I RAN A CNN INSIDE A PDF

Draw. Predict. Explore.

A real convolutional neural network. No server. No Python. Just a PDF.

DRAW A DIGIT

PREDICTED DIGIT

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CONFIDENCE

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CLASS PROBABILITIES

0	-
1	-
2	-
3	-
4	-
5	-
6	-
7	-
8	-
9	-

Draw / Ink | Clear drawing | Load example | Predict

Click Draw / Ink, then drag inside the square.

HOW TO USE

Click Draw / Ink, then drag to make a digit. Press Esc when done.

Click Predict. Clear drawing removes ink. Load example cycles through digits.

Open in Adobe Acrobat Reader with document JavaScript enabled.

Other PDF viewers may show the layout but ignore its interactive code.

Inside the CNN

INPUT	**1 x 28 x 28**
784 grayscale values	
CONV + RELU	**8 x 28 x 28**
8 spatial 3 x 3 kernels; 80 parameters	
MAX POOL	**8 x 14 x 14**
2 x 2 spatial reduction	
CONV + RELU	**16 x 14 x 14**
16 kernels over 8 channels; 1,168 parameters	
MAX POOL	**16 x 7 x 7**
2 x 2 spatial reduction	
DENSE + RELU	**32**
784 to 32; 25,120 parameters	
DENSE + SOFTMAX	**10**
32 to 10; 330 parameters	

Convolution multiplies each local patch by learned weights at prediction time.

How a PDF executes a CNN

01 INPUT

Acrobat Ink strokes are rasterized to a centered 28 x 28 grayscale image.

02 WEIGHTS

All learned kernels and biases are embedded as document JavaScript arrays.

03 COMPUTE

Acrobat JavaScript loops calculate convolution, ReLU, pooling and dense layers.

04 OUTPUT

Stable softmax converts logits into ten probabilities and updates form fields.

05 OFFLINE

Prediction reads only this document. No external connection or runtime is called.

Compatibility

Target: Adobe Acrobat Reader desktop. JavaScript must be enabled.

Browser, mobile and Preview PDF viewers are not supported for inference.

Benchmarks and reproducibility

MNIST test accuracy	**97.73%**
Model parameters	**26,698**
Exported weights	**270.5 KiB**
Generated PDF size	**546 KiB**
JS / PyTorch agreement	**100% on 100 images**
Maximum logit error	**9.94129e-06**
Acrobat latency	**Not measured in this environment**
Acrobat CNN execution	**Verified with embedded MNIST example**

Reproduce

Run train.py, export_weights.py, then generate_pdf.py from the source project.

Manual drawings can differ from MNIST in stroke width and alignment.