Model: ResNet-50 (Modified)

Why? Because ResNet-50 is a well-known deep learning architecture that performs well on image classification tasks. By modifying it to handle grayscale input and adjusting the output layer, it is adapted to suit the MNIST dataset.

Main Idea of the Model:

- **Modification of the original architecture**:
    - The first convolutional layer is modified to accept grayscale images (1 input channel).
    - The final fully connected layer is modified to output 10 classes (to match the MNIST dataset).
- **Residual connections** are retained from the original ResNet-50 to allow for easier gradient flow and better training efficiency.

Hyperparameters:

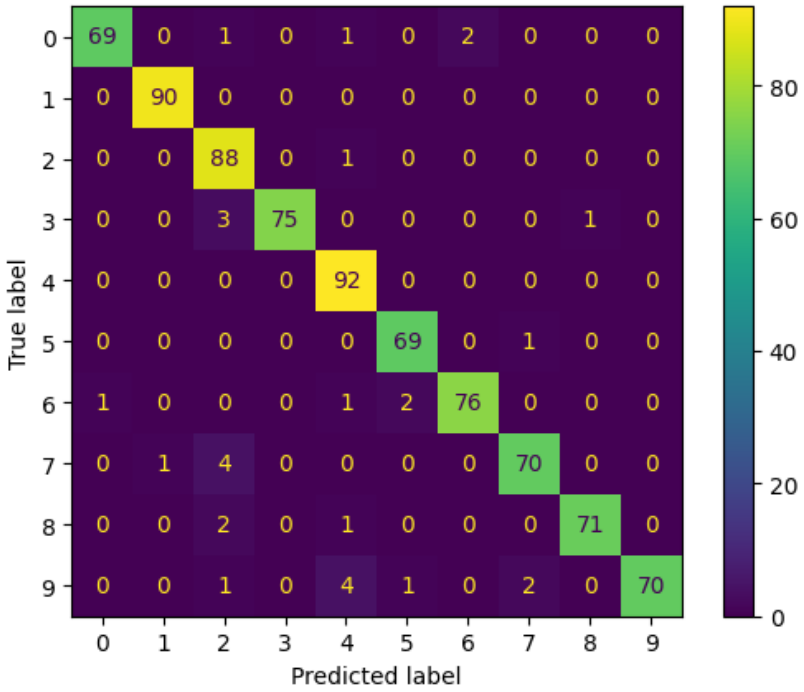
- **Input channel**: 1 (for grayscale images)
- **Output channels**: 10 (for the MNIST digit classes)
- **Optimizer**: Adam with default parameters (learning rate 0.003, weight decay 1e-5)
- **Learning rate decay**: Using StepLR scheduler, reducing the learning rate by a factor of 0.2 every 7 epochs
- **Loss function**: Cross-Entropy Loss
- **Number of epochs**: 30
- **Batches per epoch**: All available samples (subset of MNIST dataset)
- **Batch size**: 32

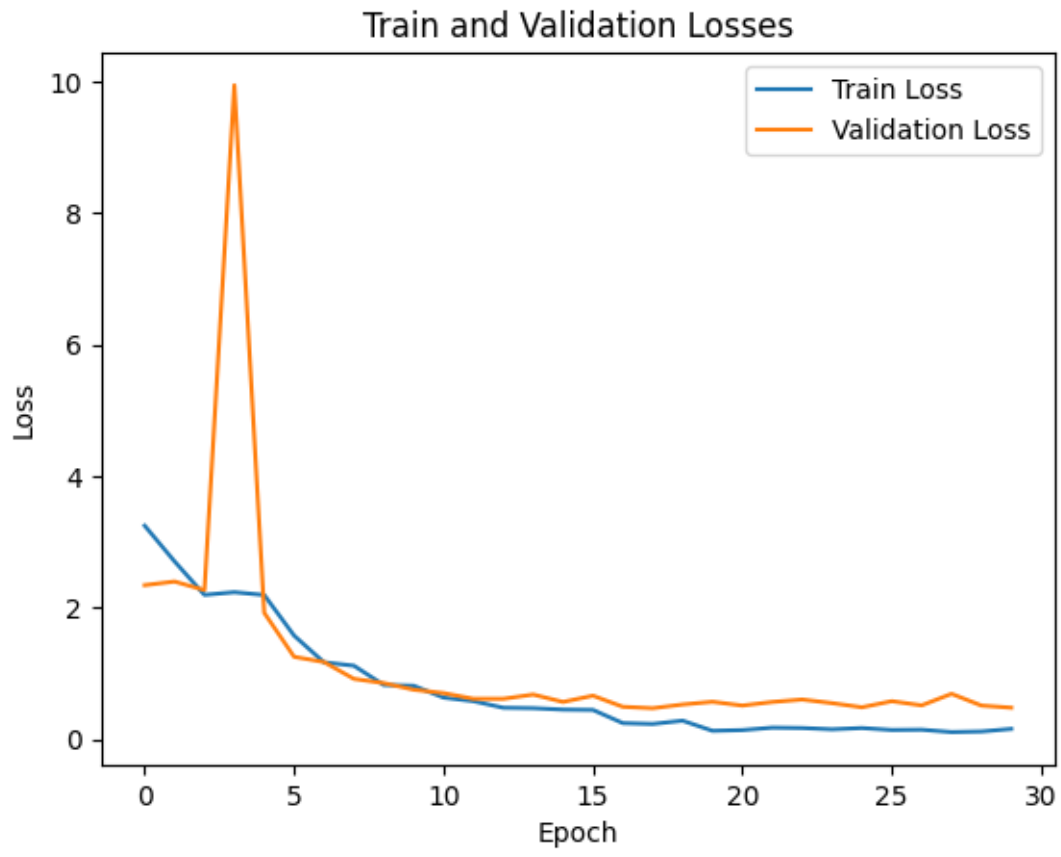
Dataset:

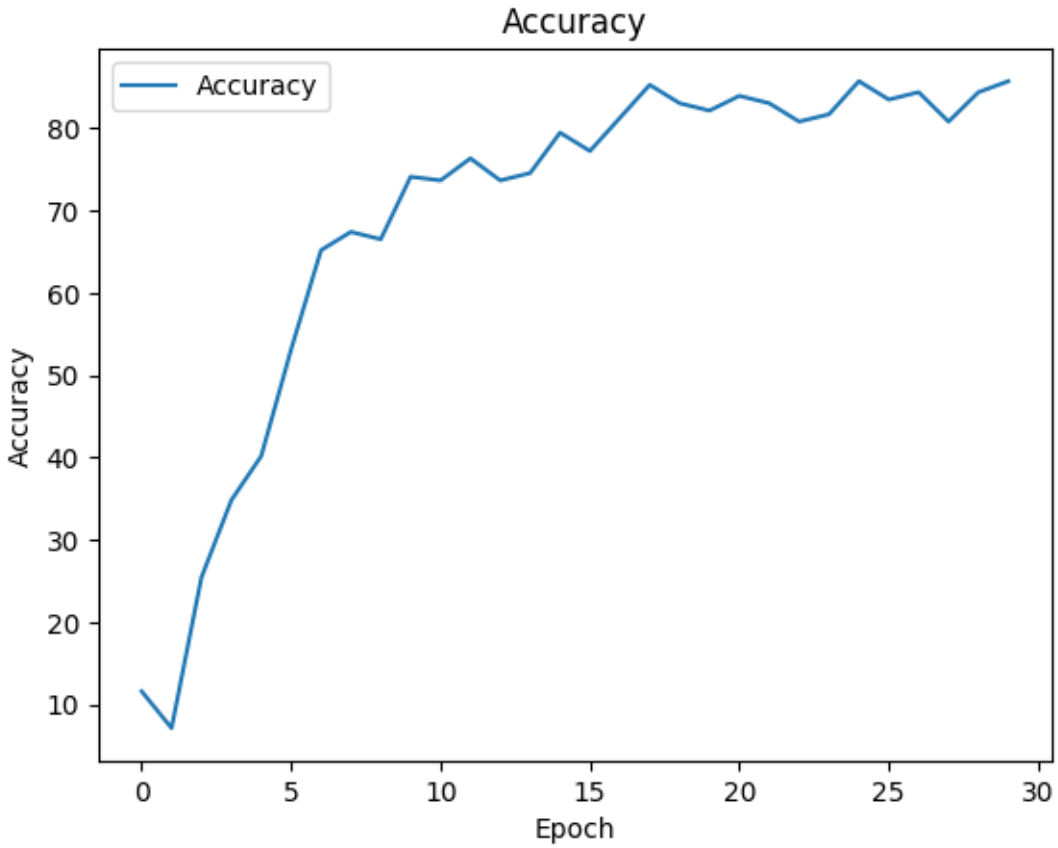
- A **random subset of MNIST** is used for training and testing:
    - **1000 training samples**
    - **800 test samples**
- The images are transformed to tensors using ToTensor().

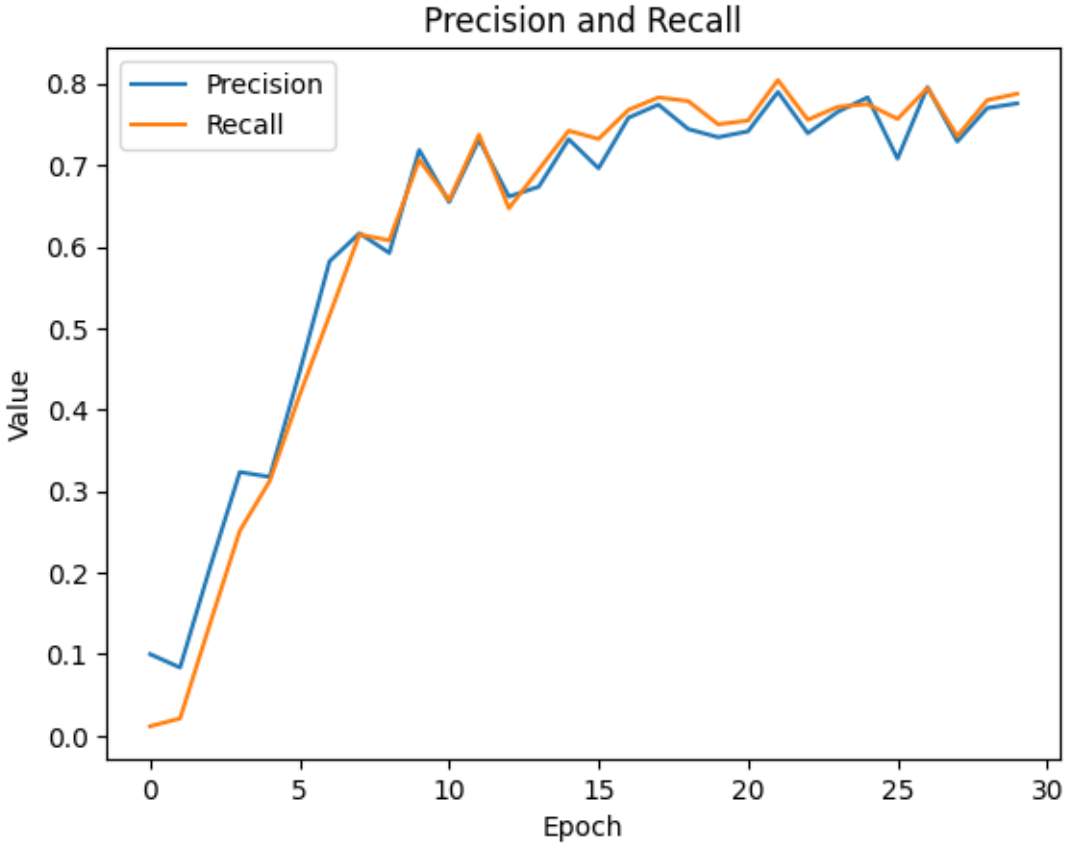
Results:

- **Highest accuracy**:96.0% (accuracy could vary based on the random subset and training conditions)






Accuracy
Accuracy
Accuracy
Epoch
10
20
30
40
50
60
70
80
0
5
10
15
20
25
30


Precision and Recall
Precision
Recall
Value
Epoch
0.0
0.1
0.2
0.3
0.4
0.5
0.6
0.7
0.8
0
5
10
15
20
25
30