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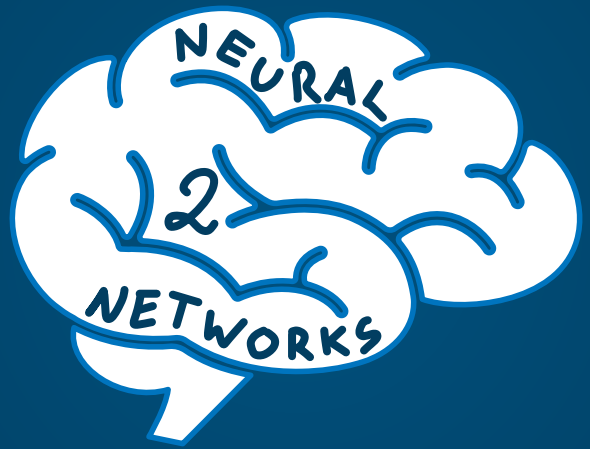

zh
aw

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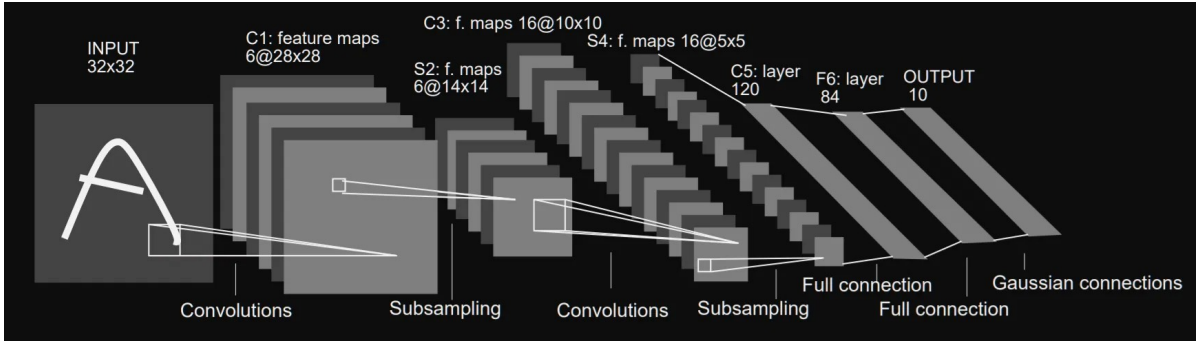
Author: Yann LeCun (1998)

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 or RBF

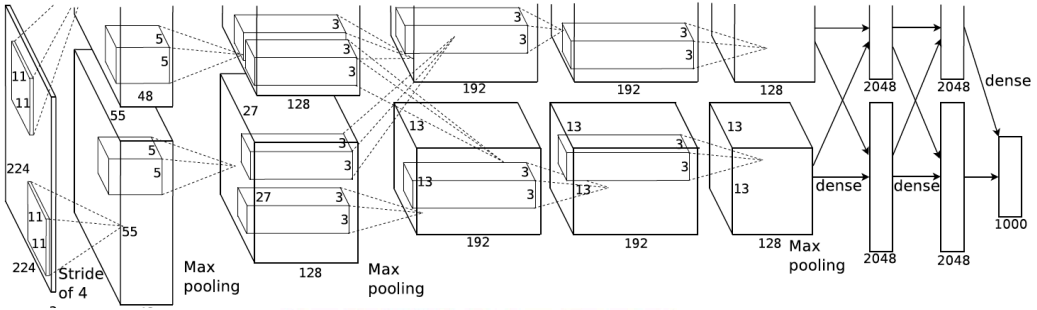
60'000 PARAMETERS!



LeNet-5

Authors: Alex Krizhevsky, Ilya Sutskever, Geoffrey Hinton (2012)

AlexNet



60 million parameters to be learned/estimated!

Layer	# filters / neurons	Filter size	Stride	Padding	Size of feature map	Activation function
Input	-	-	-	-	227 x 227 x 3	-
Conv 1	96	11 x 11	4	-	55 x 55 x 96	ReLU
Max Pool 1	-	3 x 3	2	-	27 x 27 x 96	-
Conv 2	256	5 x 5	1	2	27 x 27 x 256	ReLU
Max Pool 2	-	3 x 3	2	-	13 x 13 x 256	-
Conv 3	384	3 x 3	1	1	13 x 13 x 384	ReLU
Conv 4	384	3 x 3	1	1	13 x 13 x 384	ReLU
Conv 5	256	3 x 3	1	1	13 x 13 x 256	ReLU
Max Pool 3	-	3 x 3	2	-	6 x 6 x 256	-
Dropout 1	rate = 0.5	-	-	-	6 x 6 x 256	-

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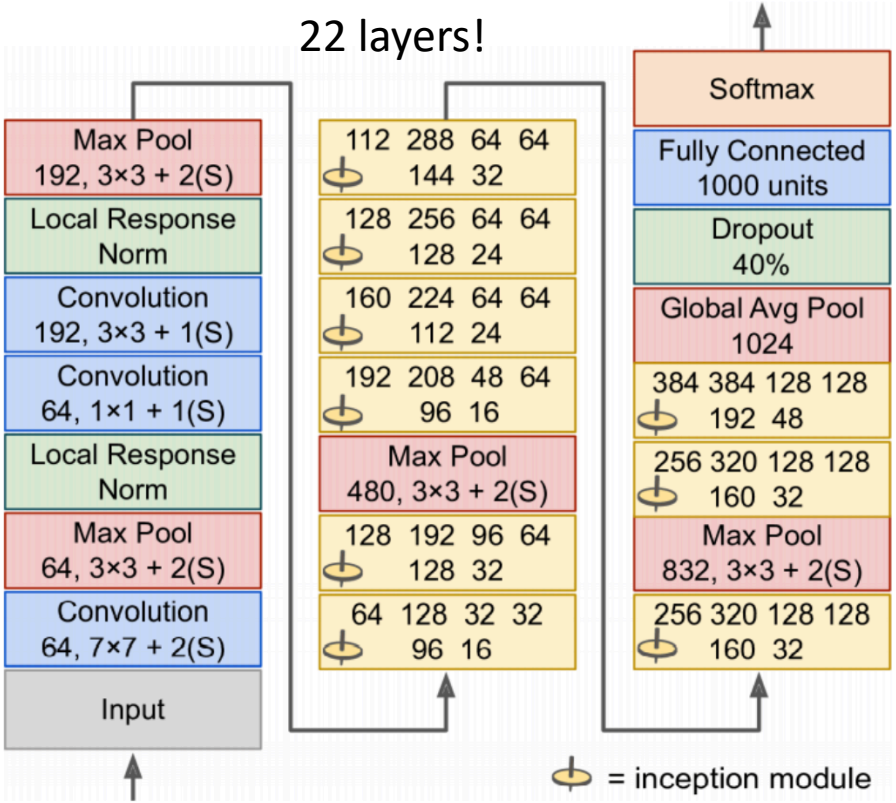
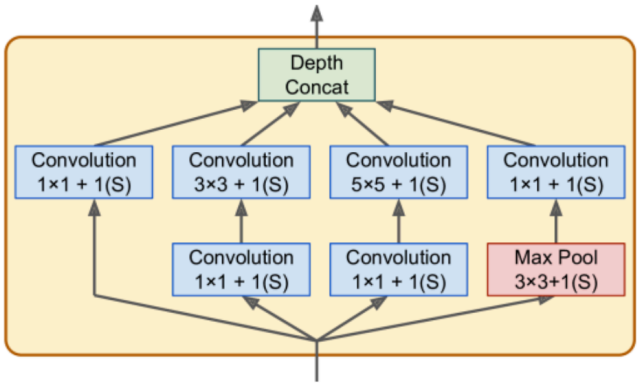
GoogLeNet

Authors: Google (2014)



6 million parameters



The idea of the Inception module is to bring down the number of parameters in a deep NN. The inception module is built with many small convolutions.

Other Famous CNN

- ResNet (2015)
- VGG-16
- Inception-v1

- They all are easily implementable (if not already implemented!) in Keras.

Transfer Learning

1. **Use Pre-trained Models:** Simply use an already trained network on a similar task (but on way more data!)

2. **Keep the basics:** keep only the first convolutional layers of the network and add new classifiers. Convolutional features are more generic in early layers and more dataset-specific in later layers!

3. **Fine-tuning of existing CNN:** keep all the convolutional layers, re-train the classifier, but also fine tune the weights of the top convolutional layers.

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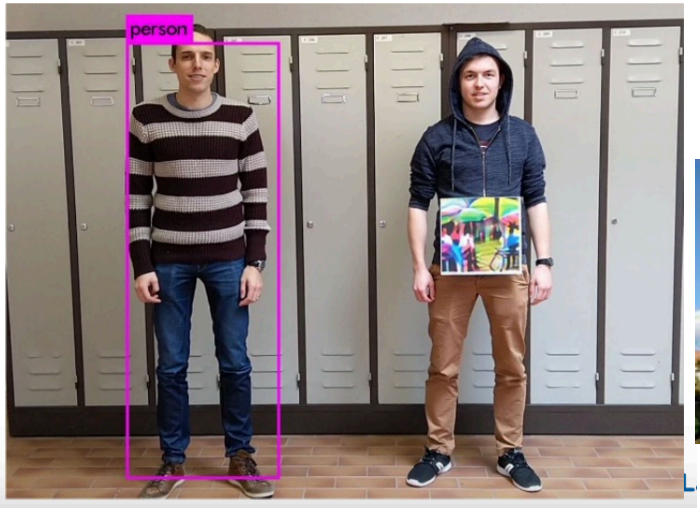
STILL WAY TO GO!

ENVIRONMENT

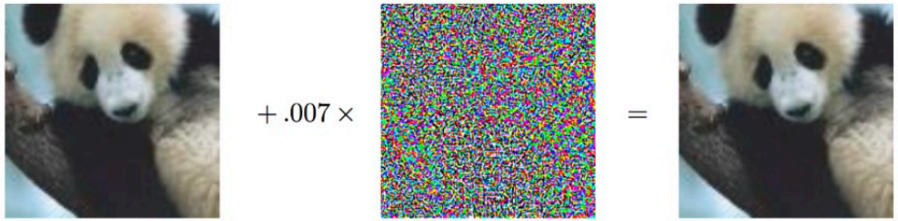
(A) **Cow: 0.99**, Pasture: 0.99, Grass: 0.99, No Person: 0.98, Mammal: 0.98

(B) No Person: 0.99, Water: 0.98, Beach: 0.97, Outdoors: 0.97, Seashore: 0.97

(C) No Person: 0.97, **Mammal: 0.96**, Water: 0.94, Beach: 0.94, Two: 0.94



NOISE



"panda" noise "gibbon"

Thanks

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