NC STATE UNIVERSITY

CropLeafNet

Deep Learning for Plant Leaf Disease Detection

Group Number: 141
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Motivation

Addressing the urgent need for automated detection of plant leaf diseases is crucial for ensuring food security and agricultural sustainability.

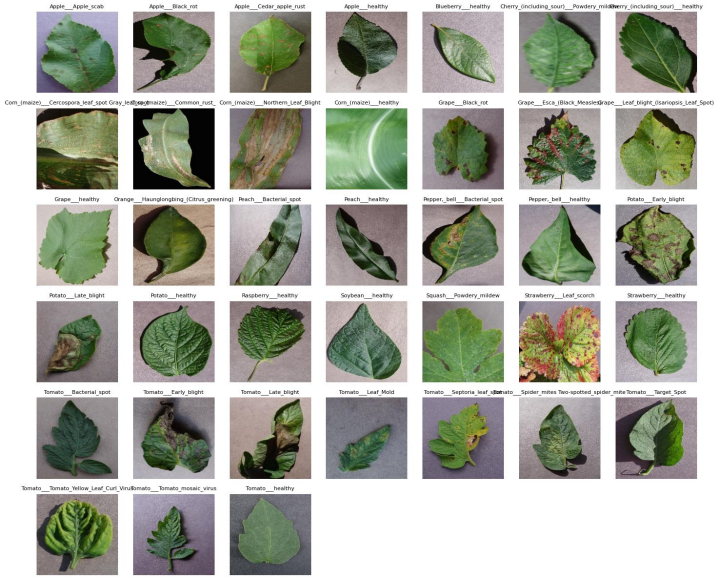
Goal:

1. Predict whether a plant leaf is healthy or diseased based on image analysis.
2. Enhance agricultural productivity and global food security by providing an efficient solution for timely identification and mitigation of plant diseases through crop management.

Dataset

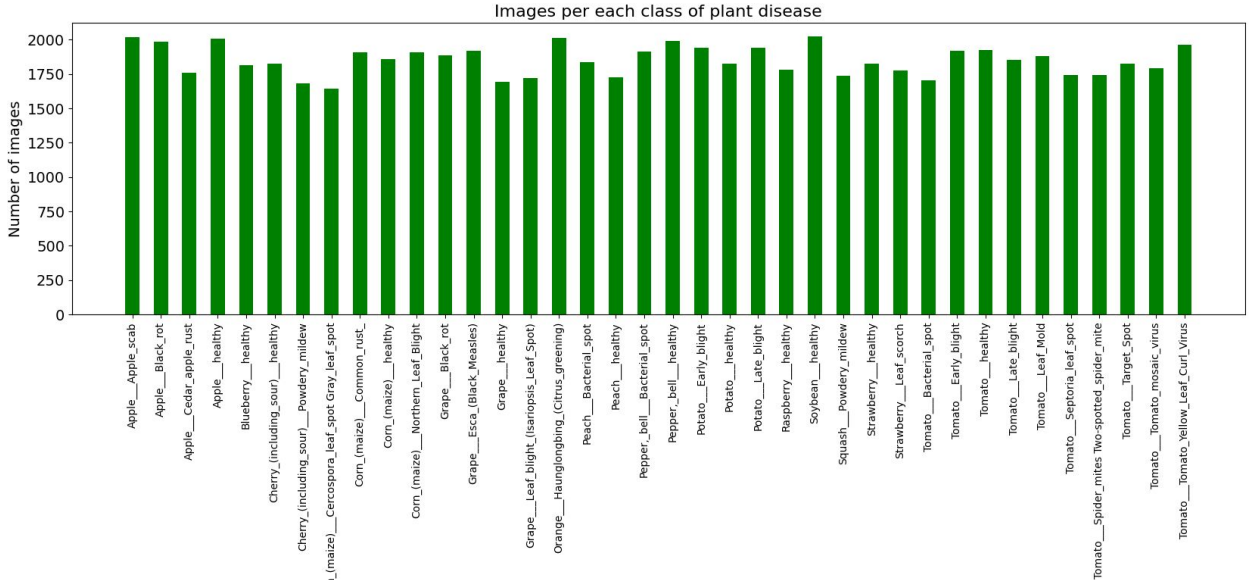
New Plant Disease Dataset

- 87000 RGB images of crop leaves
- Categorized into 38 classes
- Training and Validation Sets: 80/20 ratio
- Test Data: 33 images for prediction



Dataset

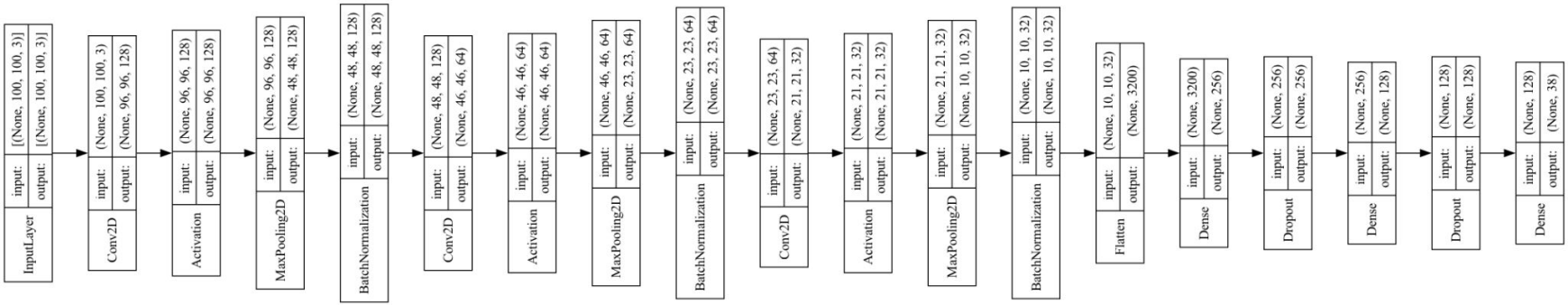
- Balanced Dataset
- Number of images ranges from 1642 to 2022



Baseline Model

Model: Convolutional Neural Networks

1. Layer Types: Convolutional, pooling, normalization, dense, and dropout layers.
2. Regularization: L2 regularization and dropout for preventing overfitting.
3. Output Activation: Sigmoid activation for multi-label classification.



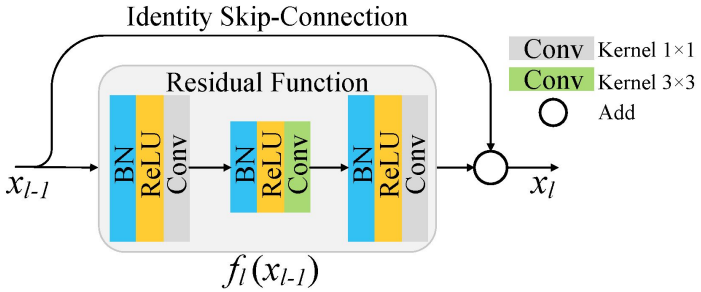
Accuracy/Loss vs Epochs

Baseline Model Results

	Training	Validation	Testing
Accuracy	91.39	90.81	90.80
Loss	29.42	33.80	33.82

Improvised Model

Model Architecture: ResNet9



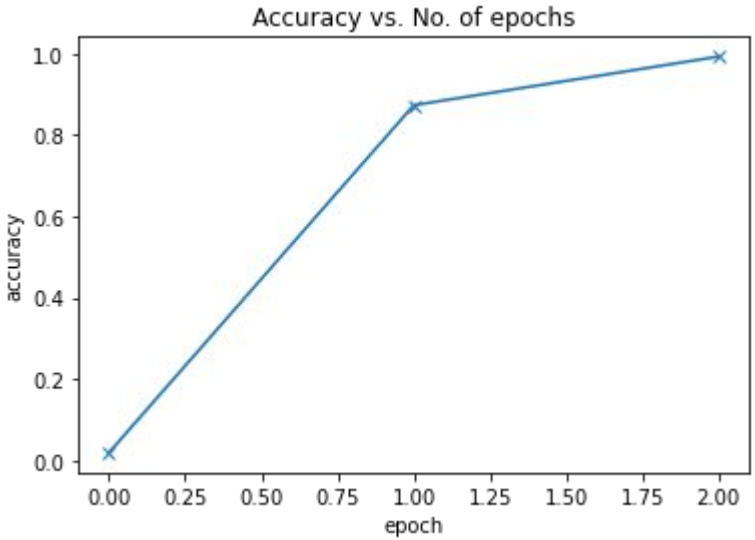
Model Training

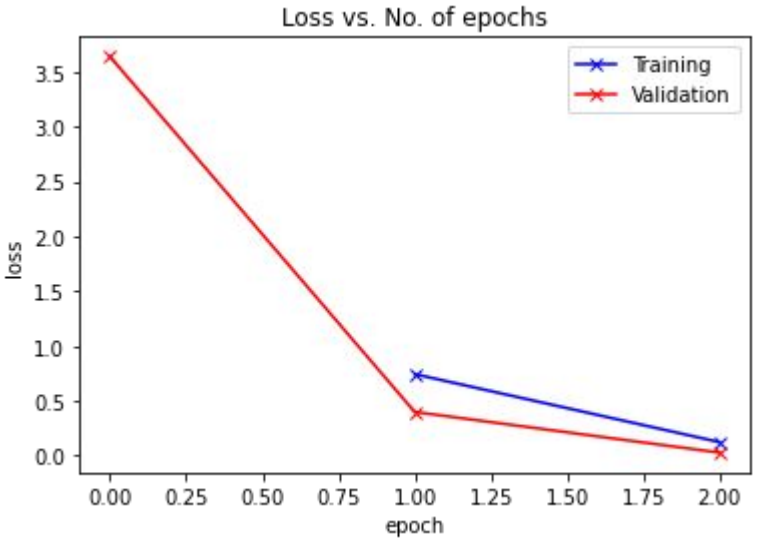
- Model initialized and transferred to GPU.
- Training loop iterates over batches, applying backpropagation.
- One-Cycle LR Scheduler dynamically adjusts learning rates.

Why ResNet9 over CNN?

1. Deeper Architectures
2. Gradient Flow
3. Effective Feature Learning
4. Improved Performance
5. Ease of Training:
6. Flexibility

Accuracy/Loss vs Epochs

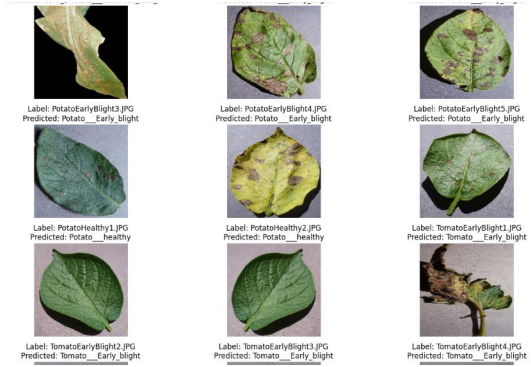


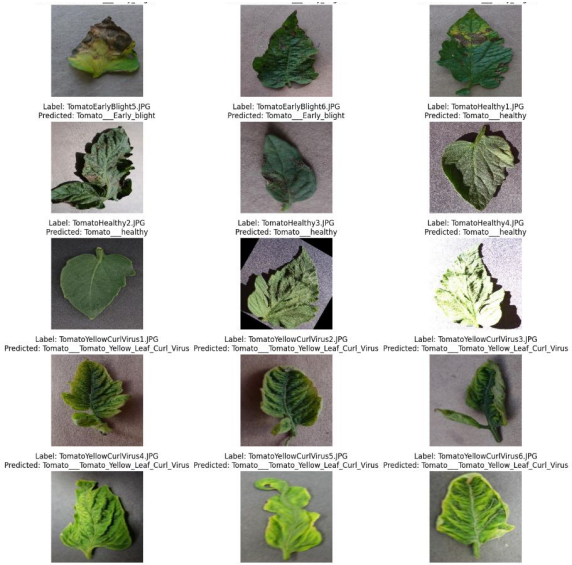


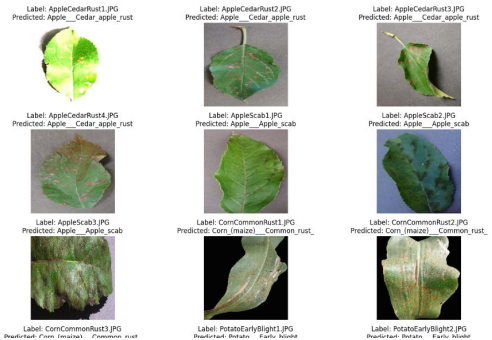
Improvised Model Results

	Training	Validation
Accuracy	98.99	98.15
Loss	12.78	2.78

Test Results







Thank you