Fig. 2. Architecture of LeNet-5, a Convolutional Neural Network, here for digits recognition. Each plane is a feature map, i.e. a set of units whose weights are constrained to be identical.

Agenda
1. Introduction to LeNet-5
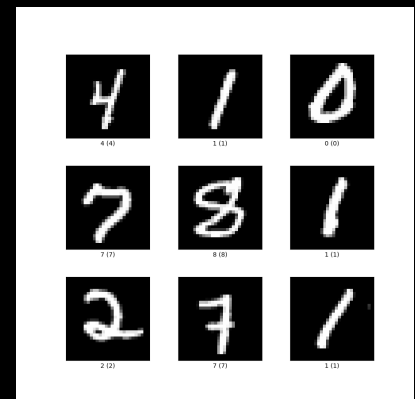2. Architecture of LeNet-5

1998   Yan Lecun

Successful but old

10 classes → 0-9

MNIST

Use Cases
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1) Hand written Digit

2) Bank Cheque Digit

3) Recognizing Zip Codes

7 layers ⟶ 3 Conv
            2 Pooling / Subsampling
            2 Dense Layer

Layer	Layer	Feature Map	Size	Kernel Size	Stride	Activation
Input	Image	1	32x32	-	-	-
1	Convolution	6	28x28	5x5	1	tanh
2	Average Pooling	6	14x14	2x2	2	tanh
3	Convolution	16	10x10	5x5	1	tanh
4	Average Pooling	16	5x5	2x2	2	tanh
5	Convolution	120	1x1	5x5	1	tanh
6	FC	-	84	-	-	tanh
Output	FC	-	10	-	-	softmax

Input layer

$$32 \times 32 \times 1$$

gray scale

Monochrome

B/W

Conv 1

$$32 \times 32 \times 1 \longrightarrow 5 \times 5 / 6 \longrightarrow 28 \times 28 \times 6$$

Pool 1

$$28 \times 28 \times 6 \longrightarrow 2 \times 2 / 2 \longrightarrow 14 \times 14 \times 6$$

Conv 2

$$14 \times 14 \times 6 \longrightarrow 5 \times 5 / 16 \longrightarrow 10 \times 10 \times 16$$

Pool 2

$$10 \times 10 \times 16 \longrightarrow (2,2) / 2 \longrightarrow 5 \times 5 \times 16$$

Conv 3

$$5 \times 5 \times 16 \longrightarrow 5, 5 / 120 \longrightarrow 1 \times 1 \times 120$$

Dense layer 1 $\longrightarrow$ 84 neurons

DL2/Output layer $\longrightarrow$ 10 neurons
Softmax