



TOMATO LEAF DISEASE CLASSIFICATION USING DEEP LEARNING

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PROJECT INTRODUCTION

Tomato plants are prone to various diseases, which can significantly affect crop yield and quality. Early detection through leaf image classification enables timely intervention and disease management. This project focuses on classifying tomato leaf diseases using deep learning models.

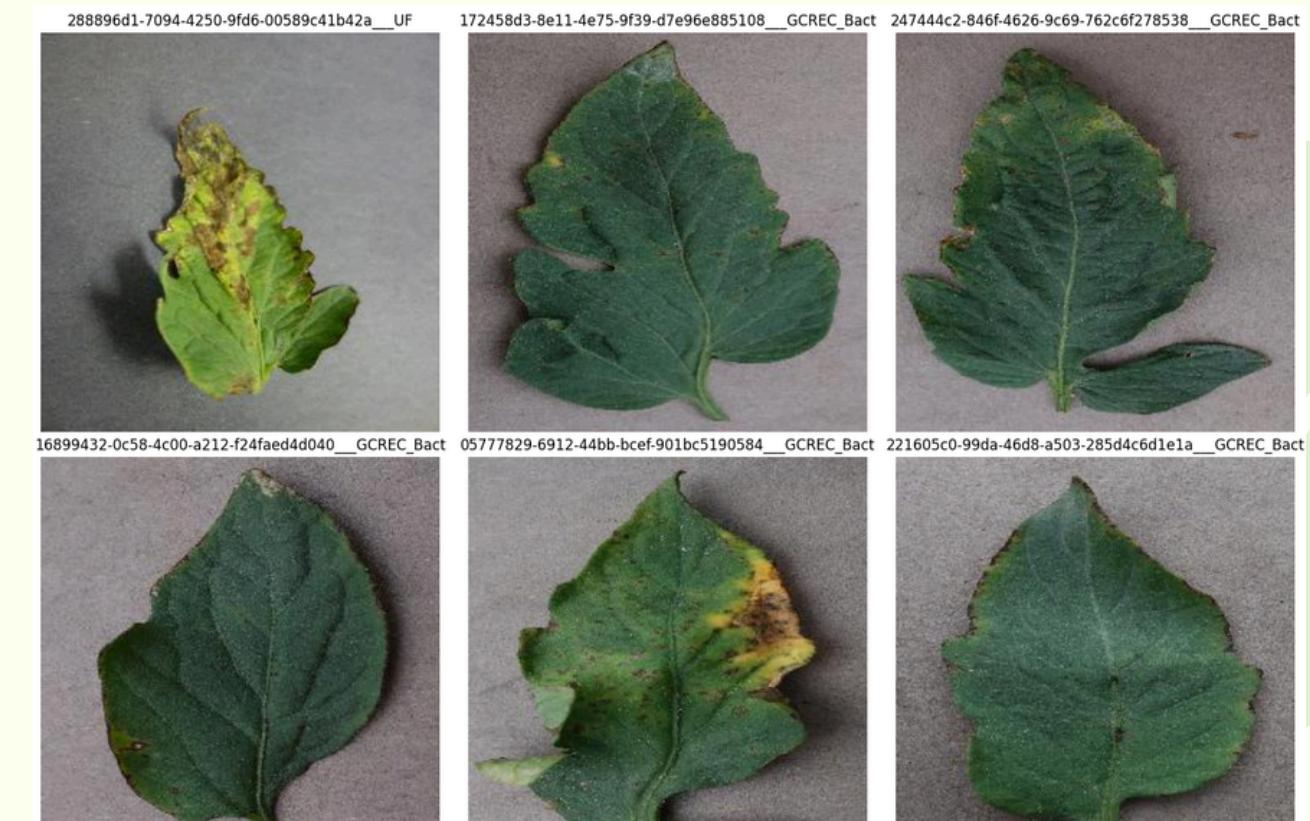
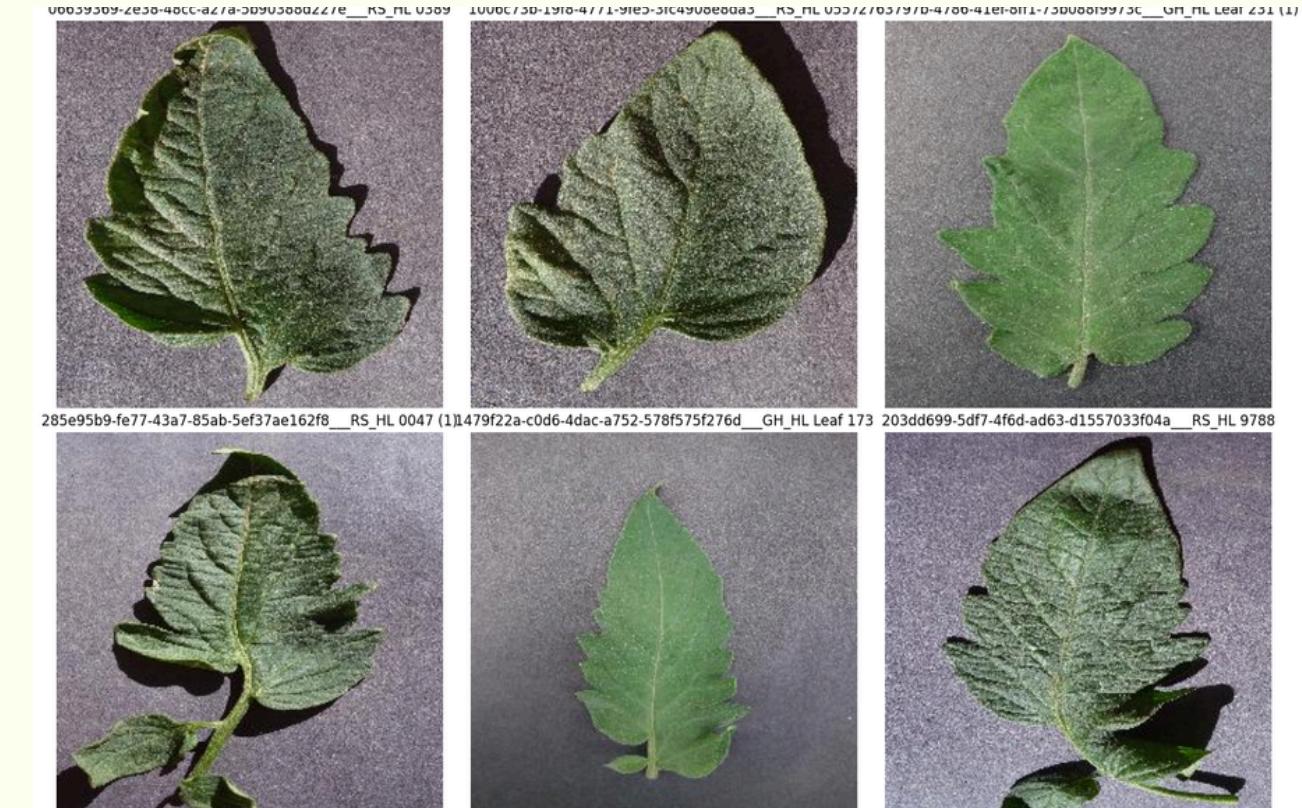
Goal:

- Classify tomato leaves into healthy or diseased categories.

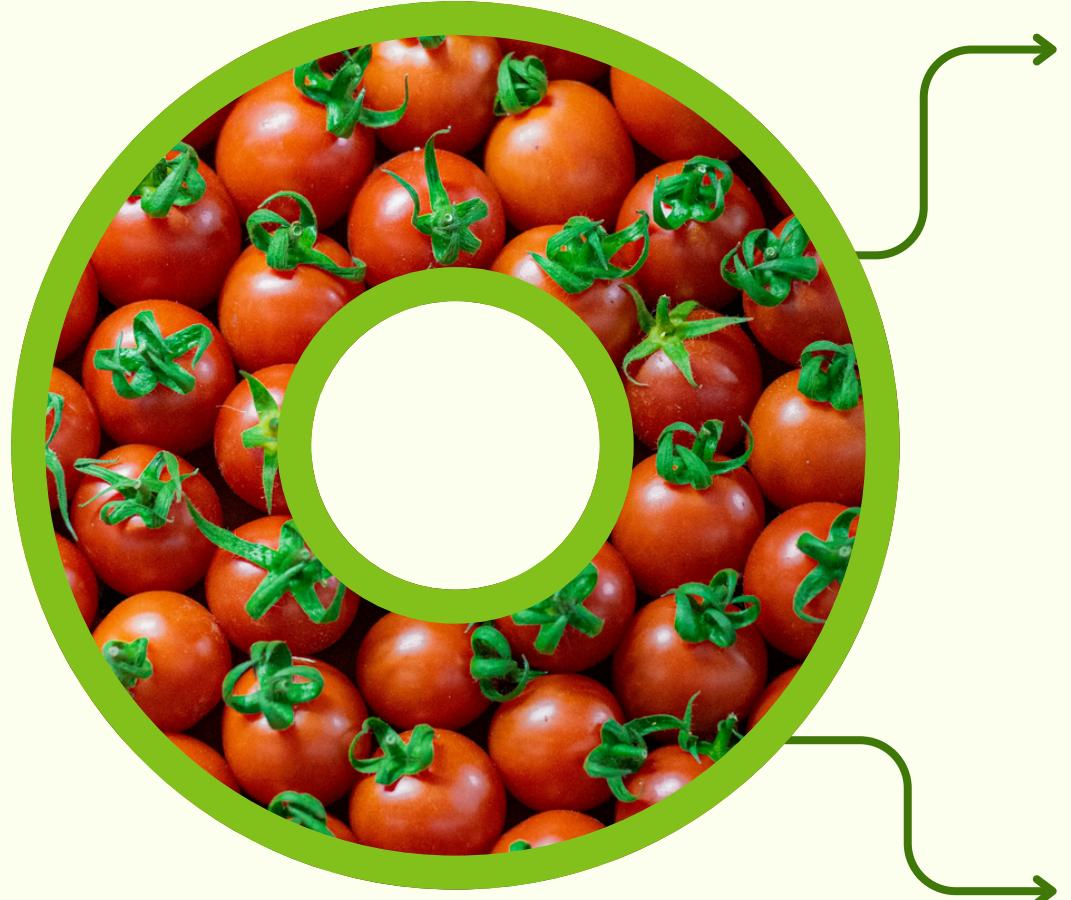
DATASET VISUALIZATION

The dataset includes several classes of tomato leaf images showing symptoms of various diseases and healthy leaves.

Visual Examples from the Dataset:



MODEL BUILDING



We used a deep learning model—DenseNet121, a type of Convolutional Neural Network (CNN)—to automatically learn features from tomato leaf images and classify them into various disease categories. The model architecture includes convolutional layers that extract patterns and hierarchical features from the input images, followed by fully connected layers for final classification.

To evaluate performance, we trained the model in two versions:

- Version 1: Trained for 5 epochs
- Version 2: Trained for 20 epochs

After comparing the results, we observed that Version 2 outperformed Version 1, demonstrating better accuracy and overall performance due to the extended training, which allowed the model to learn more complex patterns in the data.

PREDICTION RESULTS

Sample predictions made by the models V1

Tomato_Bacterial_spot 99.56%

Tomato_Early_blight 98.20%

Tomato_YLCV 41.79%

Predicted: Tomato_Tomato_Yellow_Leaf_Curl_Virus (41.79%)



Predicted: Tomato_Early_blight (98.20%)



Predicted: Tomato_Bacterial_spot (99.56%)



PREDICTION RESULTS

Sample predictions made by the models V2

Tomato_Bacterial_spot 99.97%

Tomato_Early_blight 99.93%

Tomato_Leaf_Mold 53.10%

Predicted: Tomato_Leaf_Mold (53.10%)



Predicted: Tomato_Early_blight (99.93%)



Predicted: Tomato_Bacterial_spot (99.97%)



CONCLUSION

The DenseNet121 model accurately classified tomato leaf diseases from images, with improved performance after training for more epochs. This shows that deep learning is effective for plant disease detection.

RECOMMENDATIONS

- Collect more diverse images to improve accuracy.
- Regularly update the model with new data.
- Use explainability tools for better user trust.
- Extend the approach to other crop diseases.



Thank You!

Grow with Purpose

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