Vidyalankar Institute of Technology Accredited A+ by NAAC	DEPARTMENT OF COMPUTER ENGINEERING

Mini Project

Semester	B.E. Semester VIII – Computer Engineering
Subject	Social Media Analytics
Subject Professor In-charge	Prof. Amit Alyani
Academic Year	2024-25

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Title: Plant Disease Detection Using ResNet9

Our mini-project focuses on the detection of plant diseases using deep learning. Leveraging a convolutional neural network (CNN) architecture—**ResNet9**—we trained a classifier on an augmented dataset of plant disease images. The final system is capable of identifying various plant diseases with high accuracy, offering a potential tool for modern agriculture.

Model Code: https://github.com/deepsalunkhee/PlantDiseaseDetection/blob/master/models/plant-disease-classification.ipynb

Web app Code: https://github.com/deepsalunkhee/plantDiseaseDetection

Web app: https://pdd.deepsalunkhee.com/

Dataset:

The dataset used in this project consists of labeled images of plant leaves. Each image represents either a healthy leaf or a leaf affected by a specific plant disease. The dataset includes multiple classes(Total 38) such as:

- Healthy
- Bacterial diseases
- Fungal infections
- Viral diseases

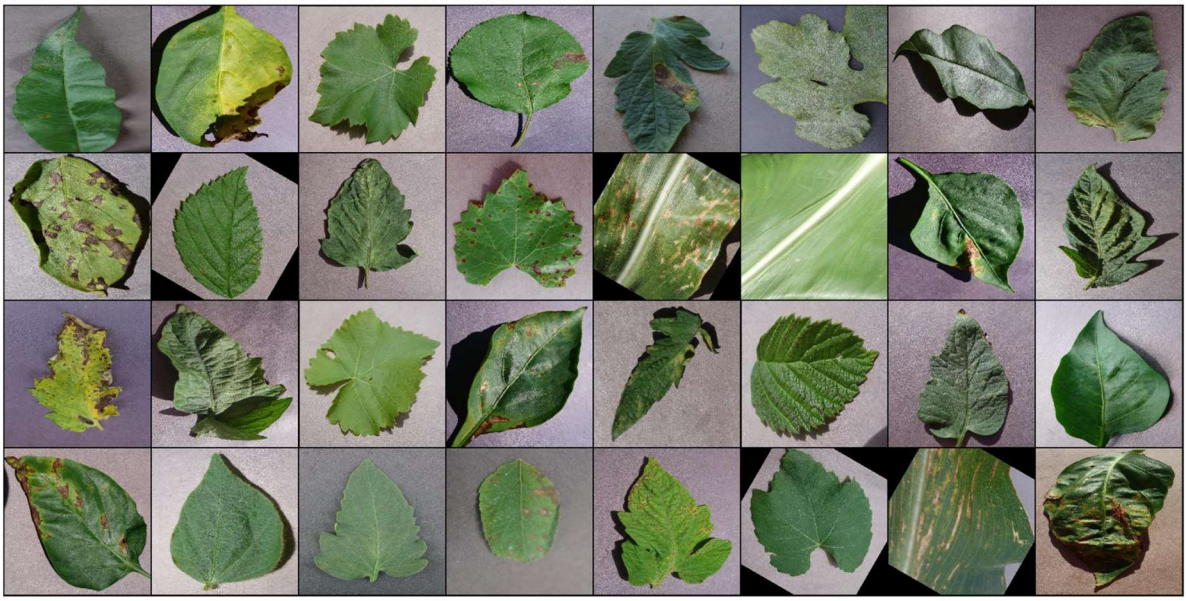
Each image is in color (RGB) and shows variations in lighting, angle, and background, making the dataset more realistic and challenging—ideal for training deep learning models.

The dataset is divided into three main parts:

- Training set: Used to teach the model to recognize patterns.
- Validation set: Used during training to monitor the model's performance and avoid overfitting.
- Test set or inference images: Used to test the model's final performance or demonstrate its predictions.

To increase the model's ability to generalize, data augmentation techniques were applied. These include:

- Horizontal and vertical flipping
- Random rotations and cropping
- Adjustments in brightness and contrast
- Random zooming

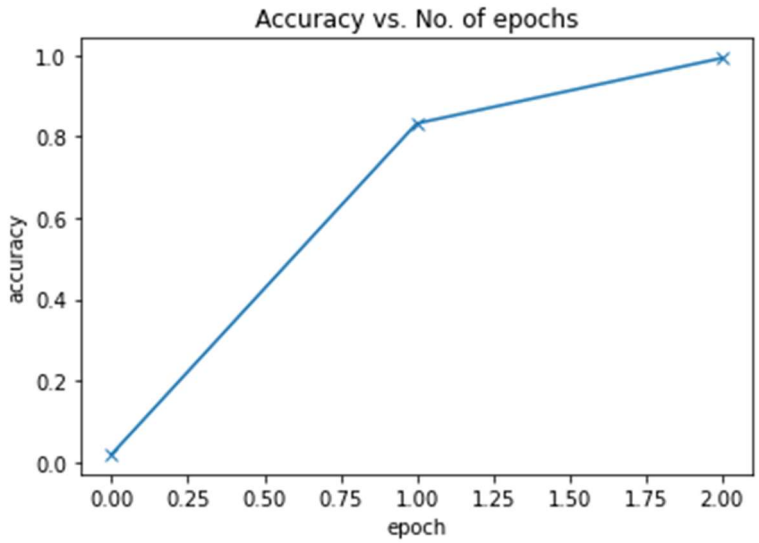


Model Architecture: ResNet9:

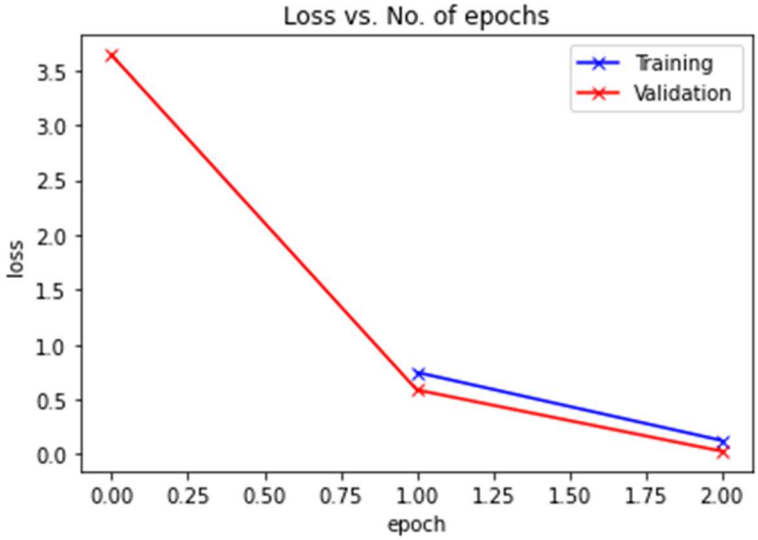
```
# Architecture for training

# convolution block with BatchNormalization
def ConvBlock(in_channels, out_channels, pool=False):
    layers = [nn.Conv2d(in_channels, out_channels, kernel_size=3, padding=1),
              nn.BatchNorm2d(out_channels),
              nn.ReLU(inplace=True)]
    if pool:
        layers.append(nn.MaxPool2d(4))
    return nn.Sequential(*layers)


# resnet architecture
class ResNet9(ImageClassificationBase):
    def __init__(self, in_channels, num_diseases):
        super().__init__()

        self.conv1 = ConvBlock(in_channels, 64)
        self.conv2 = ConvBlock(64, 128, pool=True) # out_dim : 128 x 64 x 64
        self.res1 = nn.Sequential(ConvBlock(128, 128), ConvBlock(128, 128))

        self.conv3 = ConvBlock(128, 256, pool=True) # out_dim : 256 x 16 x 16
        self.conv4 = ConvBlock(256, 512, pool=True) # out_dim : 512 x 4 x 44
        self.res2 = nn.Sequential(ConvBlock(512, 512), ConvBlock(512, 512))

        self.classifier = nn.Sequential(nn.MaxPool2d(4),
                                        nn.Flatten(),
                                        nn.Linear(512, num_diseases))

    def forward(self, xb): # xb is the loaded batch
```

```
        out = self.conv1(xb)
        out = self.conv2(out)
        out = self.res1(out) + out
        out = self.conv3(out)
        out = self.conv4(out)
        out = self.res2(out) + out
        out = self.classifier(out)
        return out
```

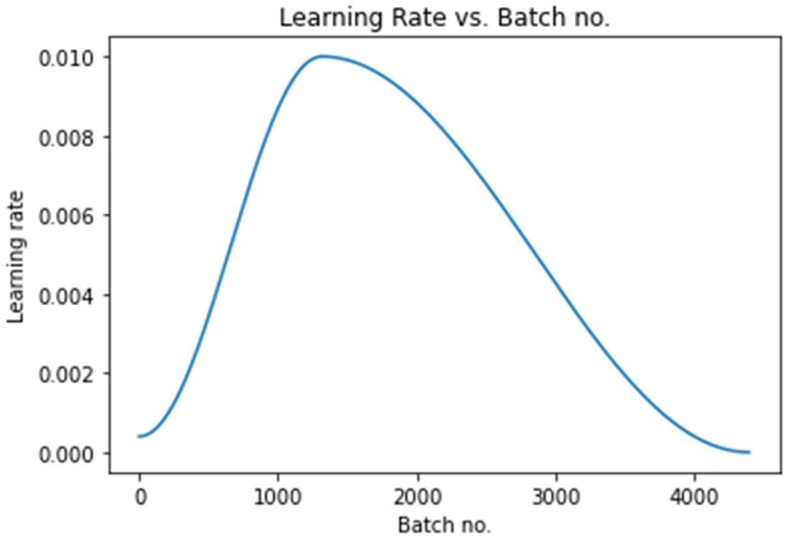
Validation Accuracy



Validation loss:



Learning Rate overtime



Output:

Plant Disease Detection

Upload Plant Image

Choose File PotatoEarlyBlight3.JPG Predict

Prediction: Potato___Early_blight

Predictable Diseases

Sr.	Tomato
1	Late Blight
2	Healthy
3	Early Blight
4	Septoria Leaf Spot
5	Yellow Leaf Curl Virus
6	Bacterial Spot
7	Target Spot
8	Tomato Mosaic Virus
9	Leaf Mold
10	Spider Mites

Sr.	Apple

Plant Disease Detection

Upload Plant Image

Choose File grapes_leaf_blight.jpeg Predict

Prediction: Grape___Leaf_blight_(Isariopsis_Leaf_Spot)

Predictable Diseases

Sr.	Tomato
1	Late Blight
2	Healthy
3	Early Blight
4	Septoria Leaf Spot
5	Yellow Leaf Curl Virus
6	Bacterial Spot
7	Target Spot
8	Tomato Mosaic Virus
9	Leaf Mold
10	Spider Mites

Sr.	Apple