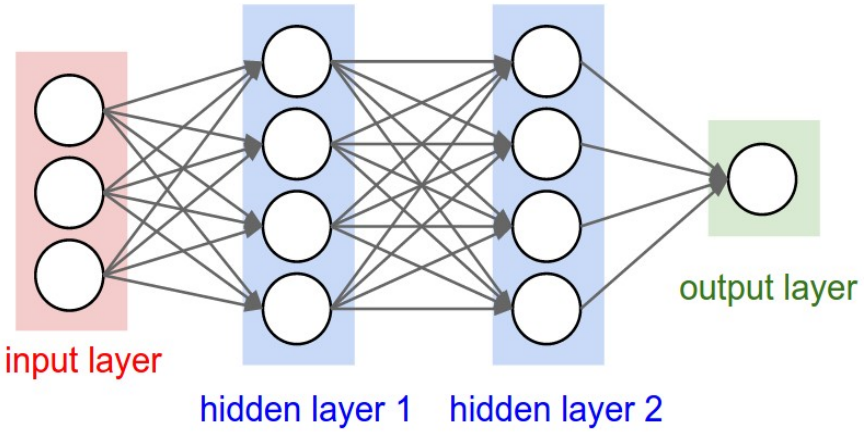
Deep Features for Image Retrieval and Classification

José M. Saavedra (PhD.)
Orand S.A.

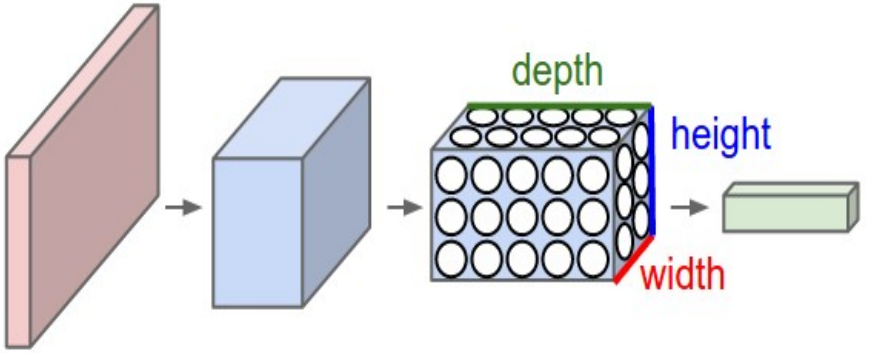
Convolutional Neural Net

A deep layer arranges neurons in a 3D space.

- depth → different kinds of features



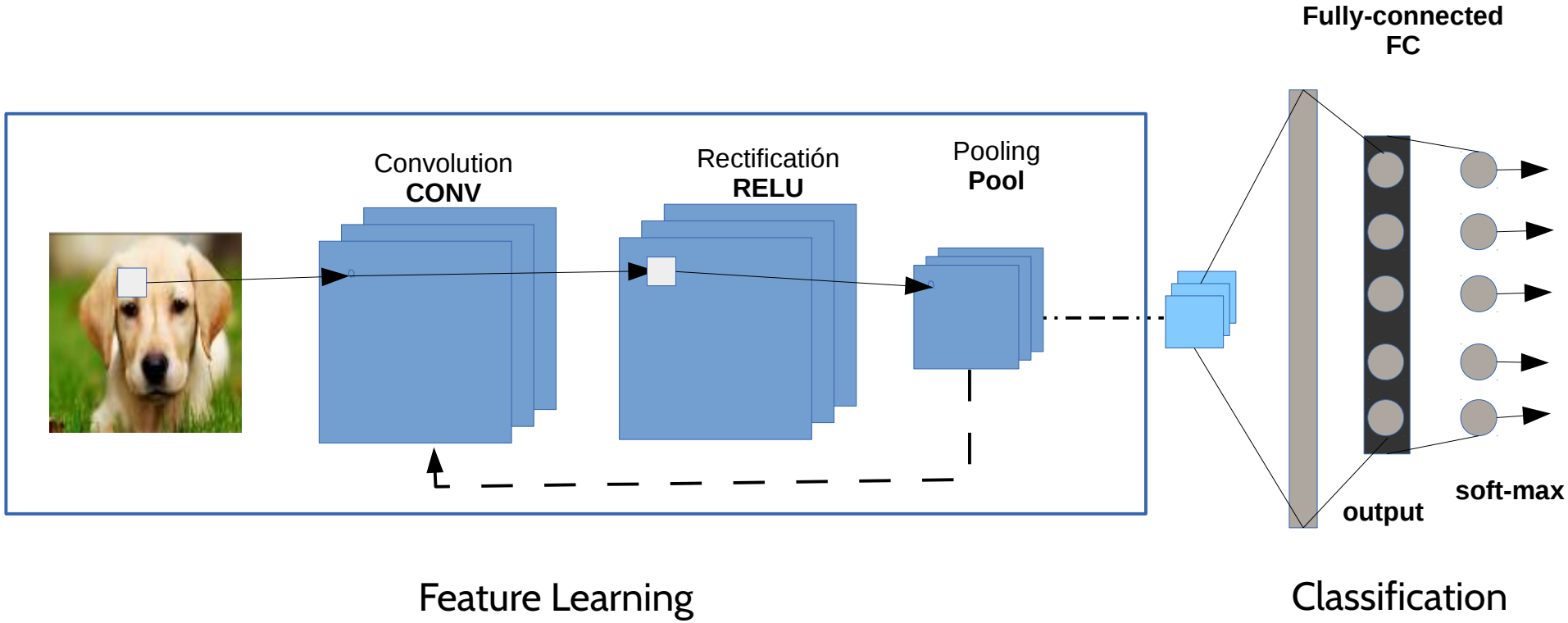
MLP



CNN

Convolutional Neural Net

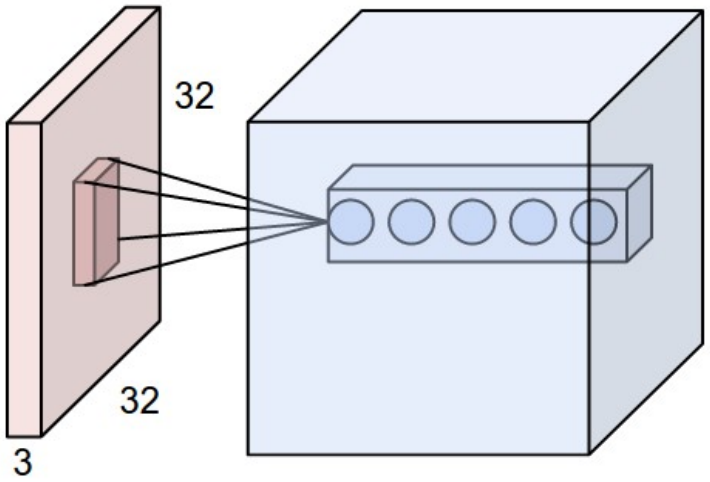
Different types of layers

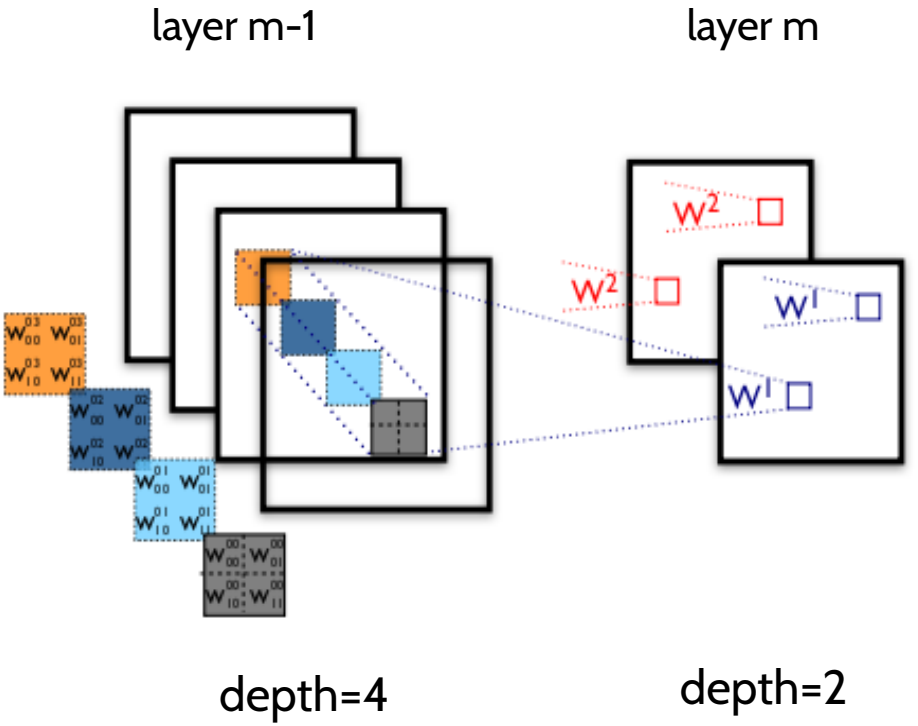


Convolutional Neural Net

Different types of layers

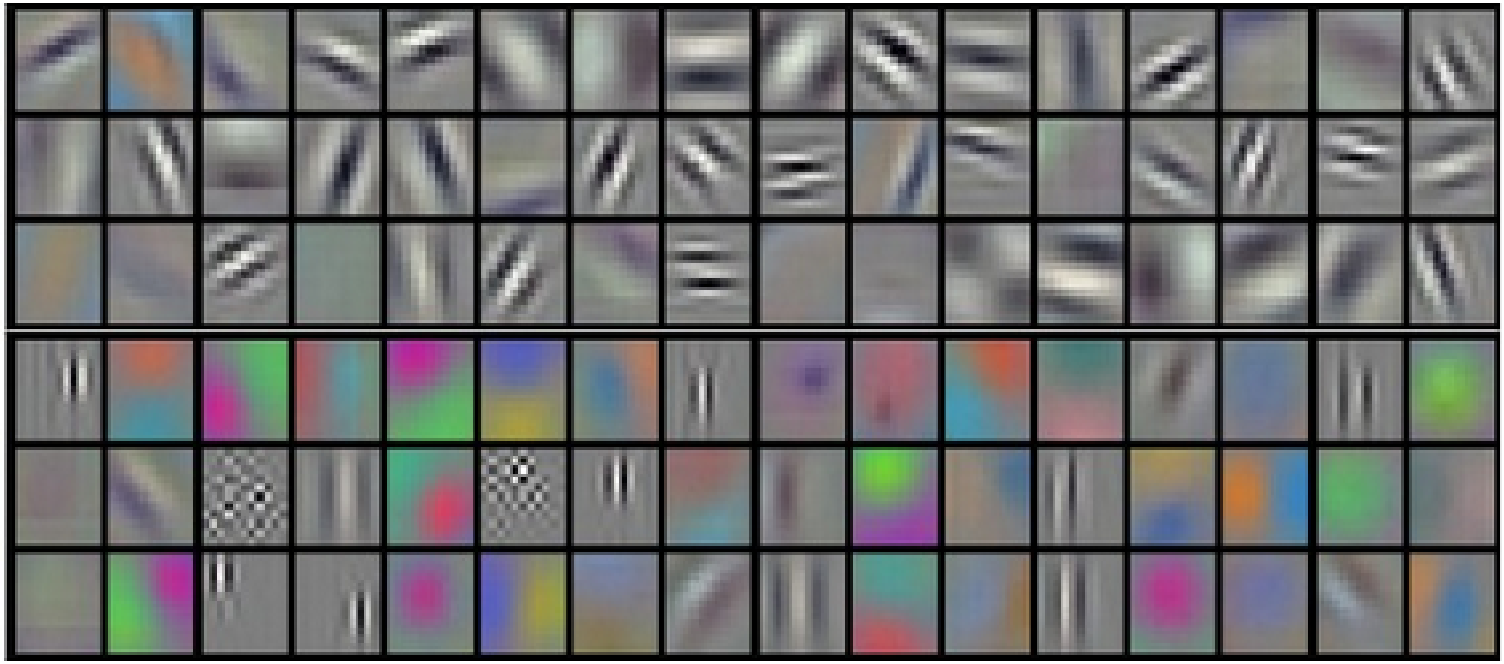
convolution





Convolutional Neural Net

Different types of layers

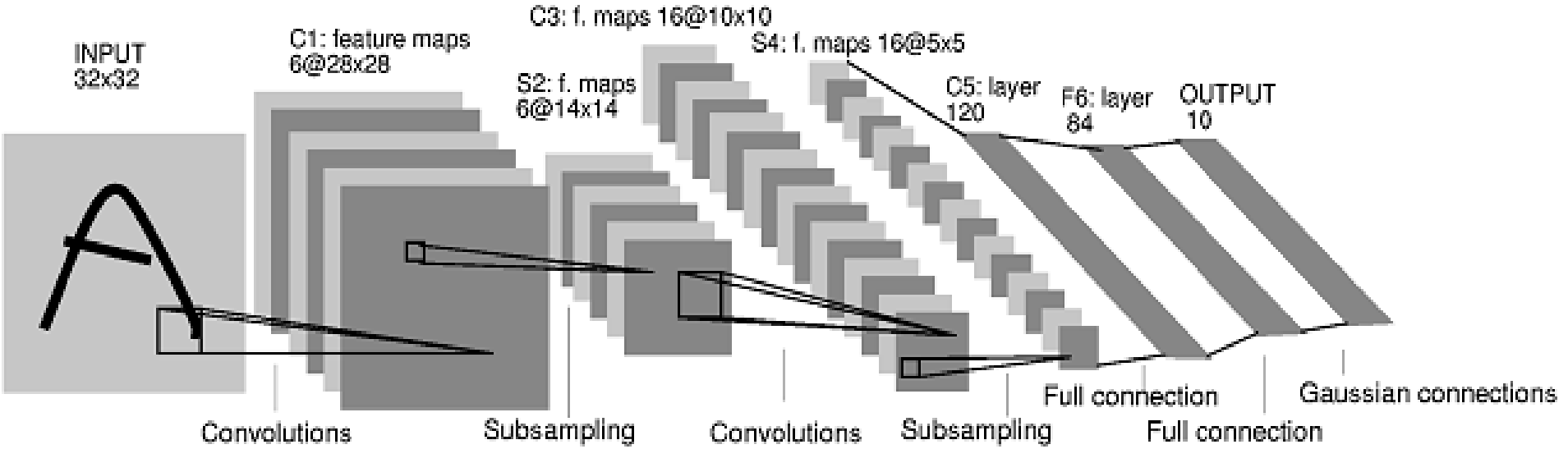


Example of learned filters

Convolutional Neural Net

Famous CNN architectures

LeNet

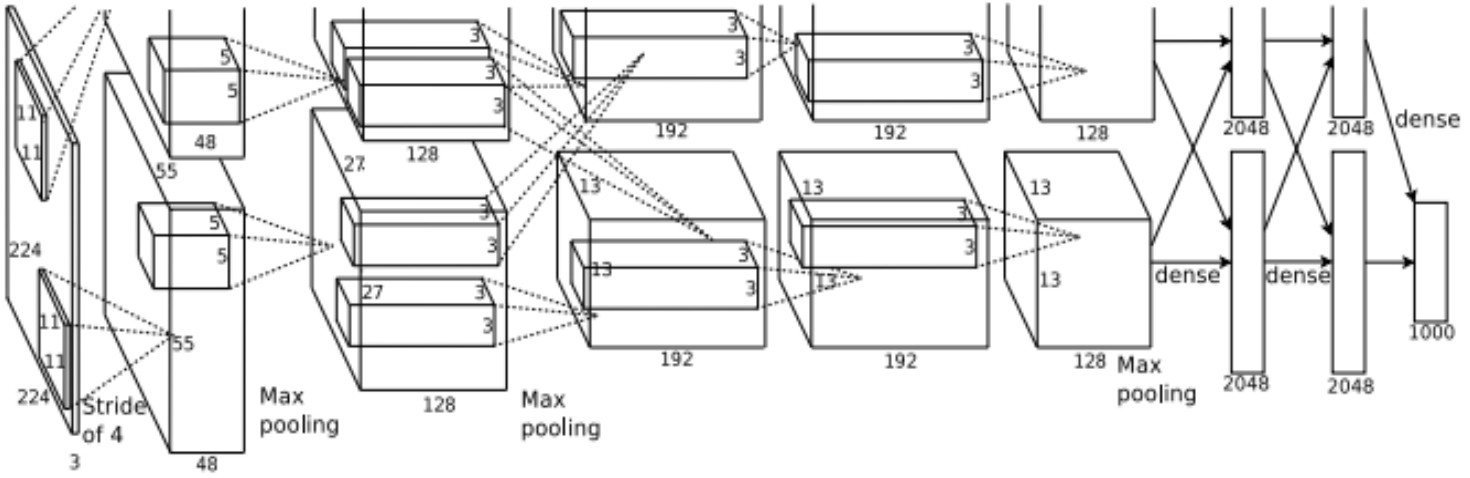


LeCun et al.., 1998. Gradient-Based Learning Applied to Document Recognition (Proc. IEEE 1998).

Convolutional Neural Net

Famous CNN architectures

AlexNet



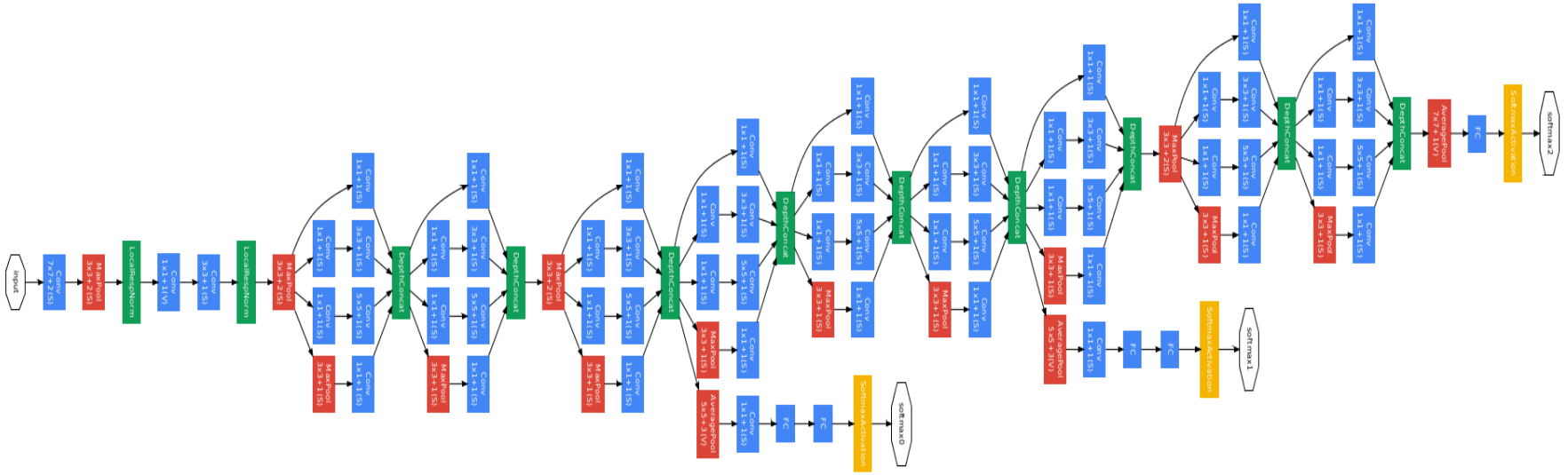
http://www.cs.toronto.edu/~fritz/absps/imagenet.pdf

ImageNet Classification with Deep Convolutional Neural Networks

Convolutional Neural Net

Famous CNN architectures

GoogleNet

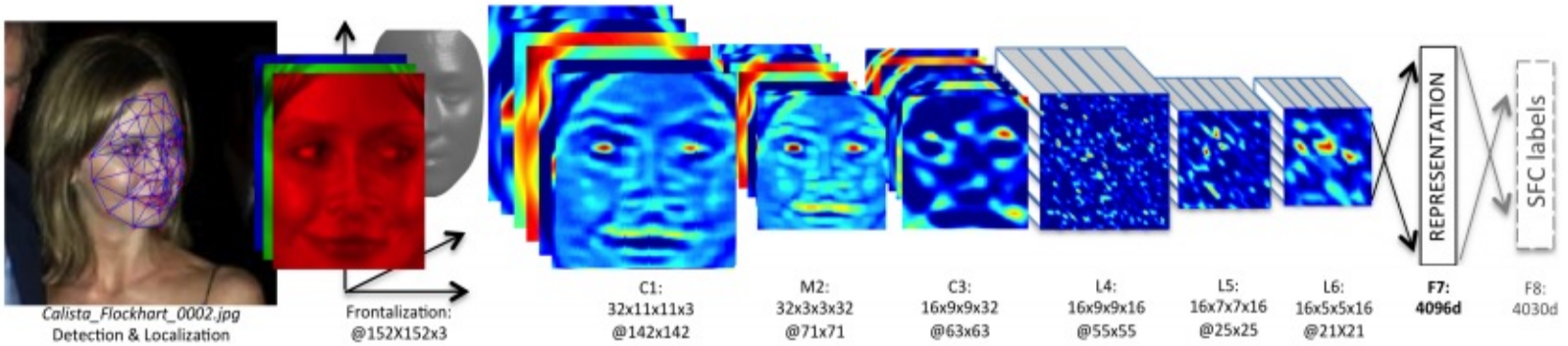


Going Deeper with Convolutions
Best performance in ImageNet 2014 (ILSVRC-14)
CVPR, 2015

Convolutional Neural Net

Famous CNN architectures

DeepFace



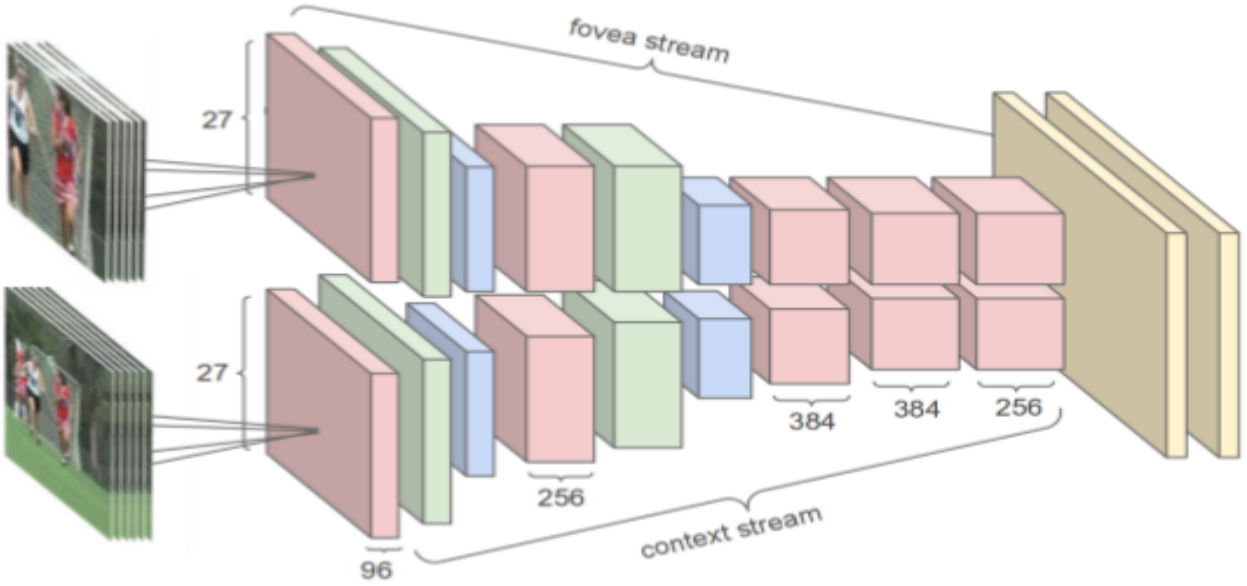
DeepFace: Closing the Gap to Human-Level Performance in Face Verification, CVPR-2014

https://research.facebook.com/publications/480567225376225/deepface-closing-the-gap-to-human-level-performance-in-face-verification/

Convolutional Neural Net

Famous CNN architectures

Large-Scale Video Classification with Convolutional Neural Networks

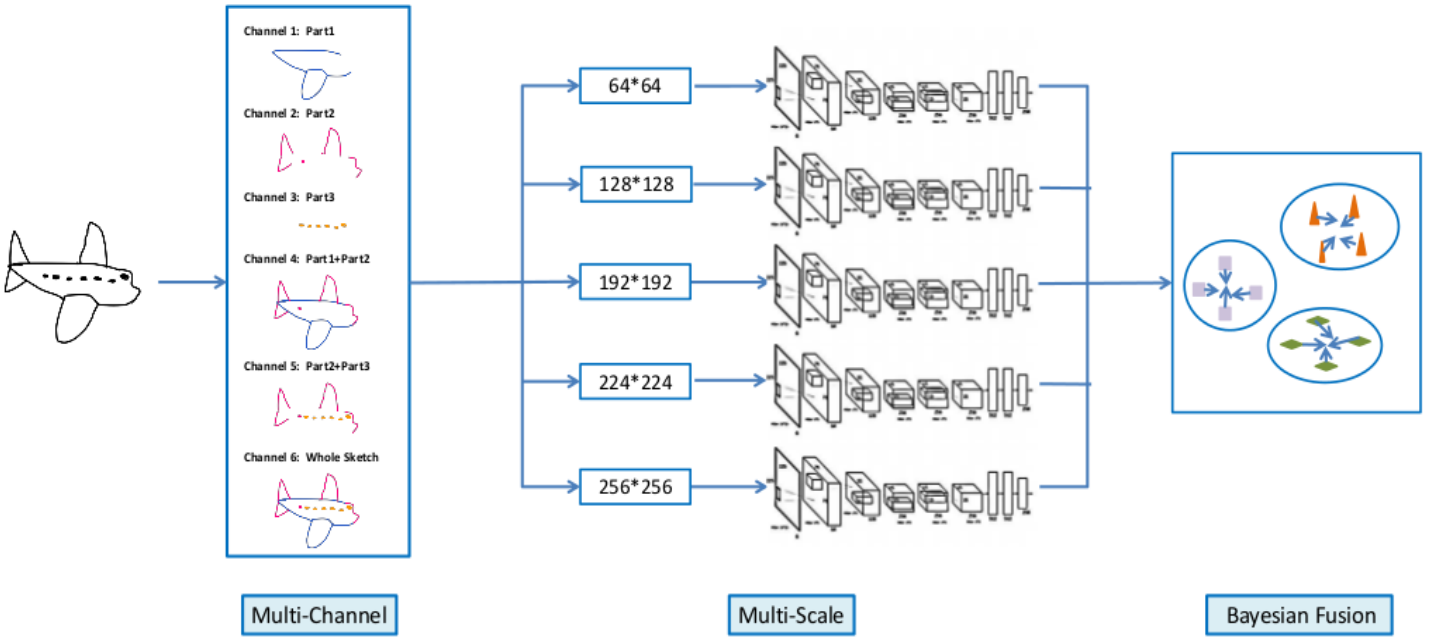


Andrej Karpathy, George Toderici, Sanketh Shetty, Thomas Leung, Rahul Sukthankar, and Li Fei-Fei. 2014. Large-Scale Video Classification with Convolutional Neural Networks. In Proceedings of the 2014 IEEE Conference on Computer Vision and Pattern Recognition (CVPR '14). IEEE Computer Society, Washington, DC, USA,

Convolutional Neural Net

Famous CNN architectures

Sketch-a-Net: Sketch Classification



Sketch-a-Net that Beats Humans

YU, YANG, SONG, XIANG, HOSPEDALES
BMVC-2015

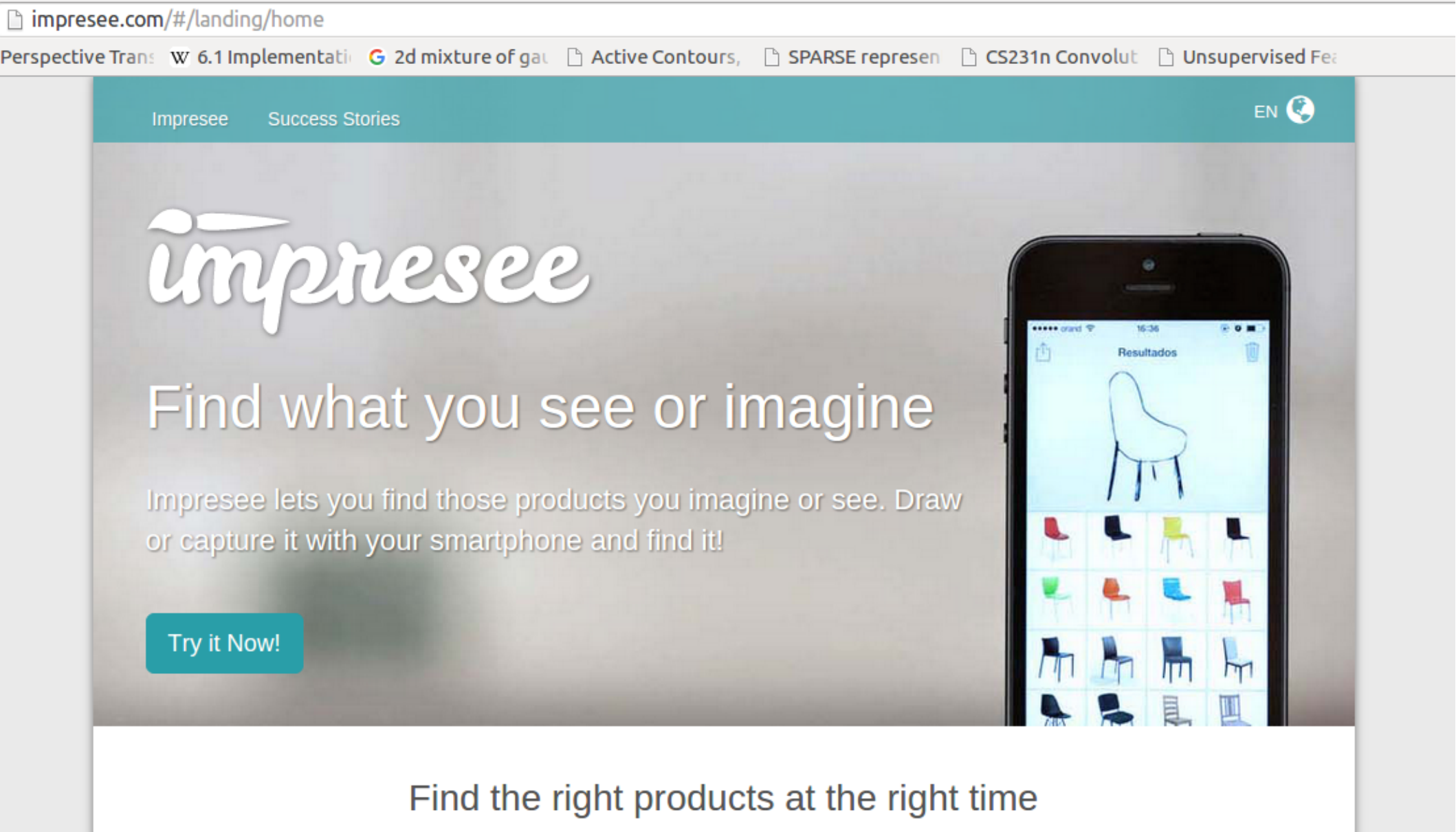
Content Based Image Retrieval

Q:**query**

Content Based Image Retrieval

Search Products in Retail Catalogs

Content Based Image Retrieval



Content Based Image Retrieval

Local Descriptors (SIFT, ...)

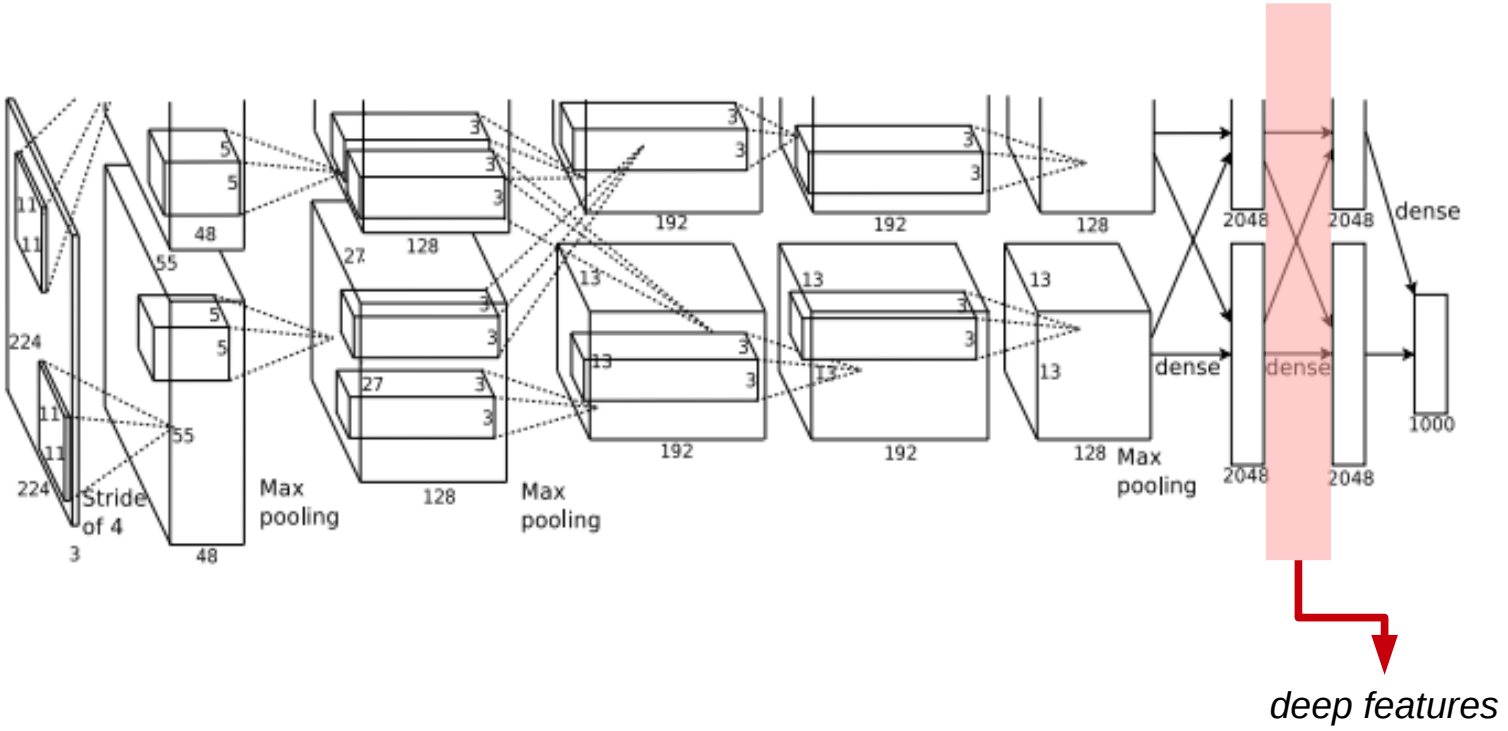
Bag of Features (BoF)

VLAD

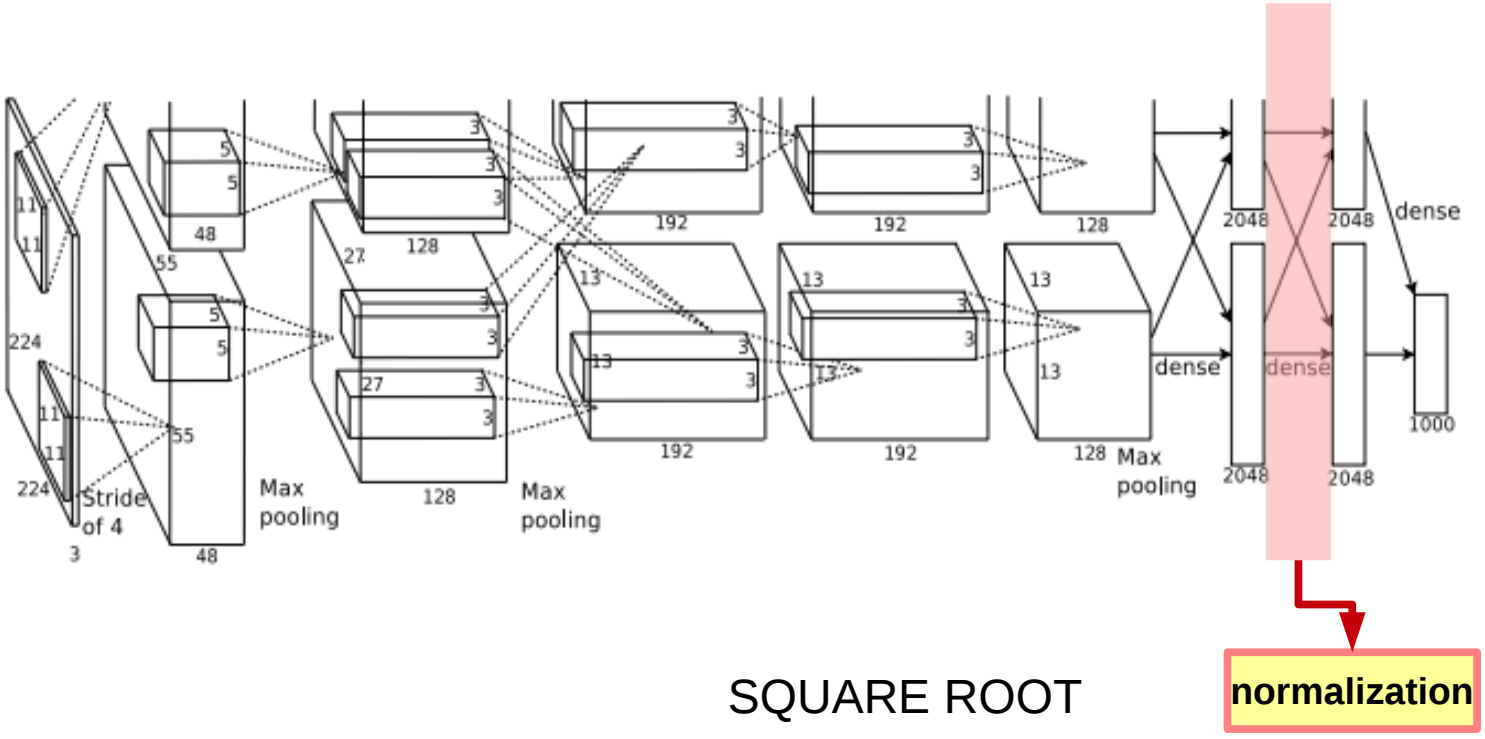
Fisher Vector

Triangulation embedding and democratic aggregation

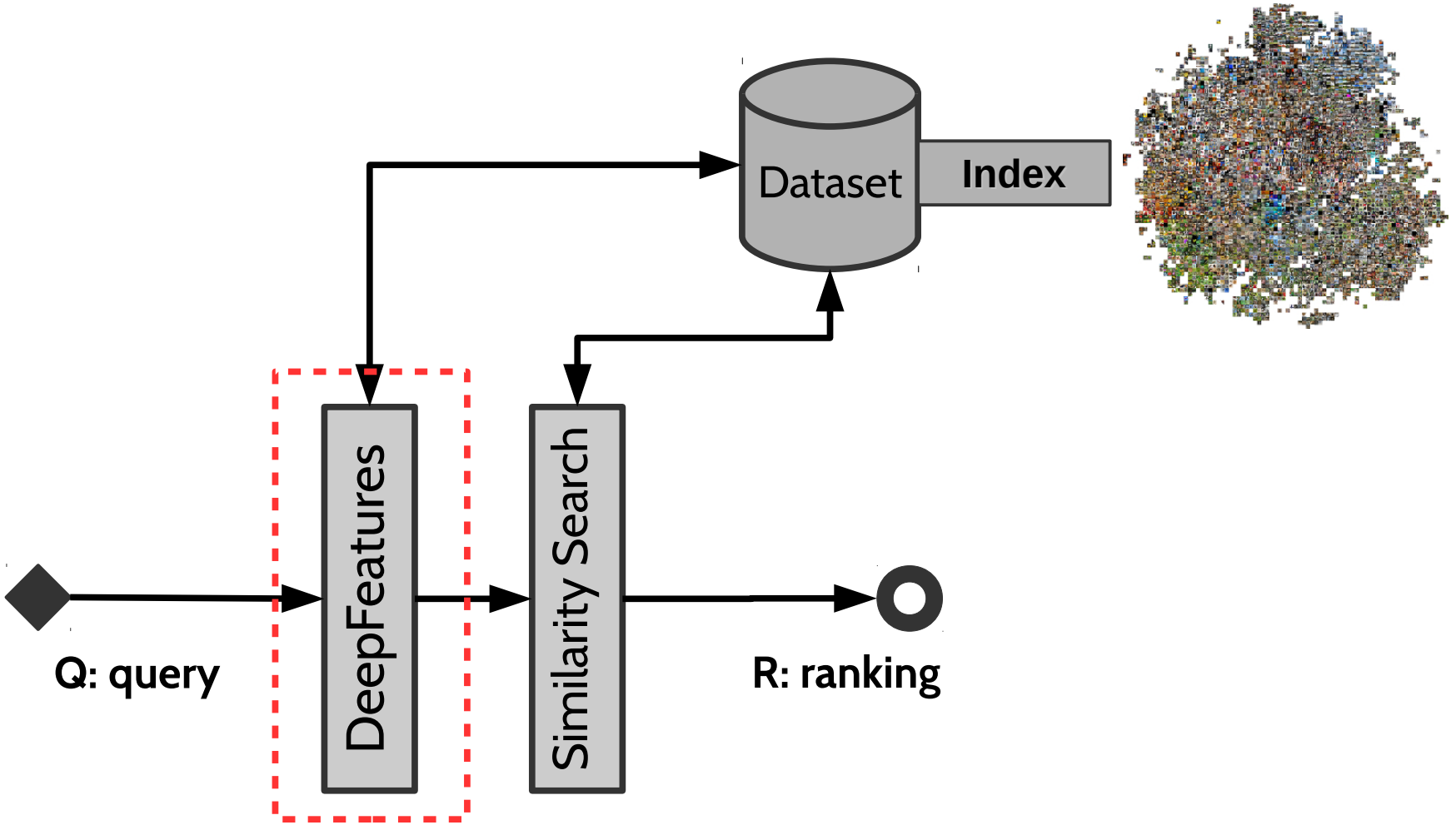
Content Based Image Retrieval using Deep Features



Content Based Image Retrieval using Deep Features

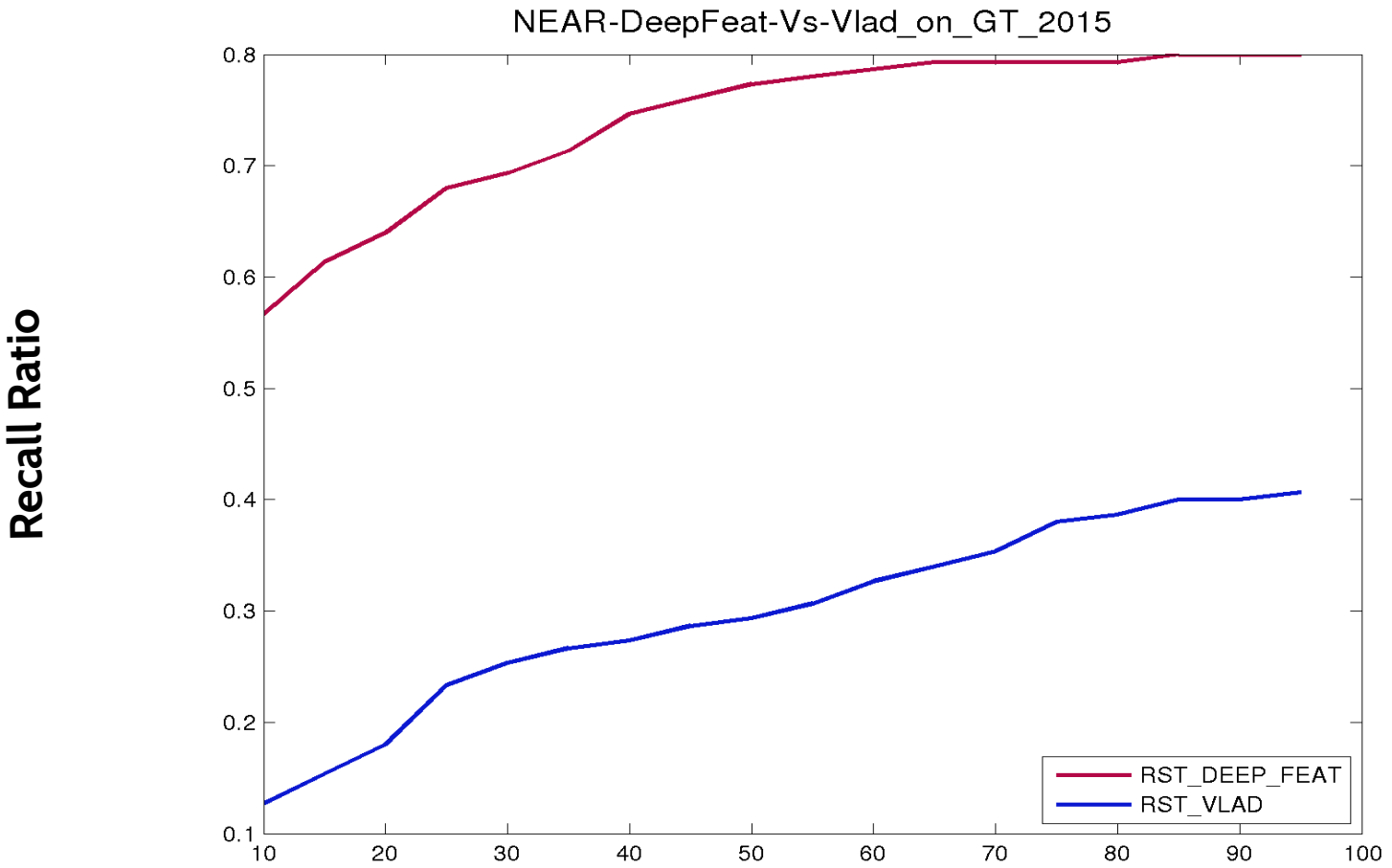


Content Based Image Retrieval using Deep Features

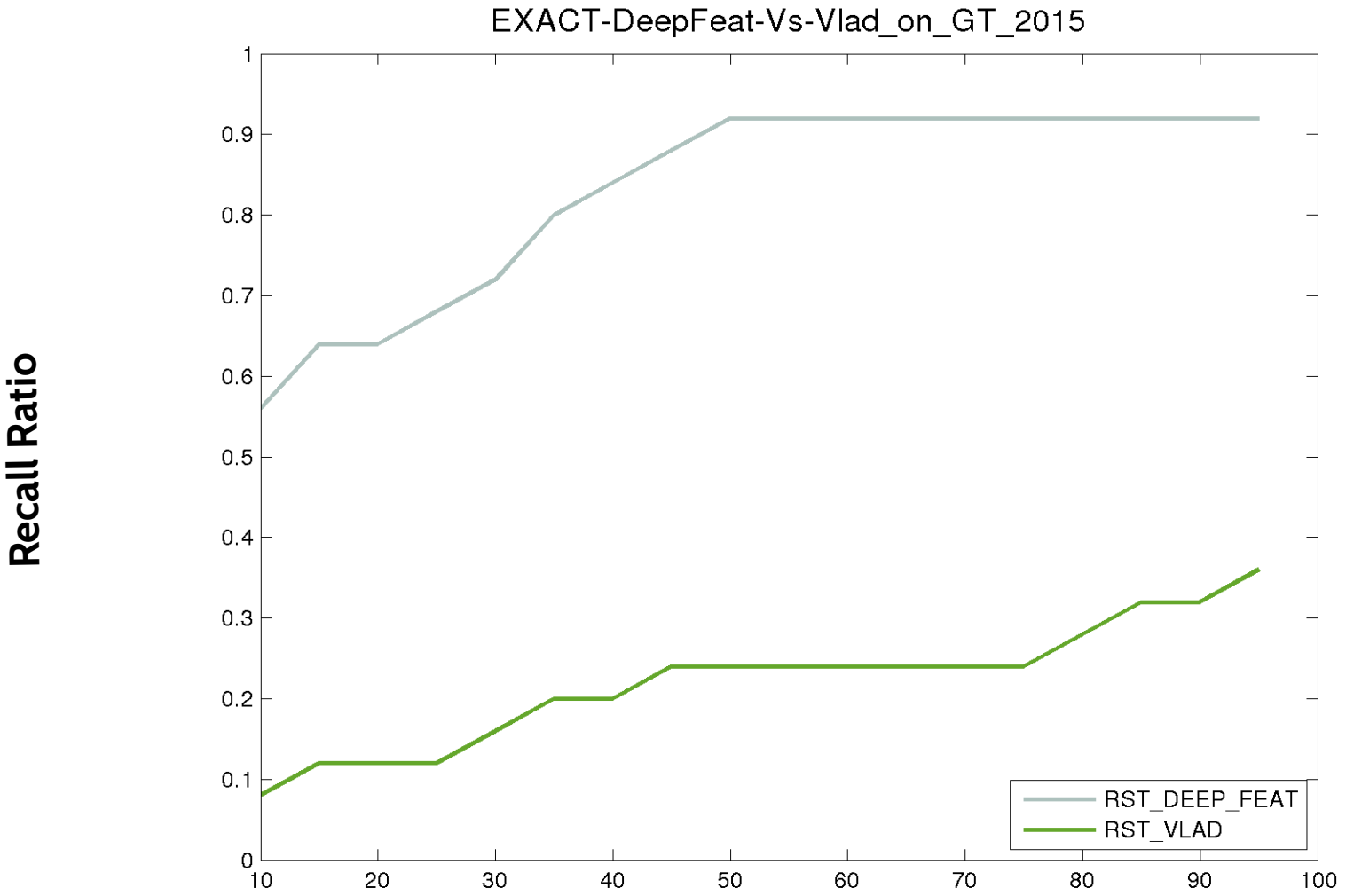


Content Based Image Retrieval using Deep Features

Content Based Image Retrieval using Deep Features



Content Based Image Retrieval using Deep Features



Content Based Image Retrieval using Deep Features

OptiScan (impresee.com)

CAMARA

SKU:

1837273

Categoría:

Sillas

Descripción:

Sillón Ejecutivo con masajeador negro Genérico

OptiScan (impresee.com)

CAMARA

SKU:

1738321

Categoría:

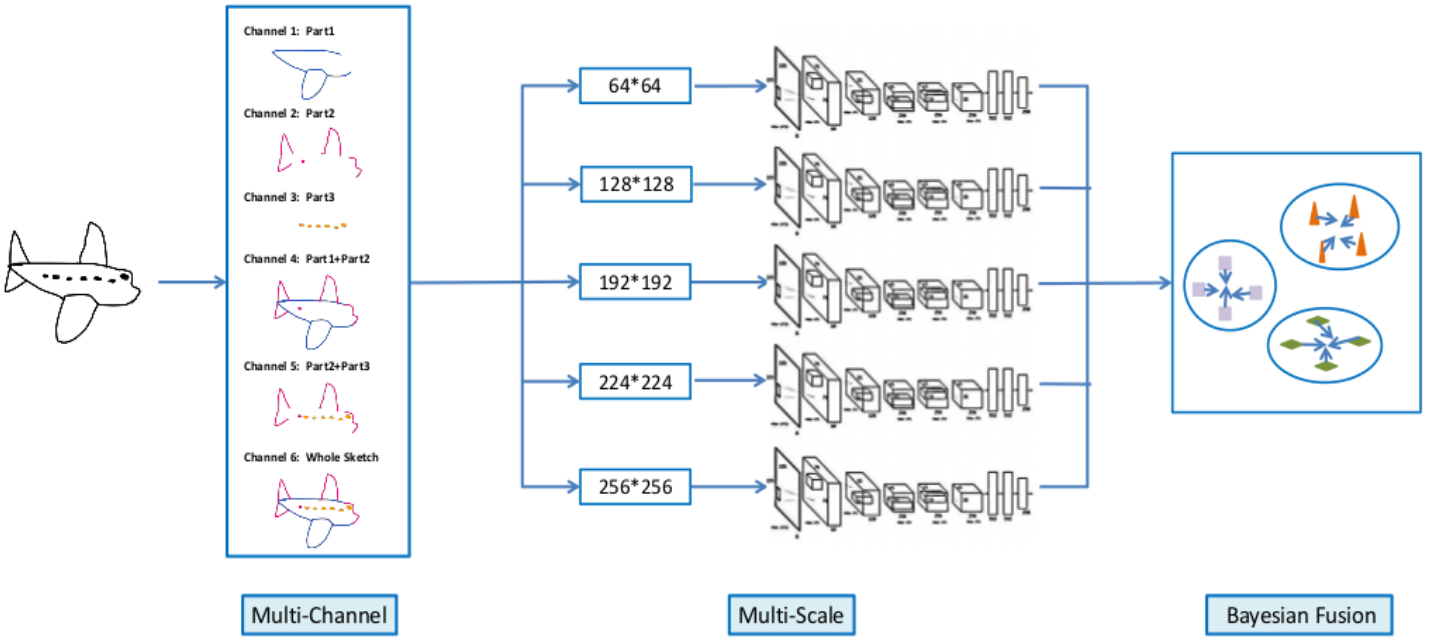
Comodas

Descripción:

Cómoda 3 cajones 55x31x70 cm cedro Tvilum

Current Research

Sketch Based Image Retrieval using DeepFeatures

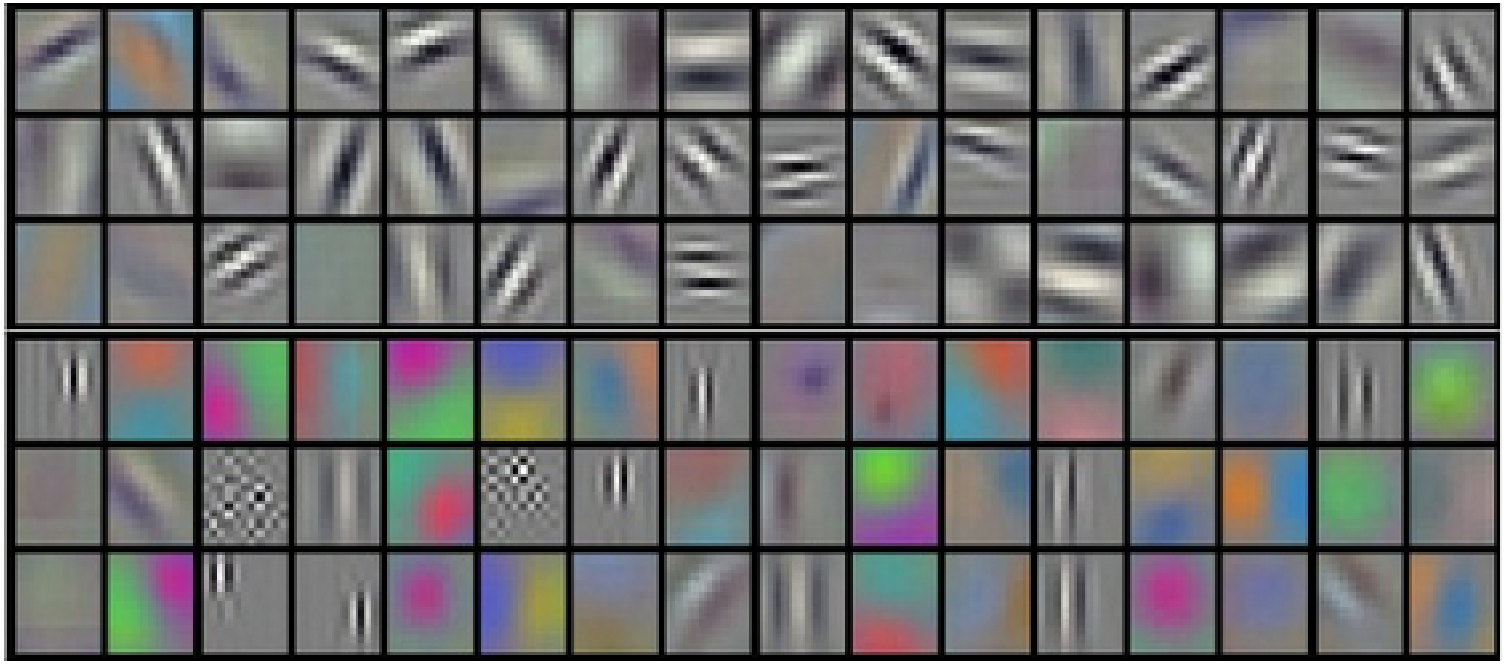


Current Research

Sketch Based Image Retrieval with Color

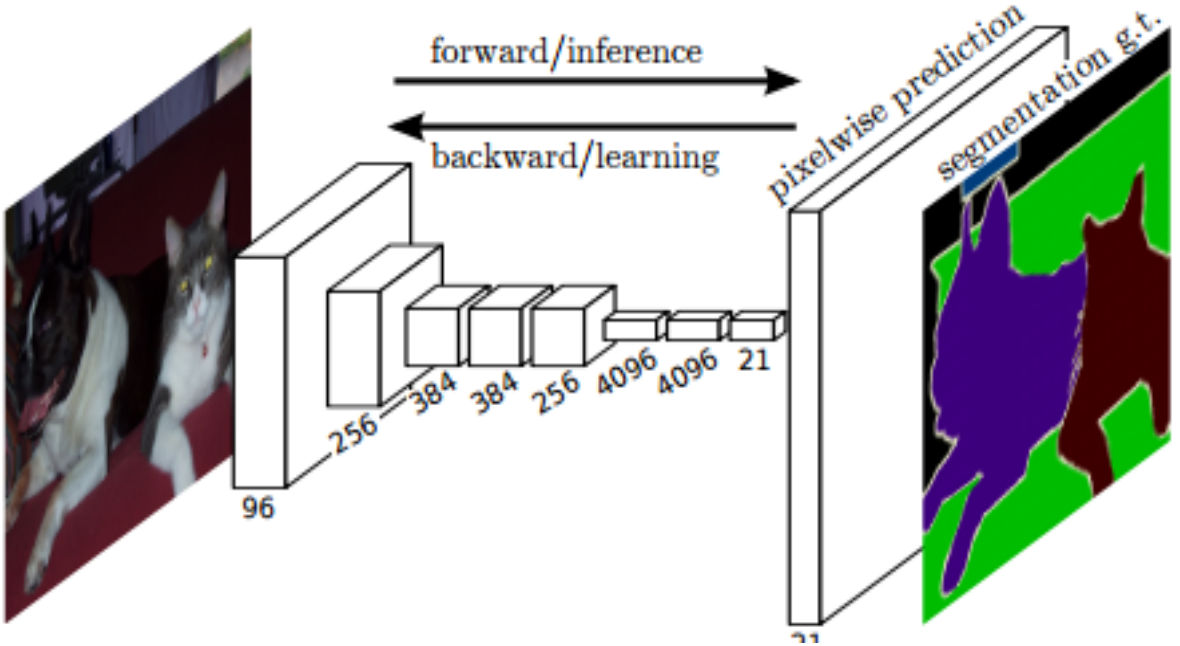
Current Research

Characterize the cases where deep features works



Current Research

Deep Learning for Segmentation



Current Research

One Shot Object Detection