

Object Detection with YOLO

Behnia - Heydari

Amirkabir University of Technology

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Overview

- 1 Computer Vision
- 2 IMAGENET
- 3 Challenge Result
- 4 Cats
- 5 AlexNet

Smartphones

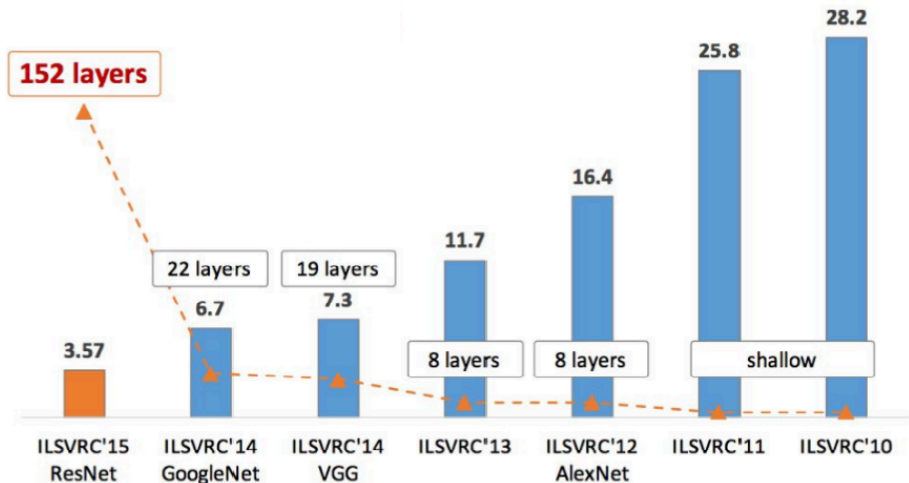
- Exploding number of sensors vs. humans



Dataset Matters



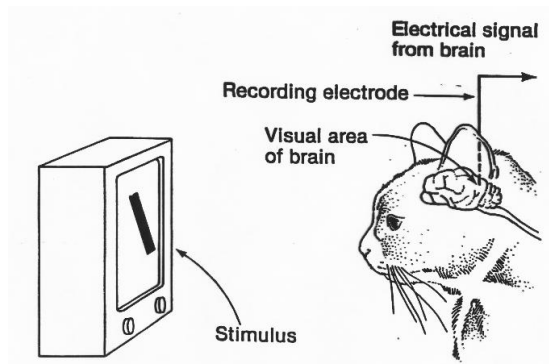
Role of CNN



Cat's Brain Uses Convolution

Types of cells:

- simple cells
- complex cells
- hypercomplex cells



AlexNet

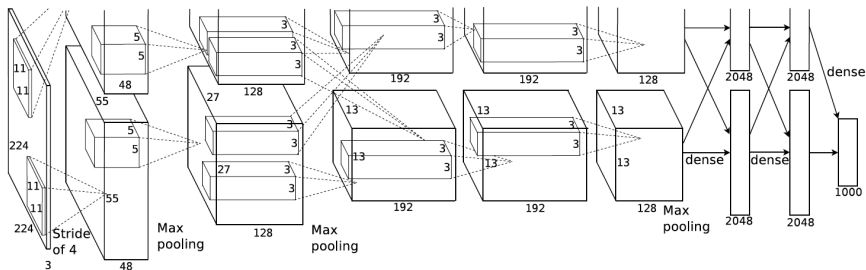


Figure: AlexNet: [Krizhevsky, Sutskever, Hinton] 2012

Convolution

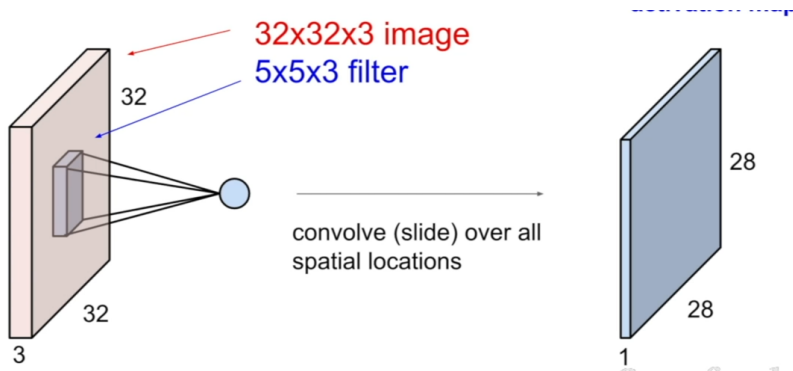


Figure: Convolution Layer

Complexity of Layers output

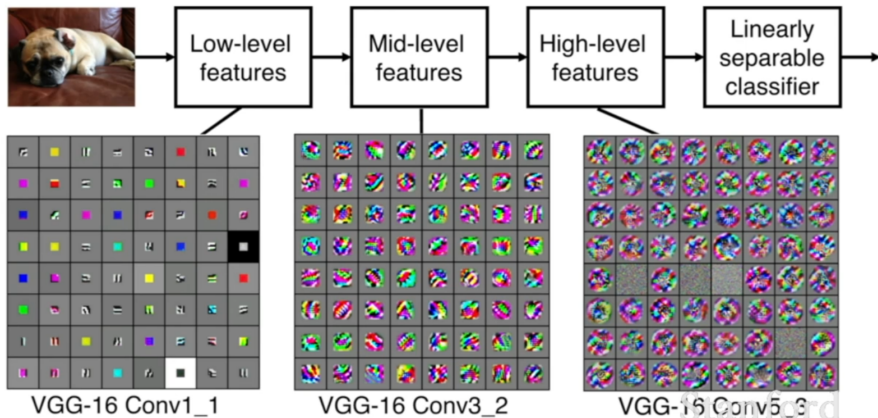


Figure: complexity of each layer output

Closer Look

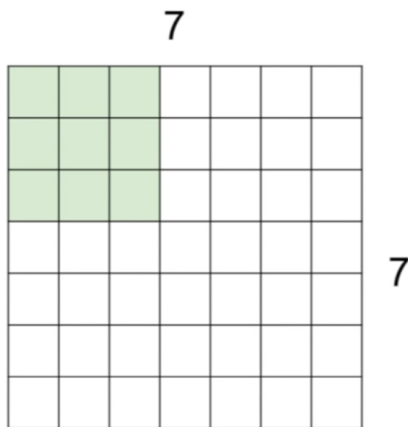


Figure: filtering example

Closer Look(CONT.)

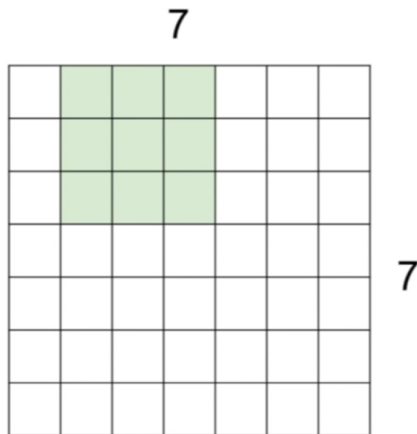


Figure: filtering example

Closer Look(CONT.)

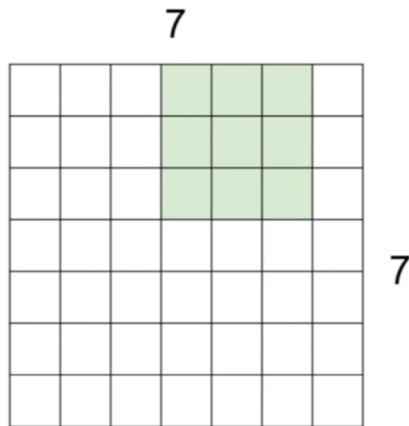


Figure: filtering example

Closer Look(CONT.)

IT WON'T FIT ?!!!!!!!

Can't apply 3*3 filter

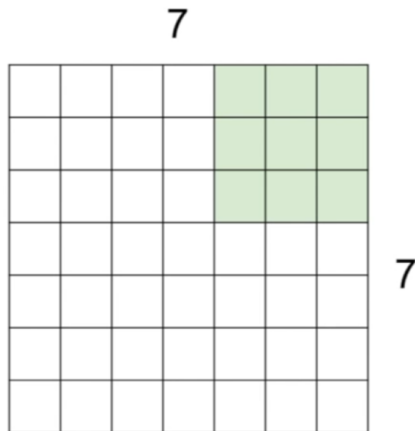


Figure: filtering example

Padding

0	0	0	0	0	0			
0								
0								
0								
0								

Summary

- Accept a volume of size $N \times N$
- requires 4 hyper parameters:
 - Filter's spatial extent F
 - Filter's Stride S
 - Amount of zero padding P
- Produces a volume of size $M \times M$
 - $M = \frac{(N-F+2p)}{S} + 1$
 - Number of parameters : $F \times F$

Pooling

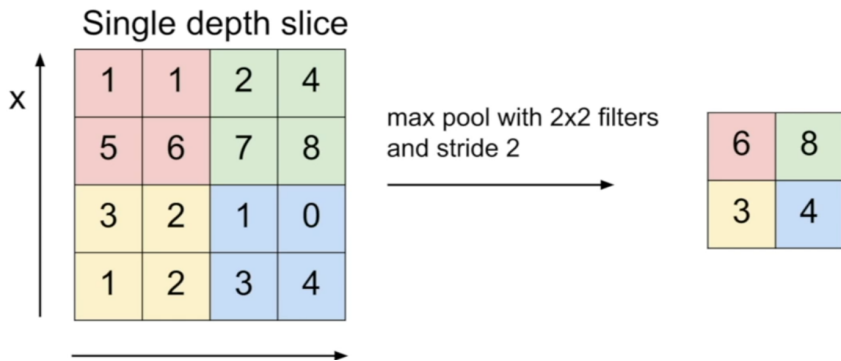


Figure: Max-pooling

Fully Connected Layer

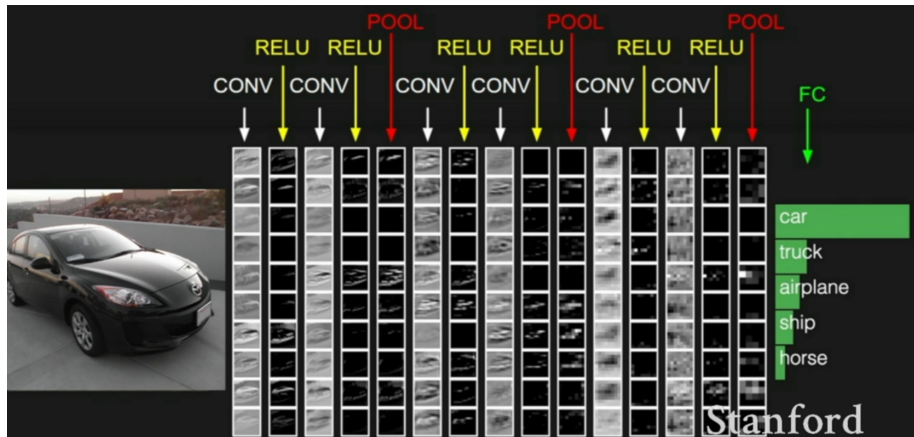
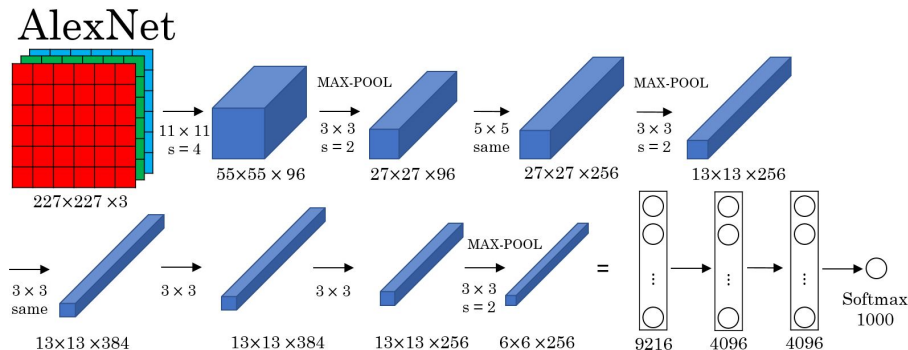


Figure: Fully Connected Layer



[Krizhevsky et al., 2012. ImageNet classification with deep convolutional neural networks]

Andrew Ng

Figure: AlexNet architecture

Comparing different Structures

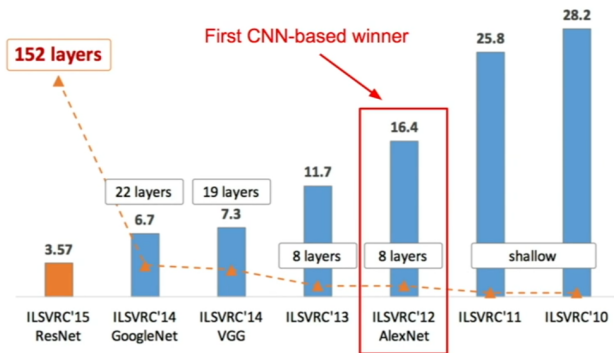
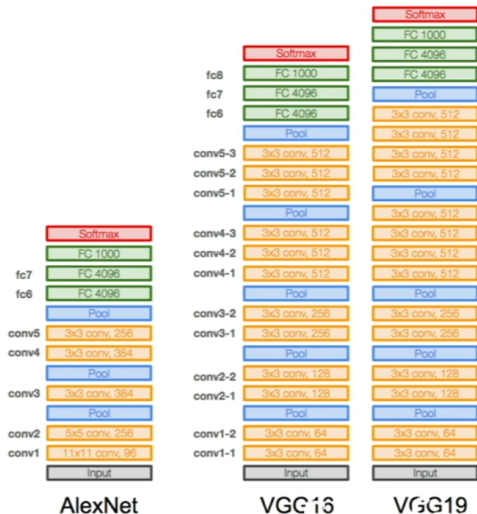


Figure: Comparing Structures

Deeper Networks, Smaller Filters



Comparing

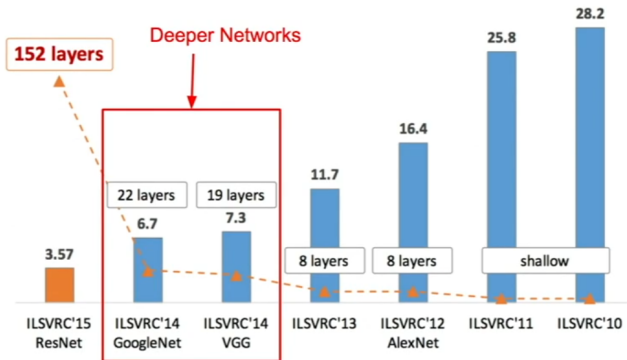


Figure: Comparing Structures

Deeper Networks, with computationally inexpensive

Full GoogLeNet
architecture

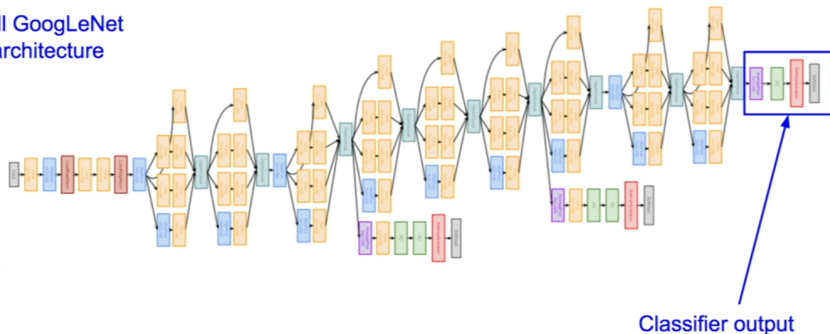


Figure: Googlenet Structures

Comparing

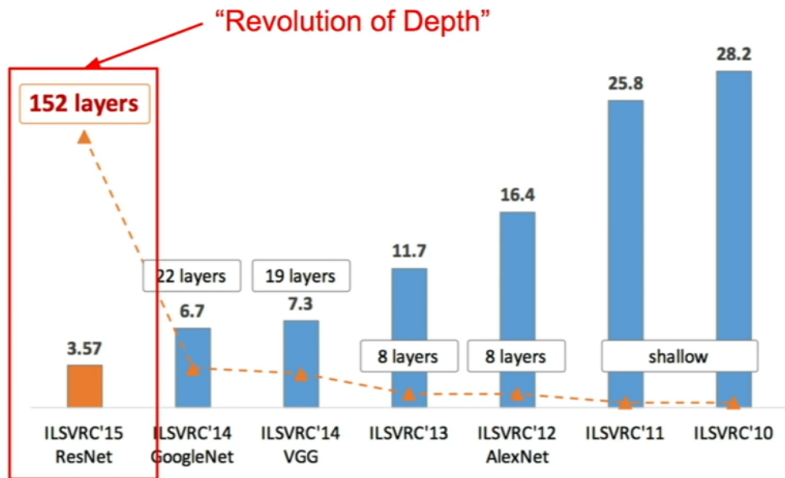


Figure: Comparing Structures

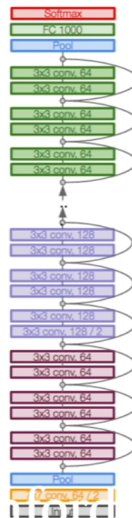
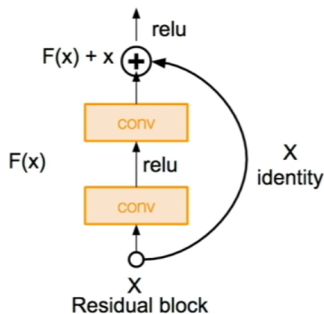


Figure: ResNet Structures

Comparing Structures

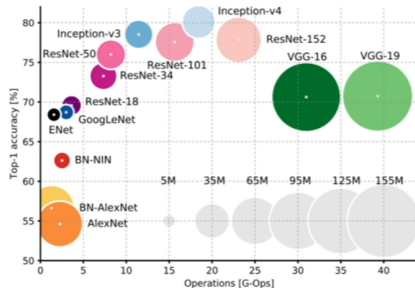
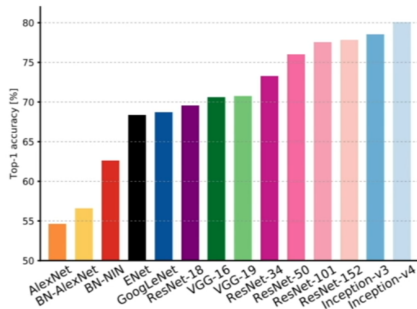


Figure: Comparing Structures

The End