

## PRACTICAL - 2

CM23042

MNIST Digit Recognition using CNN (Client Side)

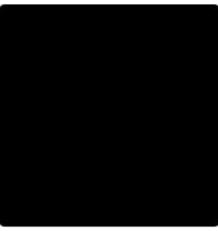
TensorFlow.js loaded using jsDelivr CDN | Training: 5 Epochs

1) Train & Test Model

Train Model (5 Epochs) Test Accuracy

Status: Testing complete ✓

2) Draw Digit & Predict



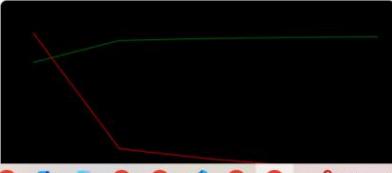
Clear Predict

Prediction: -

Logs / Output

```
Loading MNIST dataset...
Building CNN model...
Training started (5 epochs)...
Epoch 1 => loss=0.1569, acc=95.28%
Epoch 2 => loss=0.1569, acc=95.28%
Epoch 3 => loss=0.1192, acc=96.46%
Epoch 4 => loss=0.0919, acc=97.22%
Epoch 5 => loss=0.0745, acc=97.68%
Training completed successfully ✓
Testing started...
Final Test Accuracy: 98.58%
```

Visualization



MNIST Digit Recognition using CNN (Client Side)

TensorFlow.js loaded using jsDelivr CDN | Training: 5 Epochs

1) Train & Test Model

Train Model (5 Epochs) Test Accuracy

Status: Testing complete ✓

2) Draw Digit & Predict



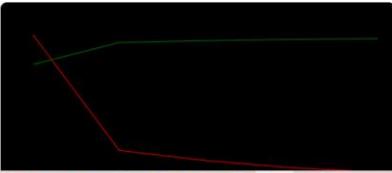
Clear Predict

Prediction: 3

Logs / Output

```
Loading MNIST dataset...
Building CNN model...
Training started (5 epochs)...
Epoch 1 => loss=0.1569, acc=95.28%
Epoch 2 => loss=0.1569, acc=95.28%
Epoch 3 => loss=0.1192, acc=96.46%
Epoch 4 => loss=0.0919, acc=97.22%
Epoch 5 => loss=0.0745, acc=97.68%
Training completed successfully ✓
Testing started...
Final Test Accuracy: 98.58%
Predicted Digit: 3
```

Visualization



**MNIST Digit Recognition using CNN (Client Side)**

TensorFlow.js loaded using jsDelivr CDN | Training: 5 Epochs

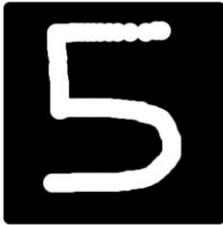
**1) Train & Test Model**

**Train Model (5 Epochs)**

**Test Accuracy**

Status: Testing complete ✓

**2) Draw Digit & Predict**



**Prediction: 5**

**Clear** **Predict**

**Logs / Output**

```

Loading MNIST dataset...
Building CNN model...
Training Dense Network (5 epochs)...
Epoch 1 => loss=0.5424, acc=83.30%
Epoch 2 => loss=0.1480, acc=95.66%
Epoch 3 => loss=0.1132, acc=96.47%
Epoch 4 => loss=0.0881, acc=97.26%
Epoch 5 => loss=0.0748, acc=97.69%
Training completed successfully ✅
Testing started...
Final Test Accuracy: 98.57%
Predicted Digit: 5

```

**Visualization**

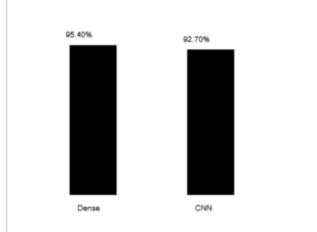


**MNIST Dense vs CNN (TFJS)**

Type here to search

CNN Epoch 5: loss=0.3301, acc=90.70%  
**CNN Accuracy: 93.20%**  
**Comparison Completed Successfully**  
Backend set to CPU  
Loading MNIST dataset...  
MNIST data loaded successfully  
**Training Dense Network (5 epochs)**  
Dense Epoch 1: loss=1.4816, acc=59.50%  
Dense Epoch 2: loss=0.5855, acc=85.30%  
Dense Epoch 3: loss=0.3960, acc=90.20%  
Dense Epoch 4: loss=0.3025, acc=92.70%  
Dense Epoch 5: loss=0.2502, acc=93.00%  
**Dense Accuracy: 95.40%**  
**Training CNN (5 epochs)**  
CNN Epoch 1: loss=1.9657, acc=40.70%  
CNN Epoch 2: loss=1.0282, acc=78.20%  
CNN Epoch 3: loss=0.5437, acc=86.40%  
CNN Epoch 4: loss=0.3819, acc=90.30%  
CNN Epoch 5: loss=0.3109, acc=91.50%  
**CNN Accuracy: 92.70%**  
**Comparison Completed Successfully**

**Accuracy Comparison Chart**



**Console**

```

dense Dense2 (Dense) [[null,128]] task1.html:132
[null,18] 1290
=====
Total params: 225034 task1.html:132
Trainable params: 225034 task1.html:132
Non-trainable params: 0 task1.html:132
=====

Training started (5 epochs)...
Epoch 1 => loss=0.5424, acc=83.30% task1.html:91
Epoch 2 => loss=0.1480, acc=95.66% task1.html:91
Epoch 3 => loss=0.1132, acc=96.47% task1.html:91
Epoch 4 => loss=0.0881, acc=97.26% task1.html:91
Epoch 5 => loss=0.0748, acc=97.69% task1.html:91
Training completed successfully ✅ task1.html:91
Testing started... task1.html:91
Final Test Accuracy: 98.57% task1.html:91
Predicted Digit: 5 task1.html:91

```

**What's new in DevTools 144**

See all new features

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**Console**

```

Backend was cleared task3.html:140
MNIST Dense vs CNN Training Started task3.html:141
Backend set to CPU task3.html:142
Loading MNIST dataset... task3.html:142
MNIST data loaded successfully task3.html:142
Training Dense Network (5 epochs) task3.html:142
Dense Epoch 1: loss=1.4816, acc=59.50% task3.html:142
Dense Epoch 2: loss=0.5855, acc=85.30% task3.html:142
Dense Epoch 3: loss=0.3960, acc=90.20% task3.html:142
Dense Epoch 4: loss=0.3025, acc=92.70% task3.html:142
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Dense Accuracy: 95.40% task3.html:142
Training CNN (5 epochs) task3.html:142
CNN Epoch 1: loss=1.9657, acc=40.70% task3.html:142
CNN Epoch 2: loss=1.0282, acc=78.20% task3.html:142
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CNN Epoch 4: loss=0.3819, acc=90.30% task3.html:142
CNN Epoch 5: loss=0.3109, acc=91.50% task3.html:142
CNN Accuracy: 92.70% task3.html:142
Comparison Completed Successfully task3.html:142

```

**What's new in DevTools 144**

See all new features

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