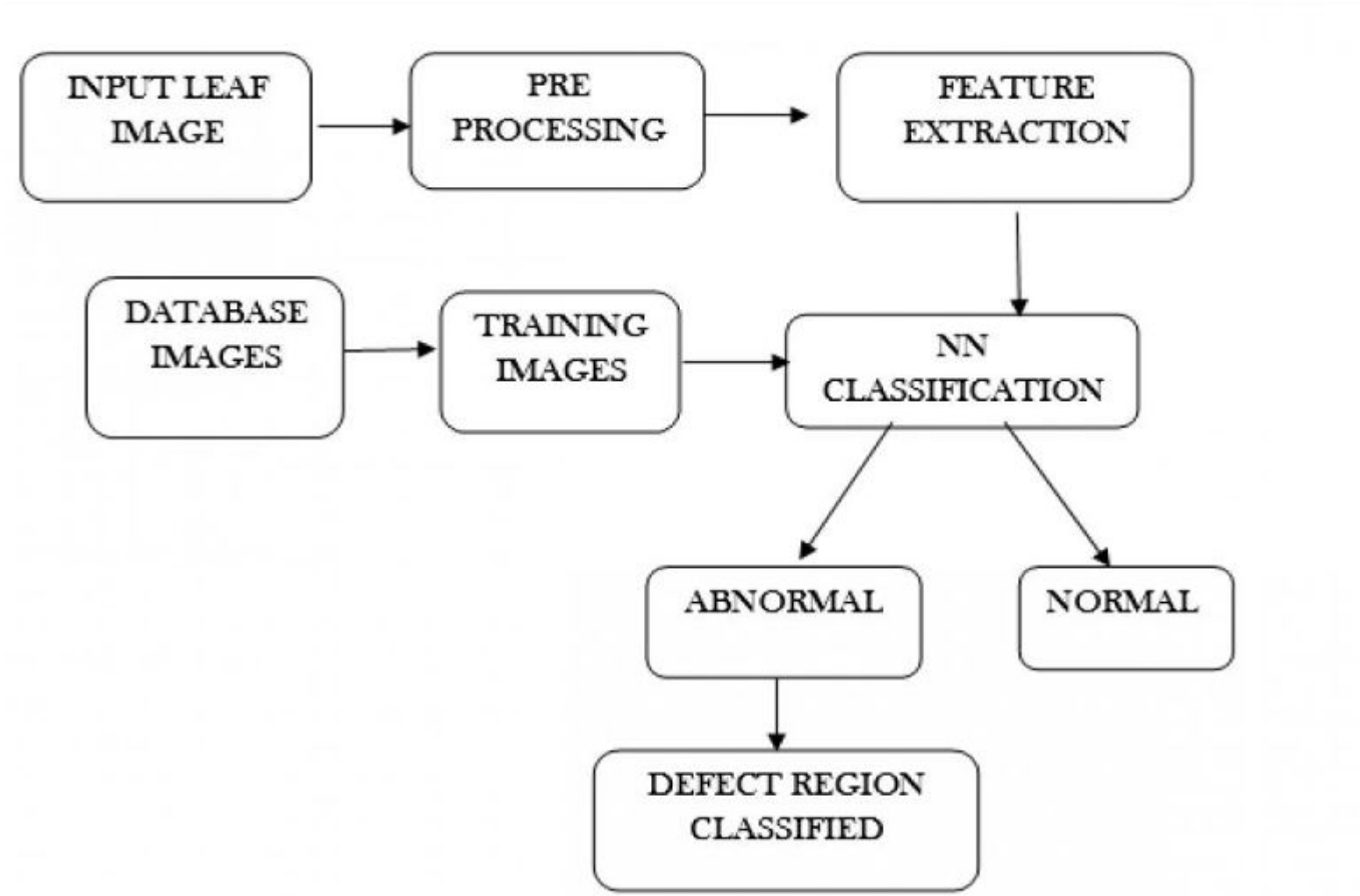
Convolutional Neural Network (CNN) Implementation :

- We utilize convolutional neural network (CNN) procedures to analyze leaf images using deep learning techniques. CNNs are very good at visual image analysis, they can accurately identify and classify different items in an image and determine their relative importance. Additionally, CNNs are more efficient and effective in our disease detection system since they require less preprocessing than other classification techniques.
- **Convolutional Layer:**

  Applies filters to extract features like edges and textures from leaf images.
- **Pooling Layer:**

  Reduces dimensionality of feature maps to improve computational efficiency.
- **Fully Connected Layer:**

  Integrates extracted features and performs classification for leaf disease detection.


INPUT LEAF IMAGE
PRE PROCESSING
FEATURE EXTRACTION
DATABASE IMAGES
TRAINING IMAGES
NN CLASSIFICATION
ABNORMAL
NORMAL
DEFECT REGION CLASSIFIED

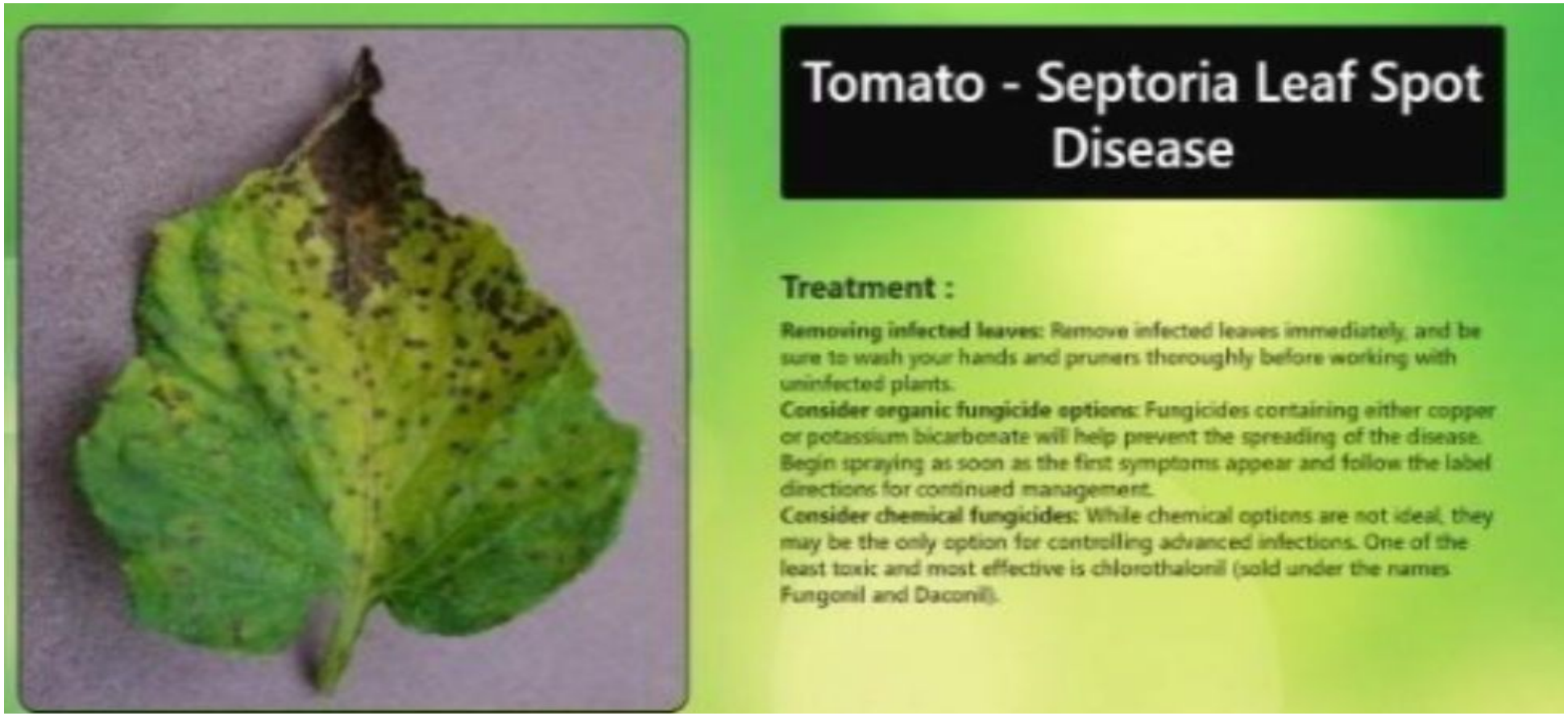
RESULTS AND CONCLUSIONS

- Convolutional Neural Networks (CNNs) are a promising solution with substantial potential in agriculture and environmental conservation for the identification of plant leaf diseases. CNNs can be used to accurately and efficiently identify a variety of diseases that affect plant leaves, allowing for immediate action to reduce crop losses and increase output. CNN-based techniques provide farmers and other agricultural users with the tools they need for early disease identification, accurate diagnosis, and targeted approaches to control by utilizing deep learning and image recognition. The efficiency and usability of CNN-based plant leaf disease detection systems will continue to be improved as research in this area advances thanks to developments in CNN architectures, dataset augmentation strategies, and model interpretability techniques. This will eventually support sustainable agriculture and global food security.

Plant Leaf Disease Prediction

Choose File | Tomato___Bacterial_spot.JPG

Predict



THANK YOU