# Mnist_Reproducible_fed_avg_plots

February 7, 2026

```python
[6]: import numpy as np
     import matplotlib.pyplot as plt
```

```python
[7]: acc_mlp_iid_m10 = np.load('./acc_mlp_iid_m10.npy')
     acc_mlp_iid_m50 = np.load('./acc_mlp_iid_m50.npy')
     acc_cnn_iid_m10 = np.load('./acc_cnn_iid_m10.npy')
     acc_cnn_iid_m50 = np.load('./acc_cnn_iid_m50.npy')

     acc_mlp_noniid_m10 = np.load('./acc_mlp_noniid_m10.npy')
     acc_mlp_noniid_m50 = np.load('./acc_mlp_noniid_m50.npy')
     acc_cnn_noniid_m10 = np.load('./acc_cnn_noniid_m10.npy')
     acc_cnn_noniid_m50 = np.load('./acc_cnn_noniid_m50.npy')
```

```python
[8]: x = np.arange(1,101)
     plt.figure(figsize=(8,6))

     plt.title("FedAvg test accuracy after $t$ rounds on iid MNIST")

     plt.xlabel("Communication rounds $t$")
     plt.ylabel("Test accuracy")
     plt.axis([0, 100, 0.9, 1])

     plt.axhline(y=0.97, color='r', linestyle='dashed')
     plt.axhline(y=0.99, color='b', linestyle='dashed')

     plt.plot(x, acc_mlp_iid_m10, label='2NN, $m=10$, $E=1$')
     plt.plot(x, acc_mlp_iid_m50, label='2NN, $m=50$, $E=1$')

     plt.plot(x, acc_cnn_iid_m10, label='CNN, $m=10$, $E=5$')
     plt.plot(np.arange(1, len(acc_cnn_iid_m50) + 1), acc_cnn_iid_m50, label='CNN,␣
      ↪$m=50$, $E=5$')

     plt.legend()

     plt.show()
```
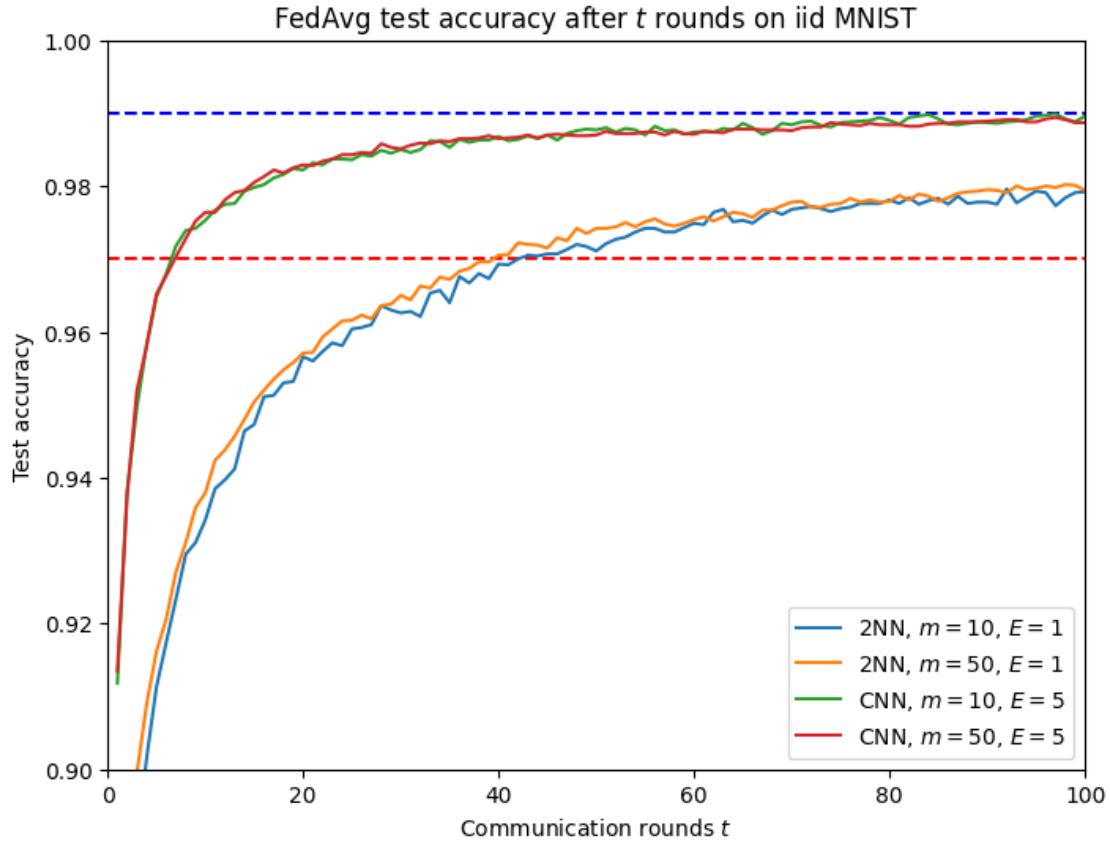
FedAvg test accuracy after $t$ rounds on iid MNIST

Legend:
- 2NN, $m = 10$, $E = 1$
- 2NN, $m = 50$, $E = 1$
- CNN, $m = 10$, $E = 5$
- CNN, $m = 50$, $E = 5$

```
[9]: x = np.arange(1,301)
     plt.figure(figsize=(8,6))

     plt.title("FedAvg test accuracy after $t$ rounds on non-iid MNIST")

     plt.xlabel("Communication rounds $t$")
     plt.ylabel("Test accuracy")
     plt.axis([0, 300, 0.85, 1])

     plt.axhline(y=0.97, color='r', linestyle='dashed')
     plt.axhline(y=0.99, color='b', linestyle='dashed')

     plt.plot(x, acc_mlp_noniid_m10[:300], label='2NN, $m=10$, E=1')
     plt.plot(x, acc_mlp_noniid_m50, label='2NN, $m=50$, E=1')

     plt.plot(x[:200], acc_cnn_noniid_m10, label='CNN, $m=10$, E=5')
     plt.plot(x[:100], acc_cnn_noniid_m50, label='CNN, $m=50$, E=5')

     plt.legend()
```

```
plt.show()
```



FedAvg test accuracy after $t$ rounds on non-iid MNIST

Legend:
- 2NN, $m = 10$, E=1
- 2NN, $m = 50$, E=1
- CNN, $m = 10$, E=5
- CNN, $m = 50$, E=5

Axis labels: Test accuracy (y-axis), Communication rounds $t$ (x-axis)