

```
In [1]: from data_loader import load_mnist, show_image
```

```
import os
current_dir = os.getcwd()
project_root = os.path.dirname(current_dir)
data_dir = os.path.join(project_root, 'data')
train_images, train_labels = load_mnist(data_dir, kind='train')
test_images, test_labels = load_mnist(data_dir, kind='t10k')
show_image(train_images, train_labels, test_images, test_labels)
```

Dataset	Images Shape	Labels Shape
Train	(60000, 784)	(60000,)
Test	(10000, 784)	(10000,)

Train Images (First 30)



```
In [2]: from cnn_model import CNN
```

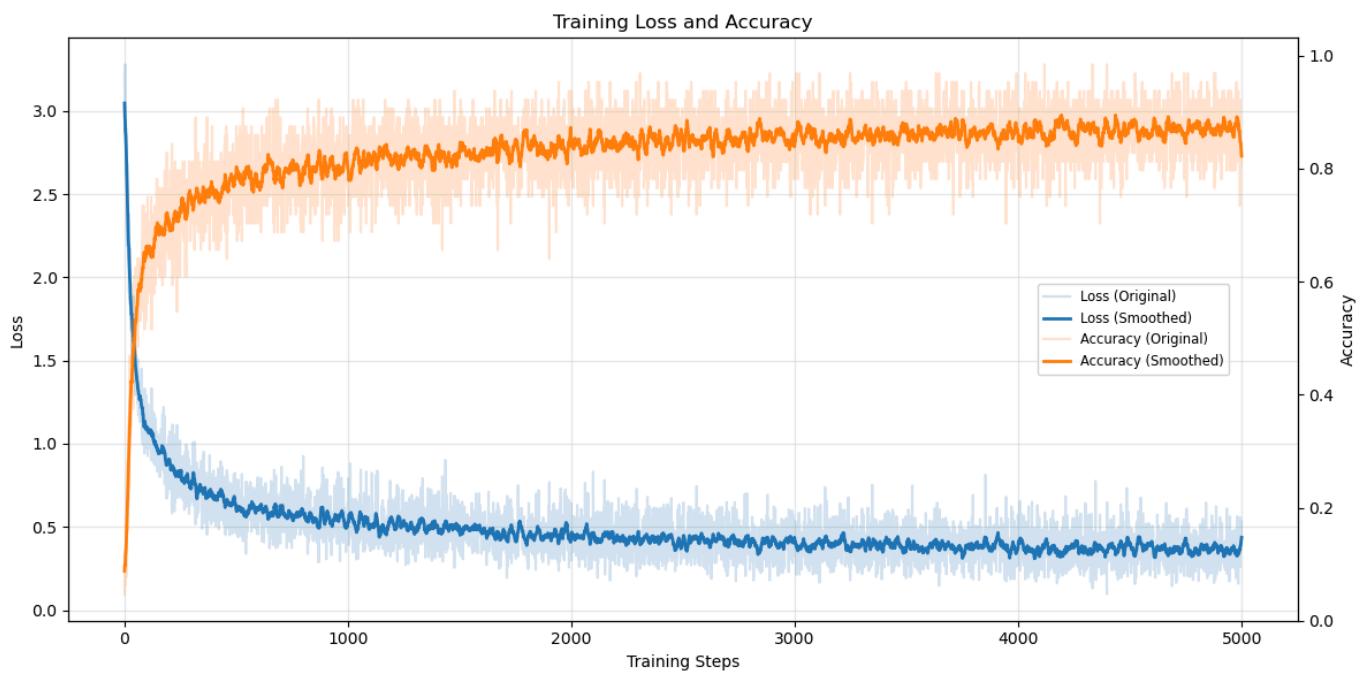
```
model = CNN()
model.print_model()
```

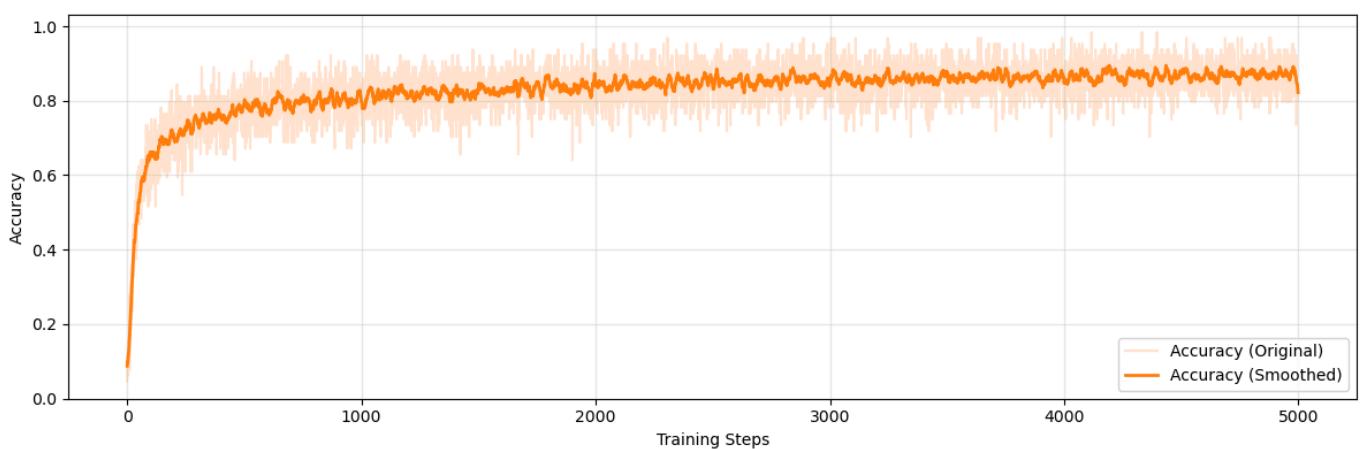
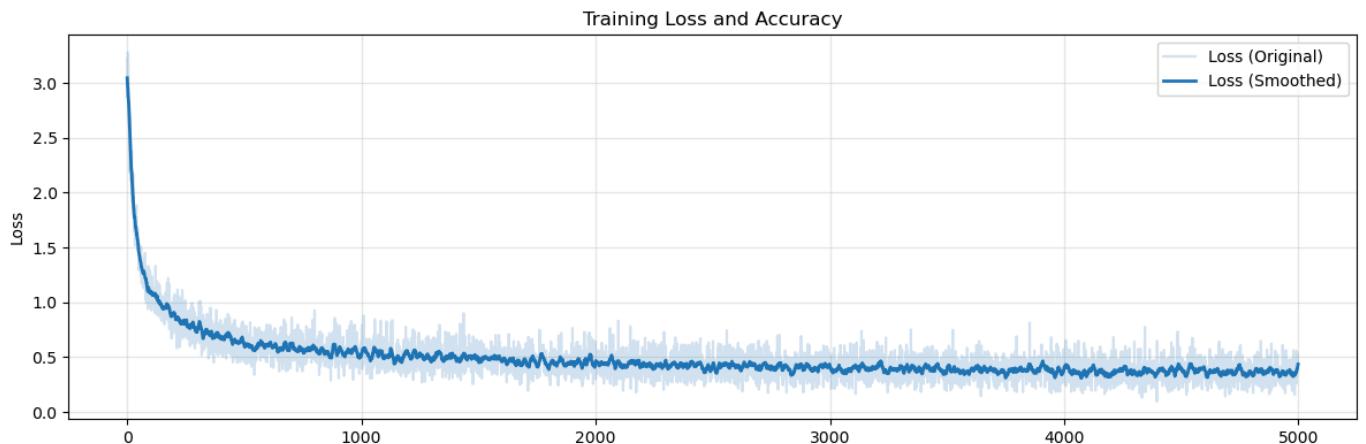
Layer (type)	Output Shape	Param #
<hr/>		
Conv2D	(6, 28, 28)	156
BatchNorm	(6, 28, 28)	12
ReLU	(6, 28, 28)	0
MaxPool2D	(6, 14, 14)	0
Conv2D	(16, 10, 10)	2416
BatchNorm	(16, 10, 10)	32
ReLU	(16, 10, 10)	0
MaxPool2D	(16, 5, 5)	0
FullyConnected	(120,)	48120
ReLU	(120,)	0
FullyConnected	(84,)	10164
ReLU	(84,)	0
FullyConnected	(10,)	850
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Total params: 61750

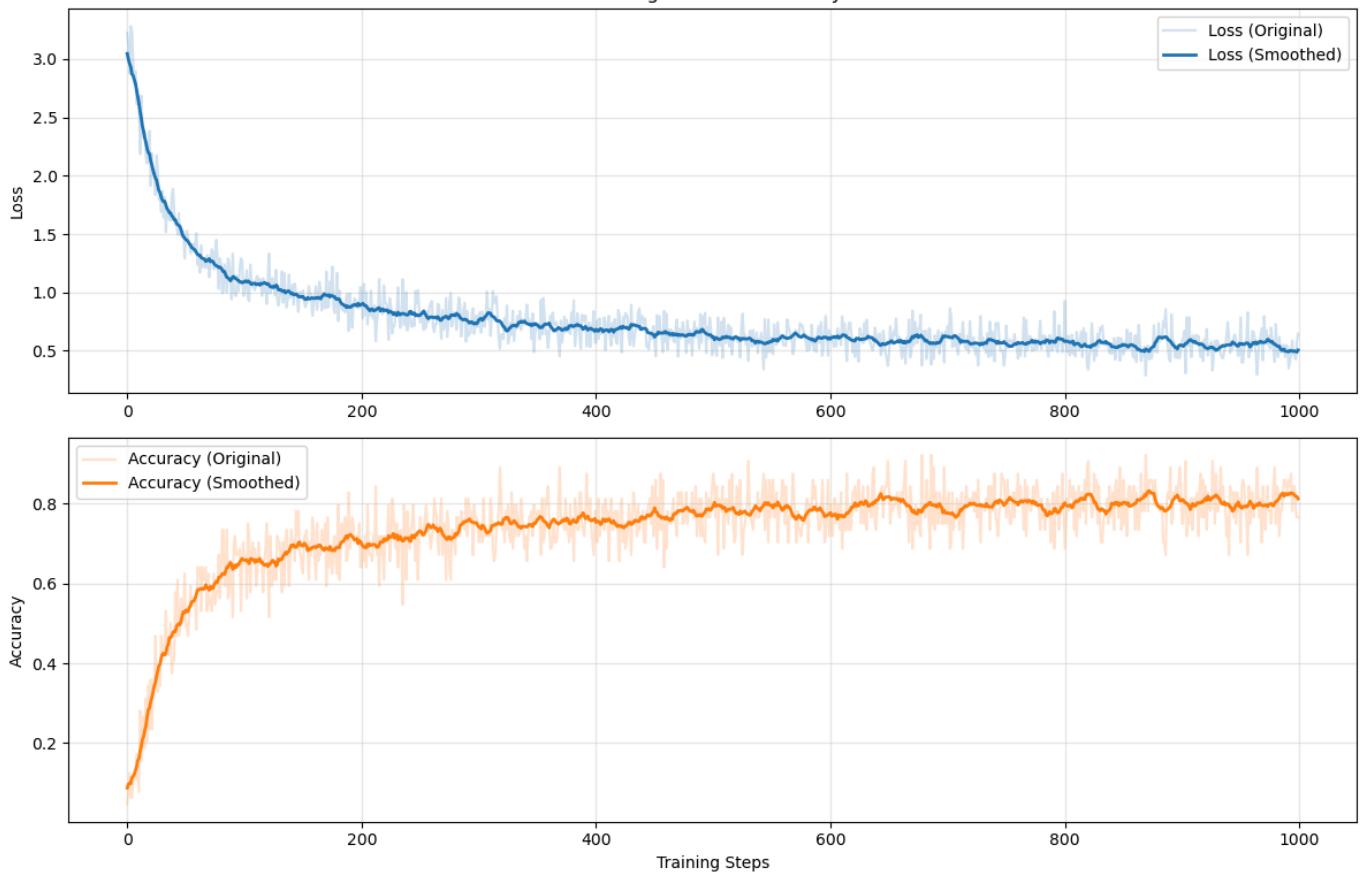
```
In [ ]: from train import train
max_steps = 5000
batch_size = 64
learning_rate = 0.0005
train(train_images, train_labels, model, max_steps, batch_size, learning_rate)
```

```
In [3]: from plot import *
log_dir = os.path.join(current_dir, 'logs')
losses = np.load(os.path.join(log_dir, 'losses.npy'))
accuracies = np.load(os.path.join(log_dir, 'accuracies.npy'))
plot_loss_accuracy1(losses=losses, accuracies=accuracies)
plot_loss_accuracy2(losses=losses, accuracies=accuracies)
losses = losses[0:1000]
accuracies = accuracies[0:1000]
plot_loss_accuracy1(losses=losses, accuracies=accuracies)
plot_loss_accuracy2(losses=losses, accuracies=accuracies)
```





### Training Loss and Accuracy



```
In [4]: from predict import predict
# test_mask = np.random.choice(len(test_images), 1000, replace=False)
# test_images = test_images[test_mask]
# test_labels = test_labels[test_mask]
predict(test_images=test_images, test_labels=test_labels)
```

model	accuracy
model_step1000.npz	0.8016
model_step2000.npz	0.8264
model_step3000.npz	0.8462
model_step4000.npz	0.8534
model_step5000.npz	0.8612

