

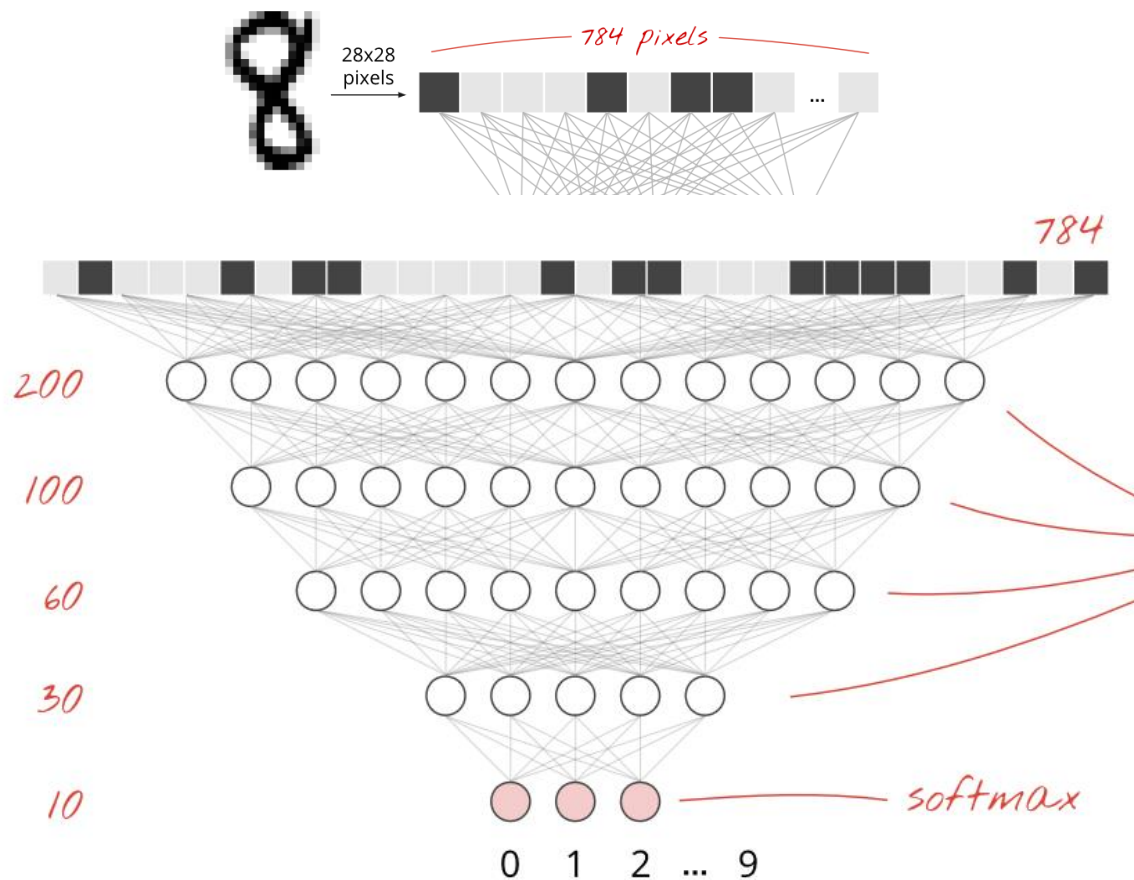
[AULA 02] Redes Neurais Convolucionais

Prof. João F. Mari
joaof.mari@ufv.br

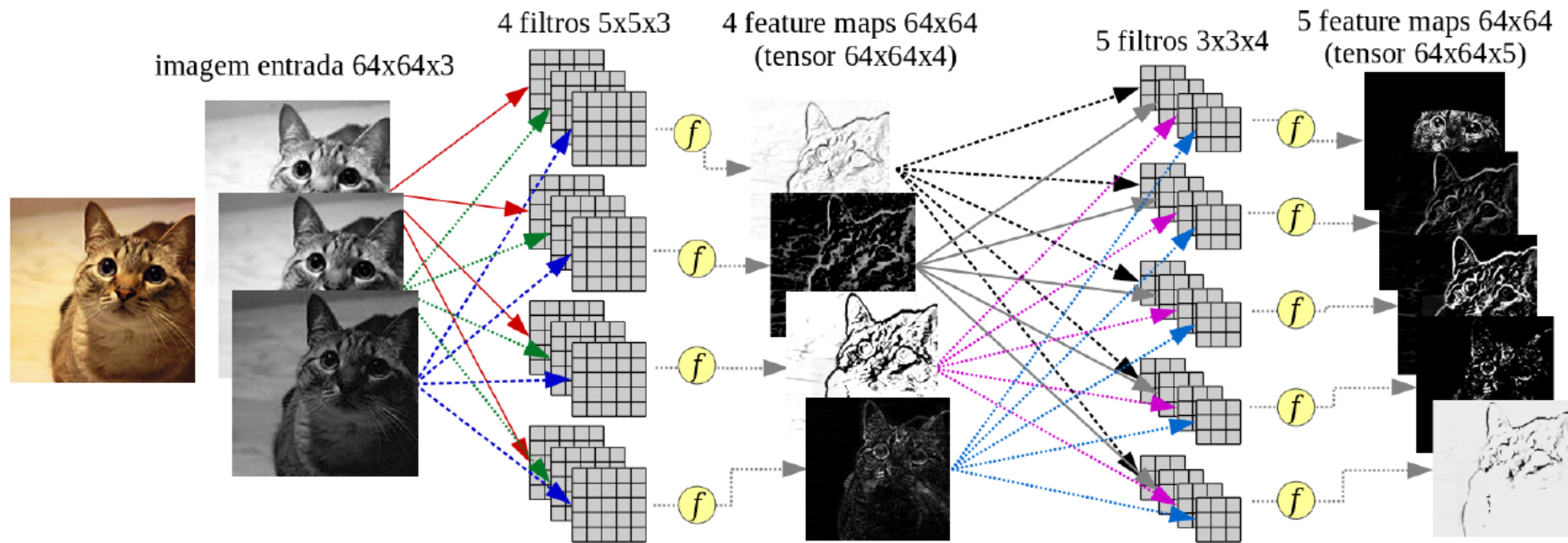
Roteiro

- Classificando imagens com Perceptron de múltiplas camadas (MLP)
- Camada convolucional
- Camada de *pooling*
- AlexNet (2012)
- LeNet-5 (1998)
- Inception (GoogLeNet) (2014)
 - Módulos Inception
- Outros modelos
- Bibliotecas para Redes Neurais Convolucionais
- Instalando o TensorFlow, Keras e PyTorch
- Hardware para o treinamento de RNCs
- Conjuntos de dados clássicos
- Outros conjuntos de dados
- REFERENCIAS

Classificando imagens com Perceptron de múltiplas camadas (MLP)

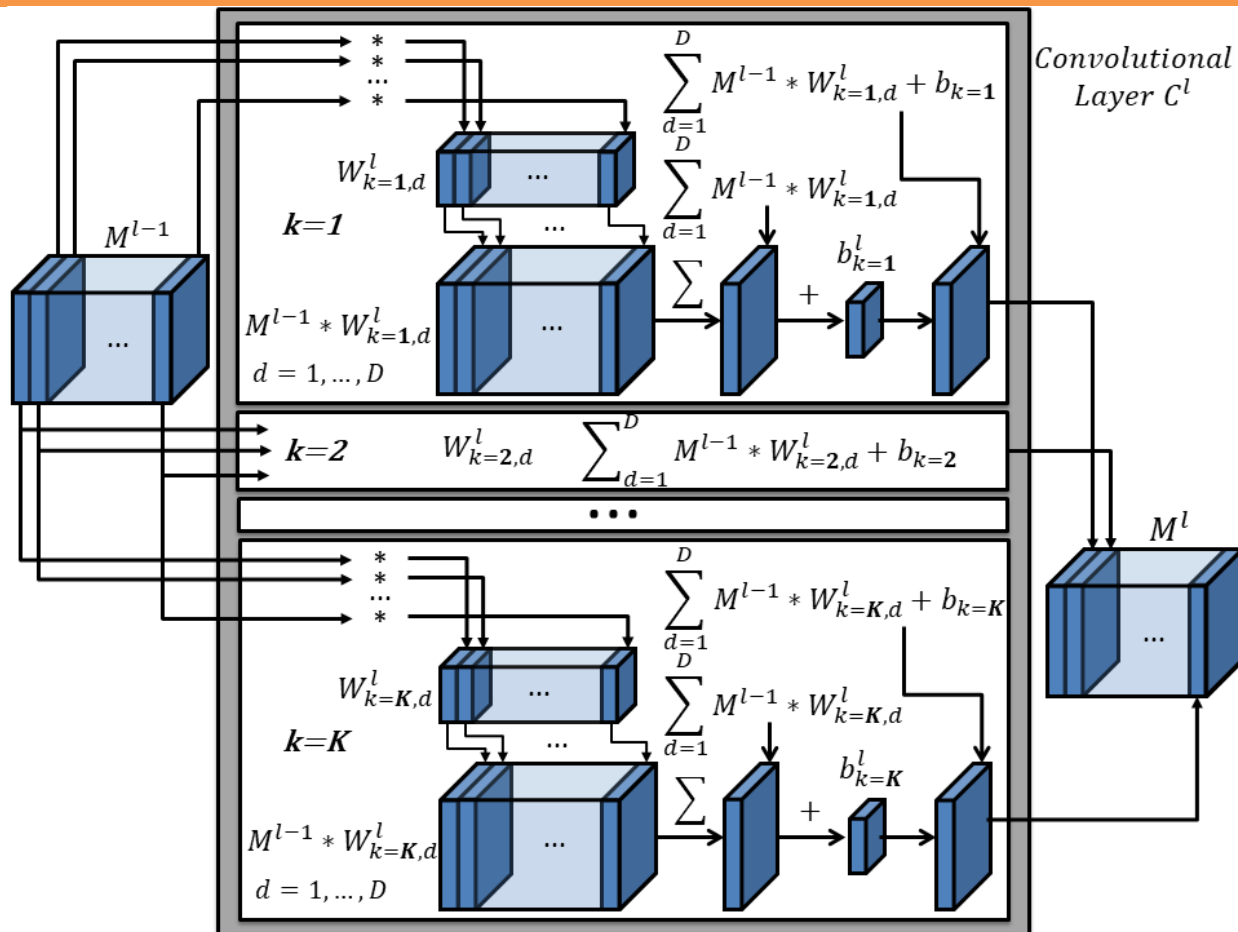


Camada convolucional

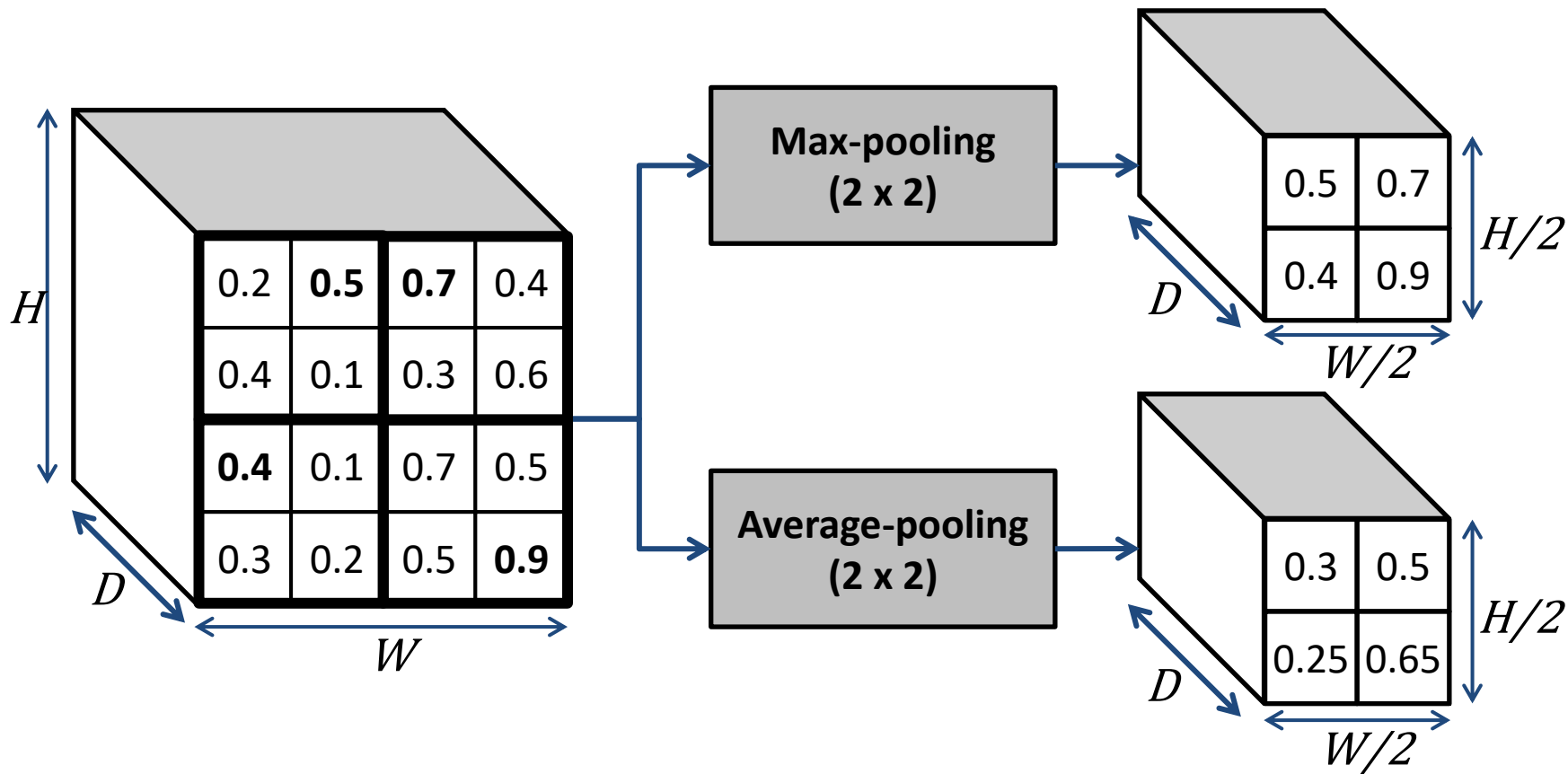


FONTE: Moacir Ponti. Disponível em: <http://conteudo.icmc.usp.br/pessoas/moacir/p17sibgrapi-tutorial/>

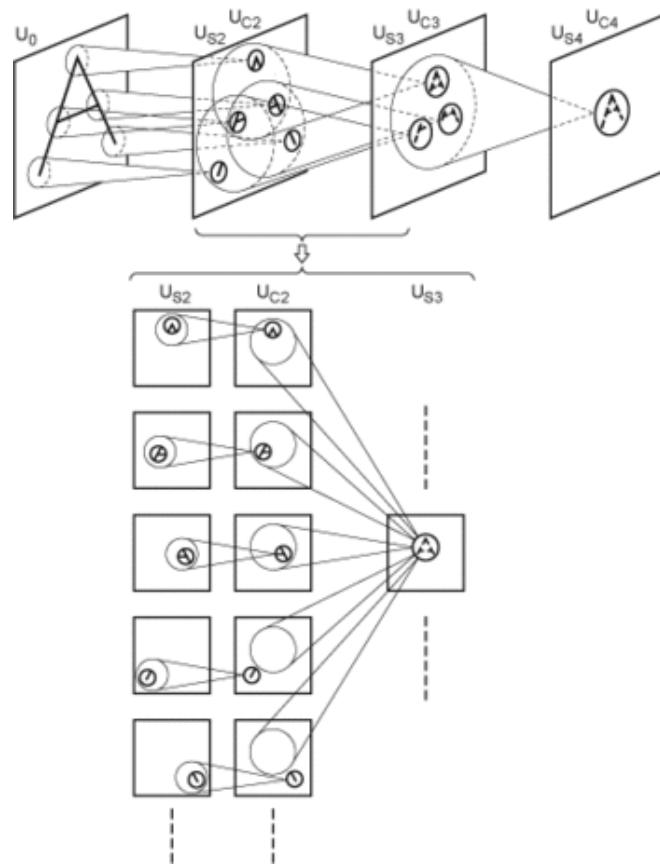
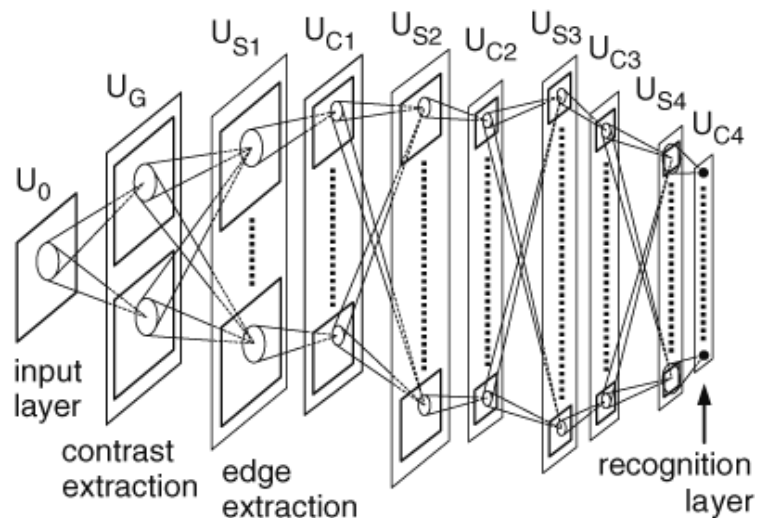
Camada convolucional



Camada de *pooling*



Neocognitron (1980)



Kunihiro Fukushima

LeNet-5 (1998)



Yann LeCun

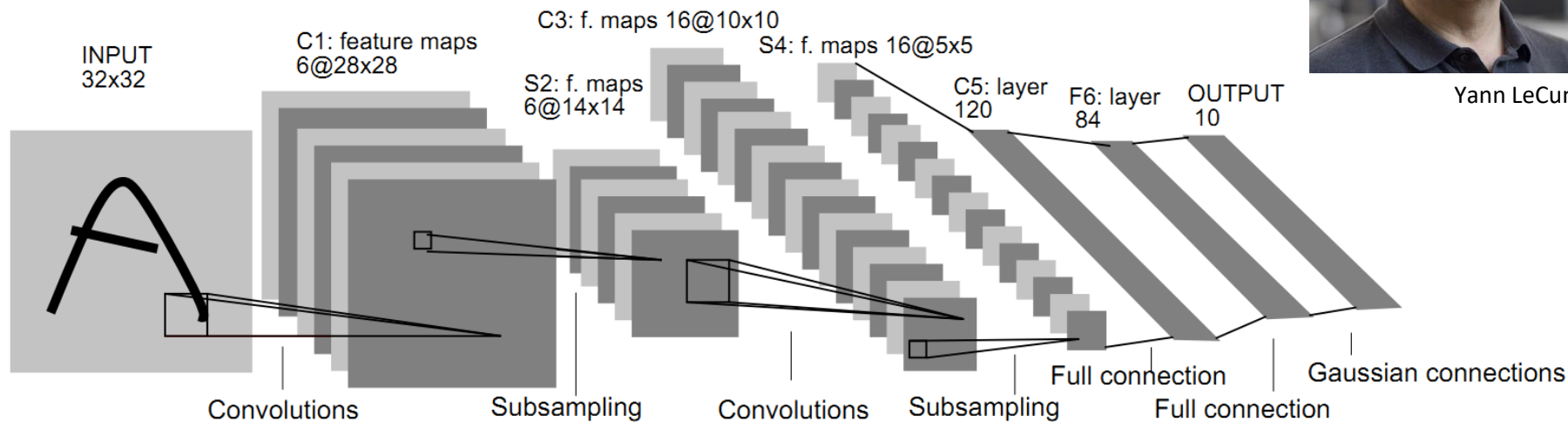
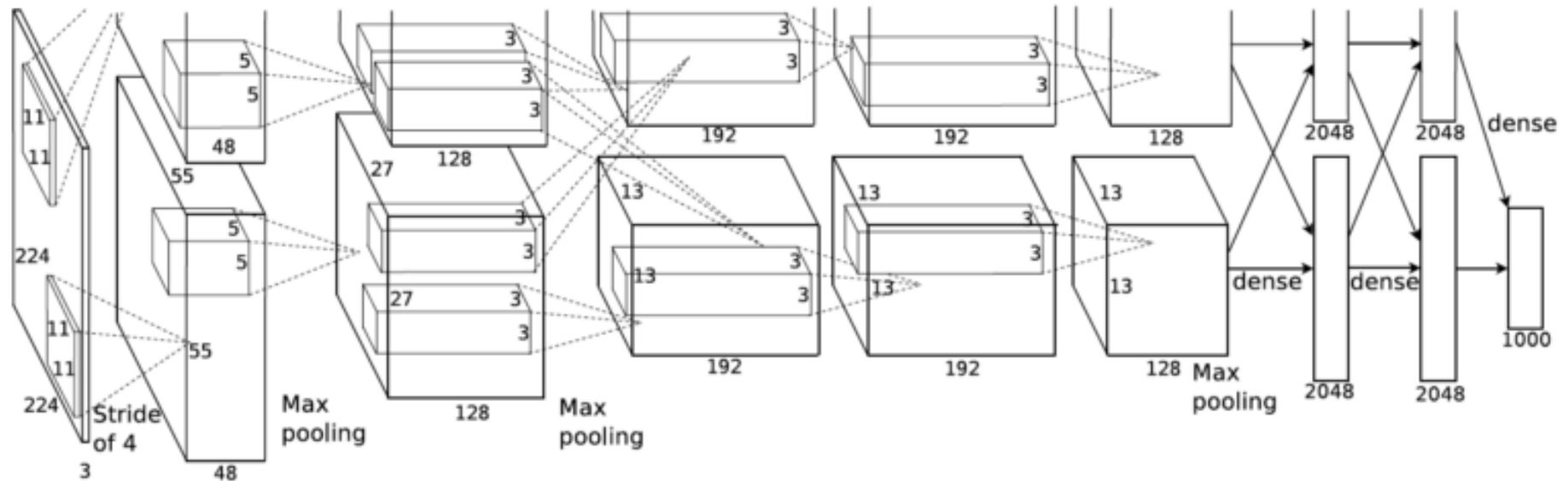
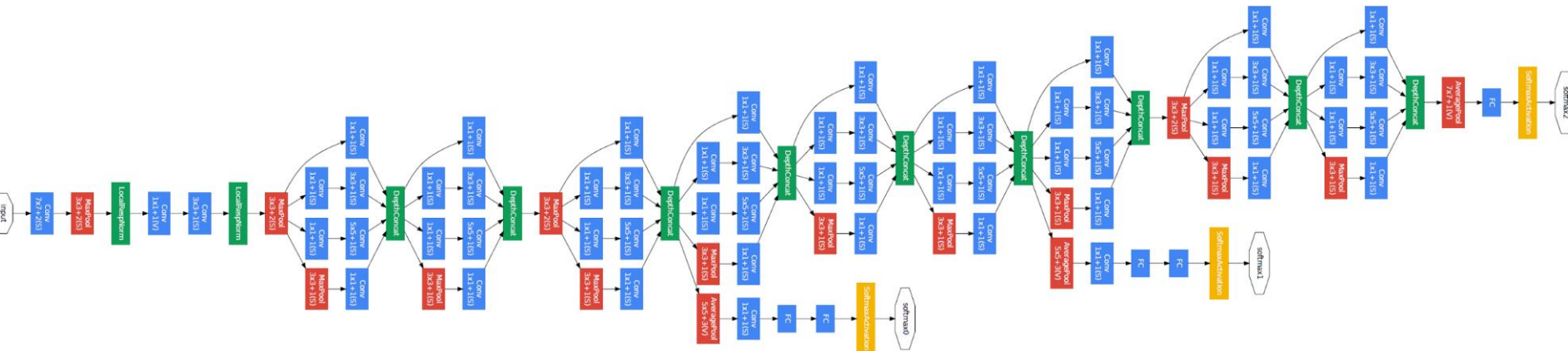


Fig. 2. Architecture of LeNet-5, a Convolutional Neural Network, here for digits recognition. Each plane is a feature map, i.e. a set of units whose weights are constrained to be identical.

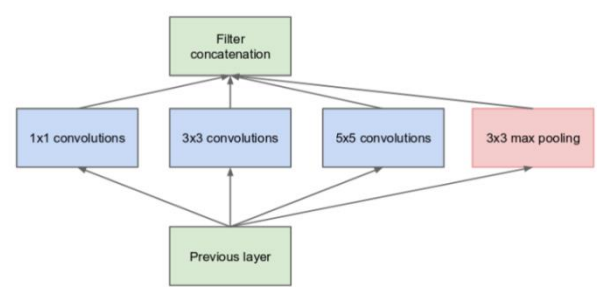
AlexNet (2012)



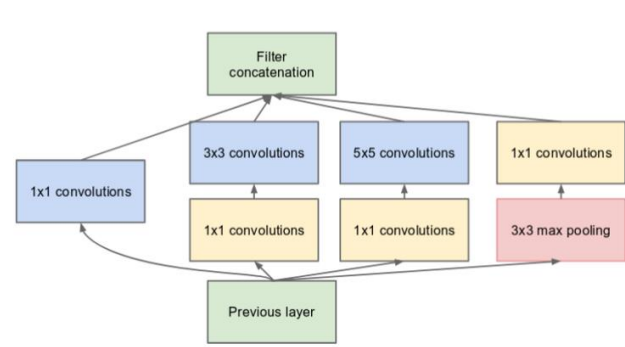
Inception (GoogLeNet) (2014)



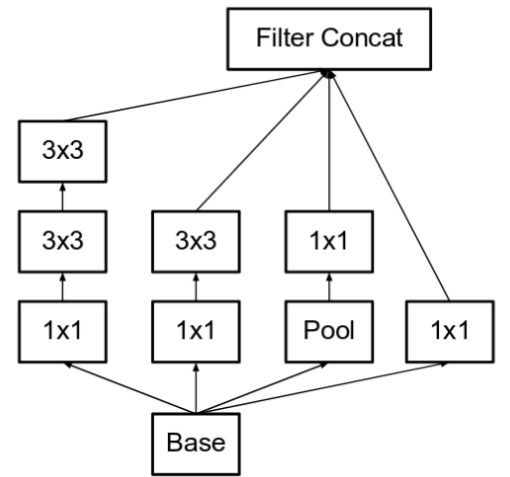
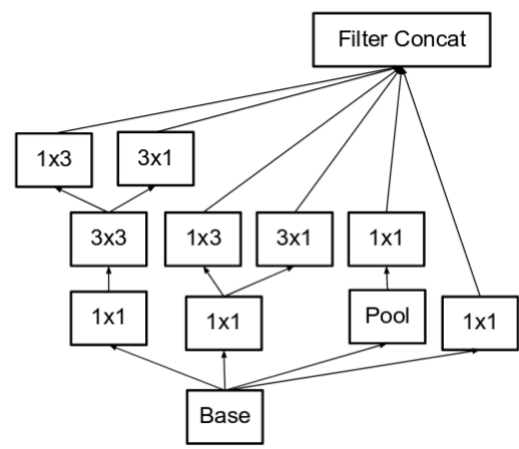
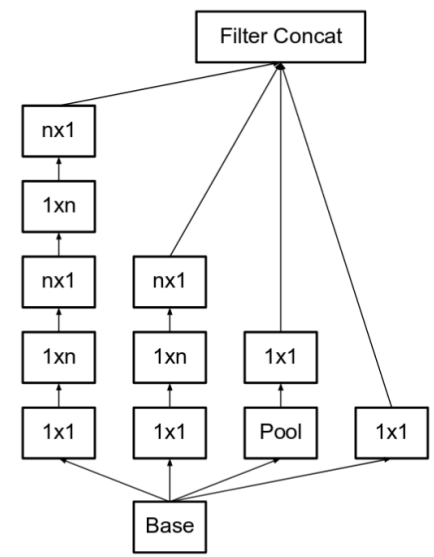
Módulos Inception



(a) Inception module, naïve version

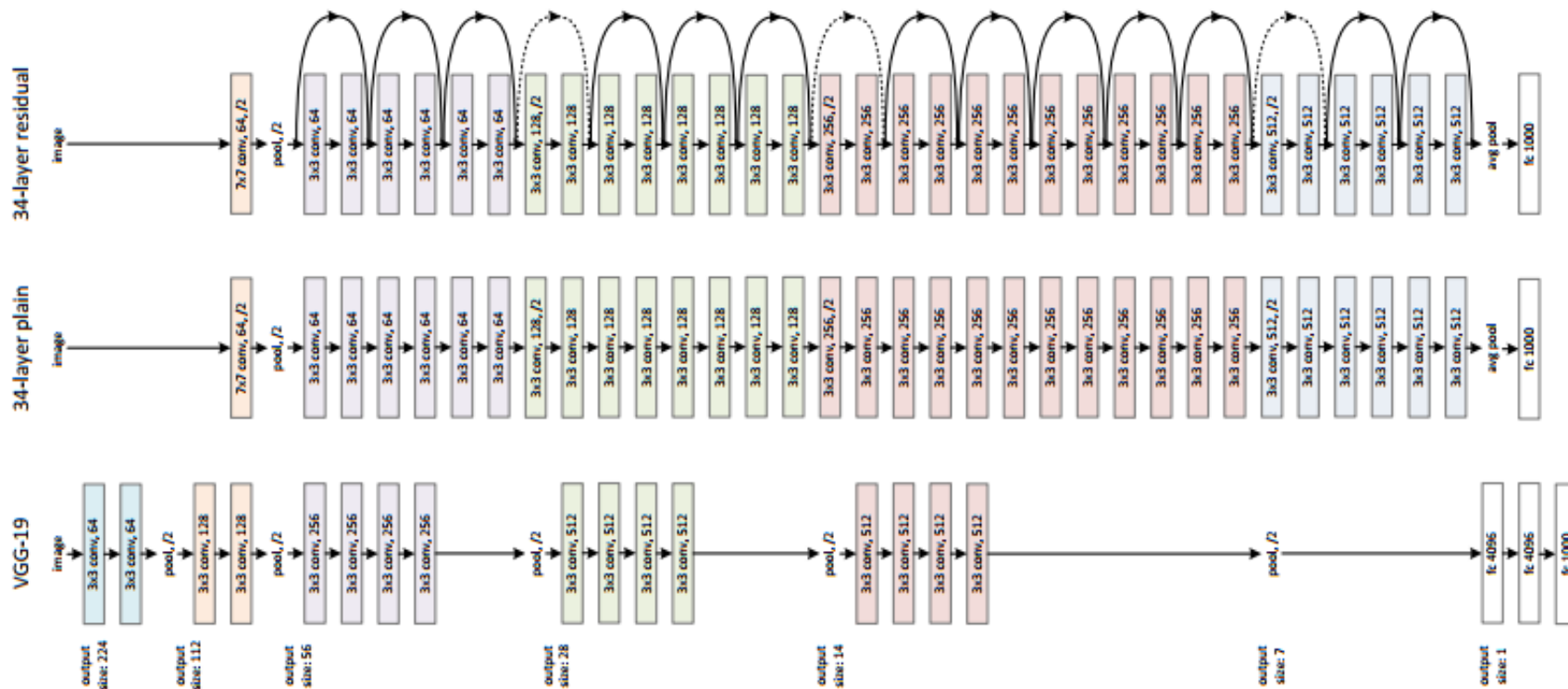


(b) Inception module with dimension reductions



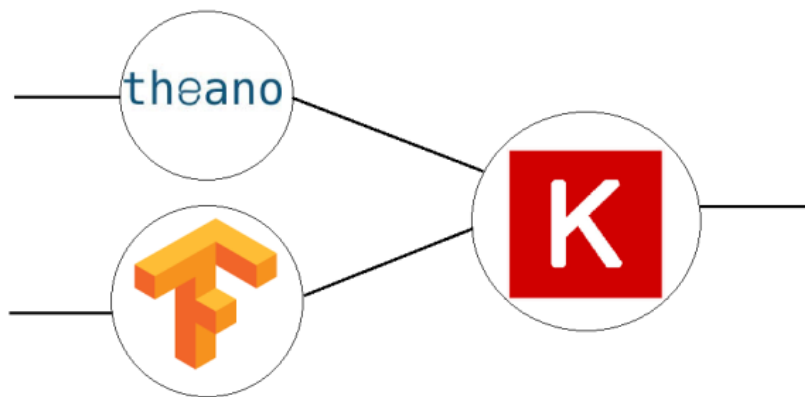
Outros modelos

- VGG (2014) e ResNet (2015)



<https://arxiv.org/abs/1512.03385>

Bibliotecas para Redes Neurais Convolucionais



Caffe

DEEPLEARNING4J



Hardware para o treinamento de RNCs

- O treinamento de RNCs possui alto custo computacional.
 - Recomenda-se que sejam treinados usando GPUs.



Instalando o TensorFlow, Keras e PyTorch

- TensorFlow e Keras:
 - <https://www.tensorflow.org/install/>
- PyTorch:
 - <https://pytorch.org/>

Conjuntos de dados clássicos

- MNIST

- 60,000 training images
- 10,000 testing images
- 28x28 pixels
- Níveis de cinza



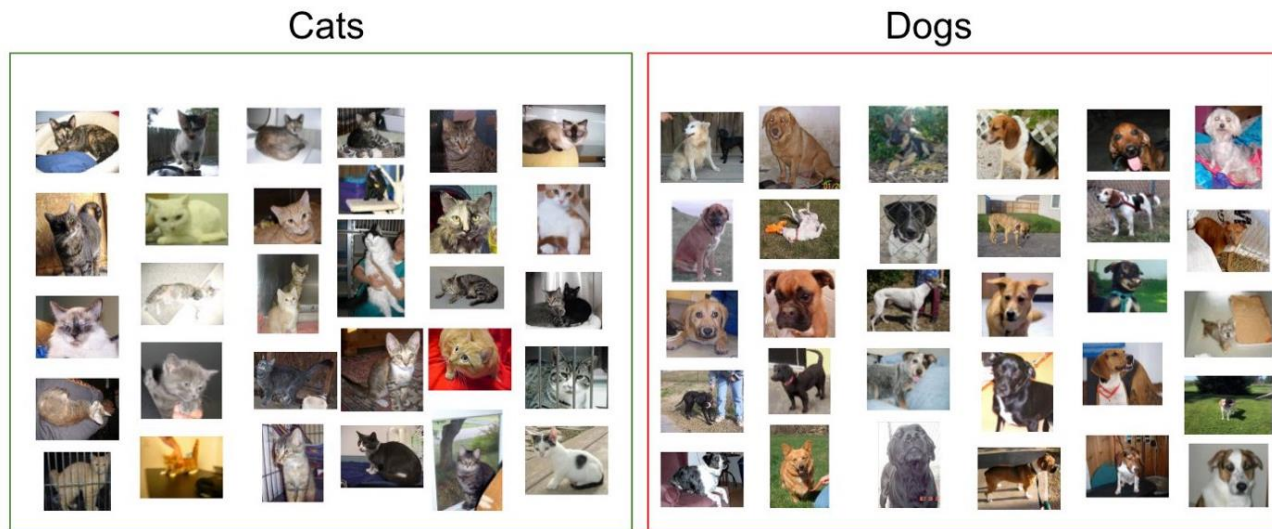
Conjuntos de dados clássicos

- CIFAR10
 - 50,000 training images
 - 10,000 testing images
 - 10 classes
 - 32 x 32 pixels
 - RGB

airplane**automobile****bird****cat****deer****dog****frog****horse****ship****truck**

Conjuntos de dados clássicos

- Cats vs. Dogs
 - 25,000 images of dogs and cats
 - 12500 imagens de teste
 - 2 classes
 - Vários tamanhos
 - RGB



Sample of cats & dogs images from Kaggle Dataset

REFERENCIAS

- Material do Prof. Moacir Ponti (ICMC-USP) sobre Deep Learning
 - https://github.com/maponti/deeplearning_intro_datascience
- Learn TensorFlow and deep learning, without a Ph.D.
 - <https://cloud.google.com/blog/products/gcp/learn-tensorflow-and-deep-learning-without-a-phd>
- CS231n: Convolutional Neural Networks for Visual Recognition
 - <http://cs231n.github.io/>
- Goodfellow, Bengio and Courville. Deep Learning. MIT Press, 2016
 - <https://www.deeplearningbook.org/>
- LeNet – Convolutional Neural Network in Python
 - <https://www.pyimagesearch.com/2016/08/01/lenet-convolutional-neural-network-in-python/>
- A Simple Guide to the Versions of the Inception Network
 - <https://towardsdatascience.com/a-simple-guide-to-the-versions-of-the-inception-network-7fc52b863202>

FIM