Introduction

Week1_발표자: 구미진
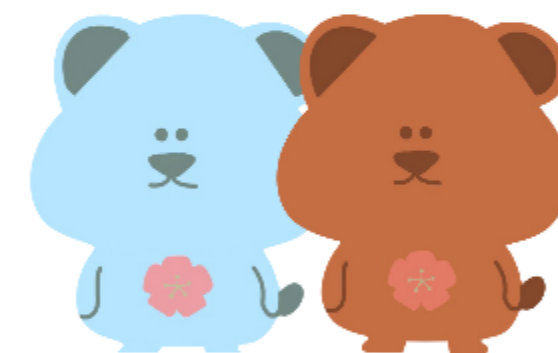
목차

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Intro

01 Intro

Lecture 1:
Introduction

모두 재생

Stanford University CS231n, Spring 2017

동영상 16개 • 조회수 894,744회 • 최종 업데이트: 2017. 8. 11.

CS231n: Convolutional Neural Networks for Visual Recognition
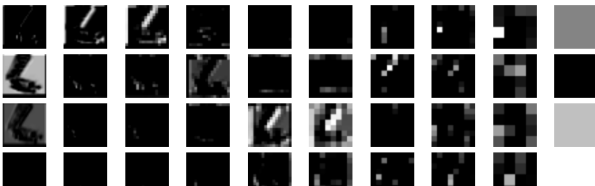
Spring 2017

http://cs231n.stanford.edu/

CS231n: Convolutional Neural Networks for Visual Recognition

Stanford - Spring 2021

cat

CS231n: Convolutional Neural Networks for Visual Recognition

Schedule and Syllabus

Unless otherwise specified the course lectures and meeting times are Tuesday and Thursday 12pm to 1:20pm in the NVIDIA Auditorium in the Huang Engineering Center. (map)

This is the syllabus for the **Spring 2017** iteration of the course. The syllabus for the Winter 2016 and Winter 2015 iterations of this course are still available.

Event Type	Date	Description	Course Materials
Lecture 1	Tuesday April 4	**Course Introduction** Computer vision overview Historical context Course logistics	[slides] [video]
Lecture 2	Thursday April 6	**Image Classification** The data-driven approach K-nearest neighbor Linear classification I	[slides] [video] [python/numpy tutorial] [image classification notes] [linear classification notes]

CS231n Convolutional Neural Networks for Visual Recognition

Course Website

These notes accompany the Stanford CS class CS231n: Convolutional Neural Networks for Visual Recognition. For questions/concerns/bug reports, please submit a pull request directly to our git repo.

Spring 2021 Assignments

Assignment #1: Image Classification, kNN, SVM, Softmax, Fully Connected Neural Network

Assignment #2: Fully Connected and Convolutional Nets, Batch Normalization, Dropout, Frameworks

Assignment #3: Image Captioning with RNNs and Transformers, Network Visualization, Generative Adversarial Networks, Self-Supervised Contrastive Learning

Module 0: Preparation

Software Setup

Python / Numpy Tutorial (with Jupyter and Colab)

Google Cloud Tutorial

Module 1: Neural Networks

Image Classification: Data-driven Approach, k-Nearest Neighbor, train/val/test splits
  L1/L2 distances, hyperparameter search, cross-validation

Linear classification: Support Vector Machine, Softmax
  parameteric approach, bias trick, hinge loss, cross-entropy loss, L2 regularization, web demo

Optimization: Stochastic Gradient Descent
  optimization landscapes, local search, learning rate, analytic/numerical gradient

Cs231n은 컴퓨터 비전에 관한 수업으로,
Neural network(신경망)과 CNN(Deep Learning)과 관련된 부분을 중점적으로 공부합니다.

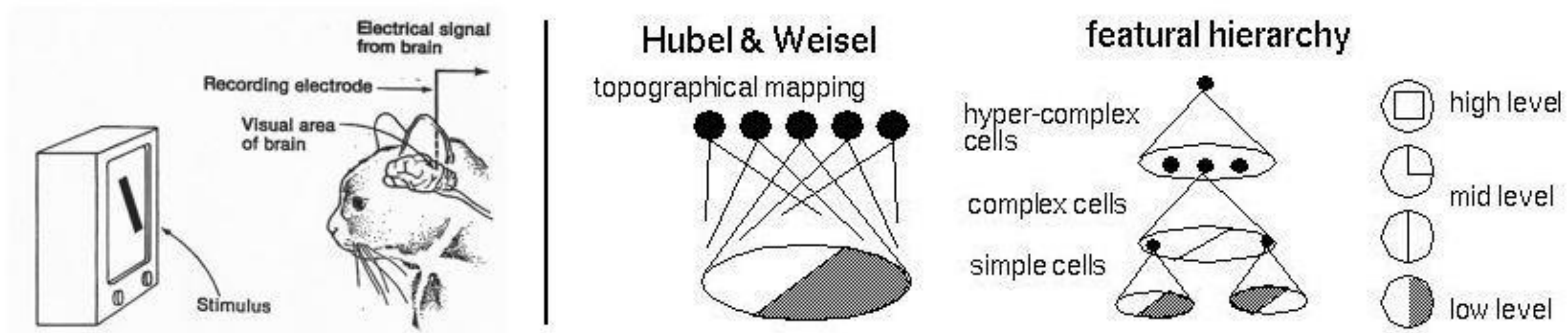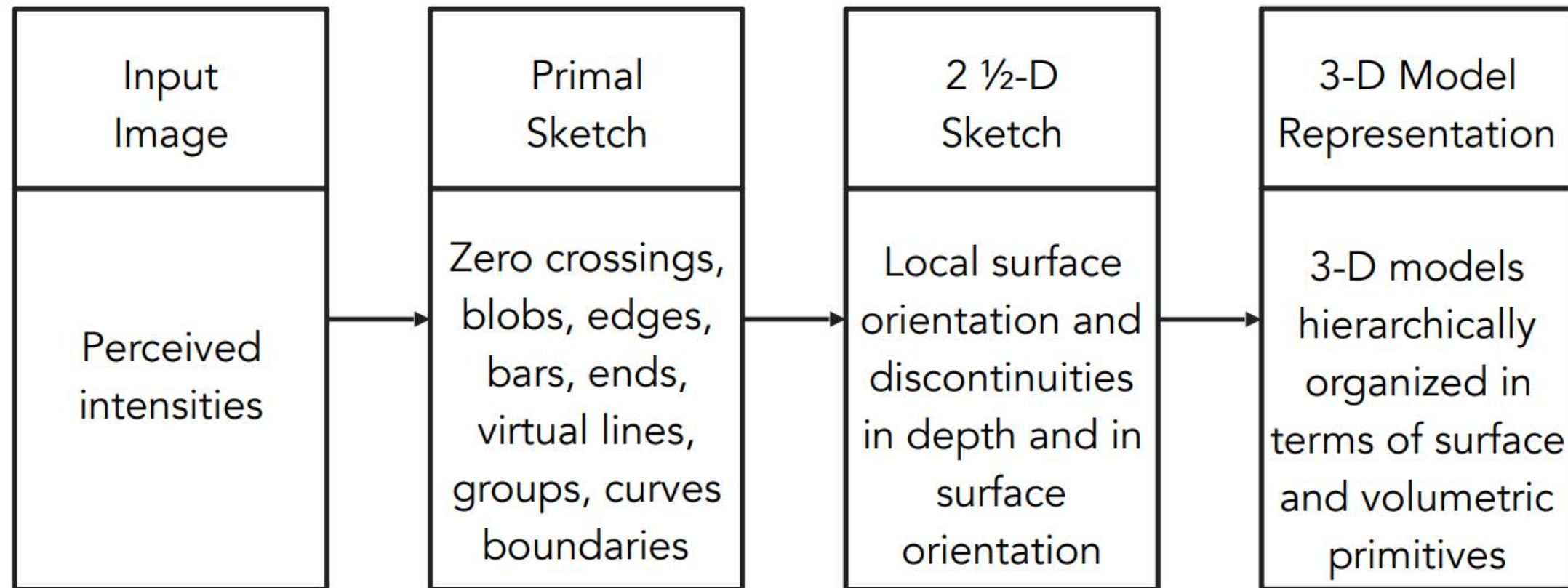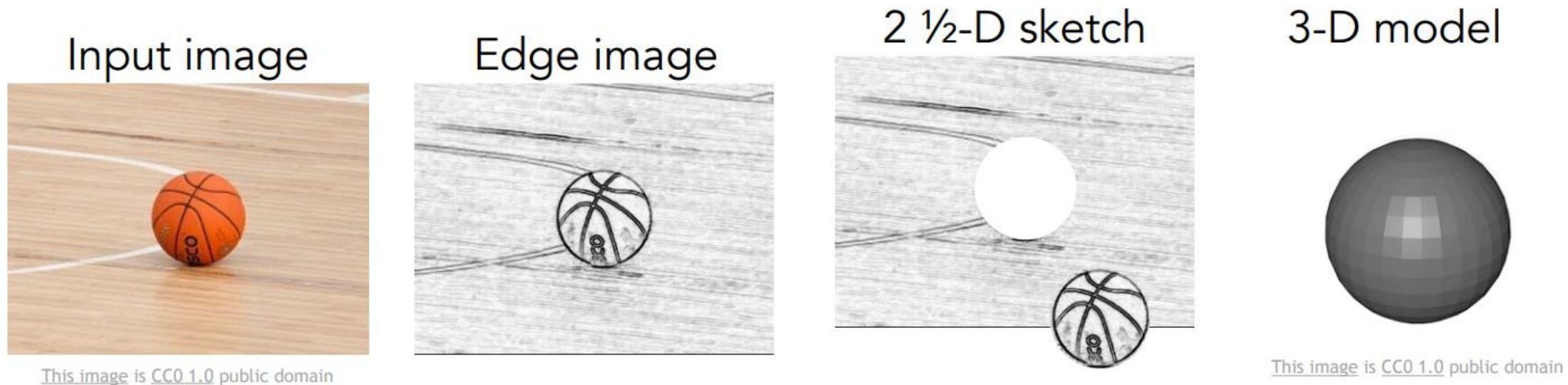# History of
Computer Vision

Hubel & Wiesel, 1959

동물의 시각적 처리 메커니즘은 무엇일까?

"시각 처리는 edges와 같은 단순한 구조로 시작하고, 그 정보가 layer를 거치면서 점점 복잡해져 실제 이미지를 시각적으로 인식할 수 있게 된다."

눈으로 Input 이미지를 보고 3D 표현으로 재구성하려면 몇 단계 과정을 거쳐야 함

Input Image	Primal Sketch	2 ½-D Sketch	3-D Model Representation
Perceived intensities	Zero crossings, blobs, edges, bars, ends, virtual lines, groups, curves boundaries	Local surface orientation and discontinuities in depth and in surface orientation	3-D models hierarchically organized in terms of surface and volumetric primitives

Stages of Visual Representation, David Marr, 1970s

Normalized cut (Shi & Malik, 1997)

객체 분할(object segmentation) : 이미지의 각 픽셀을 의미 있는 영역들로 grouping하는 방법

SIFT(Scale-Invariant Feature Transform)

- 이미지의 크기와 회전에 불변하는 특징을 추출하는 특징 기반 객체 인식 알고리즘
- 서로 다른 두 이미지에서 feature를 각각 추출한 다음, 다른 이미지에 추출한 특징들을 매칭시키는 방법
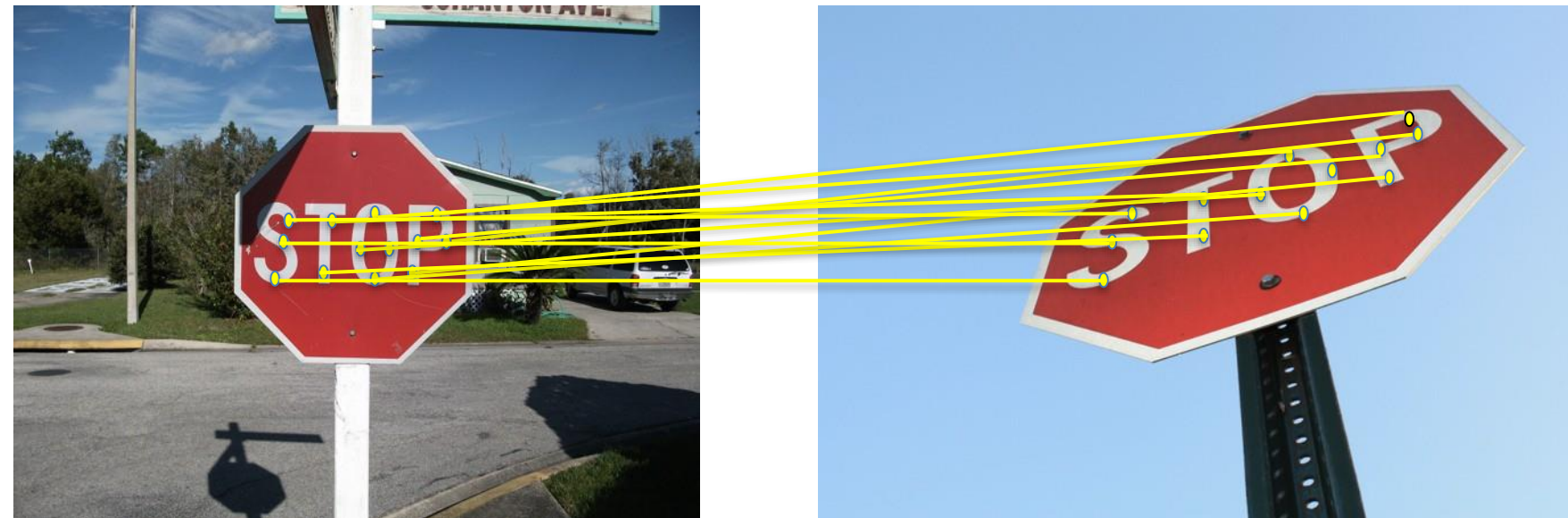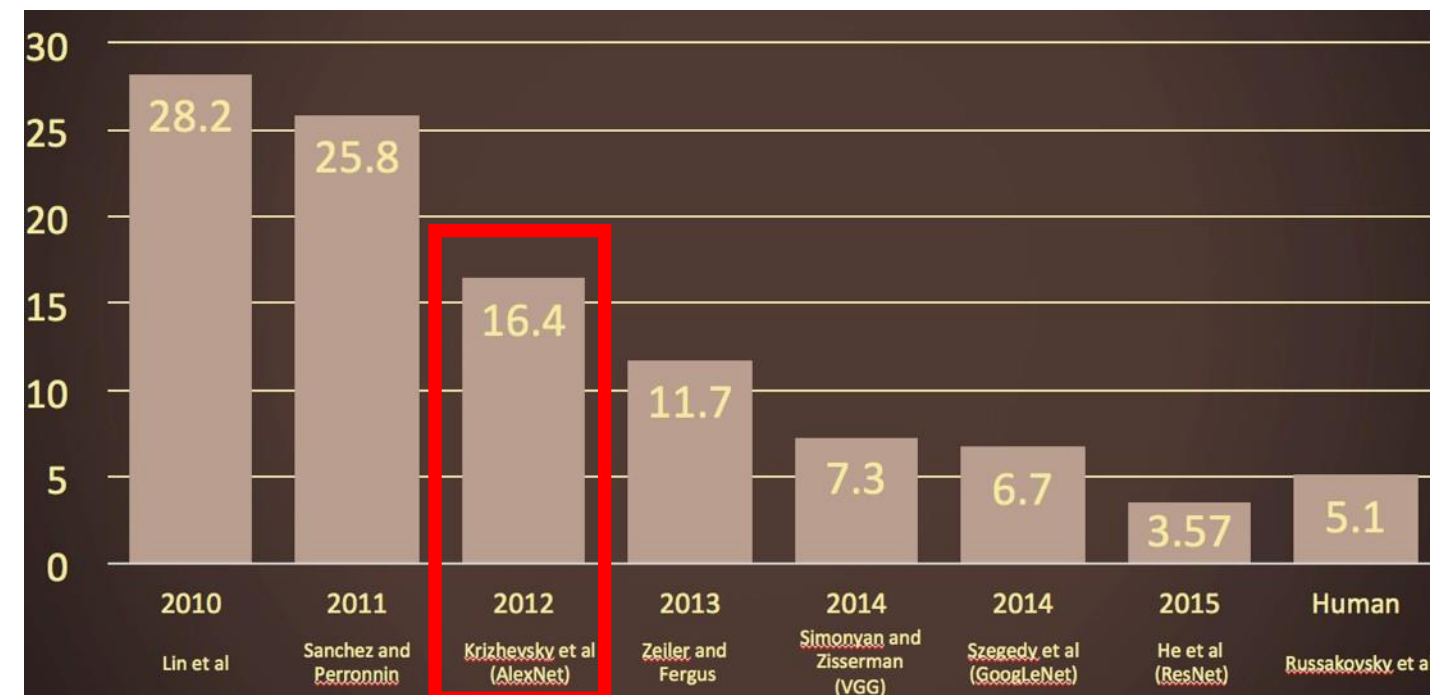
IM**A**GENET **Large Scale Visual Recognition Challenge**

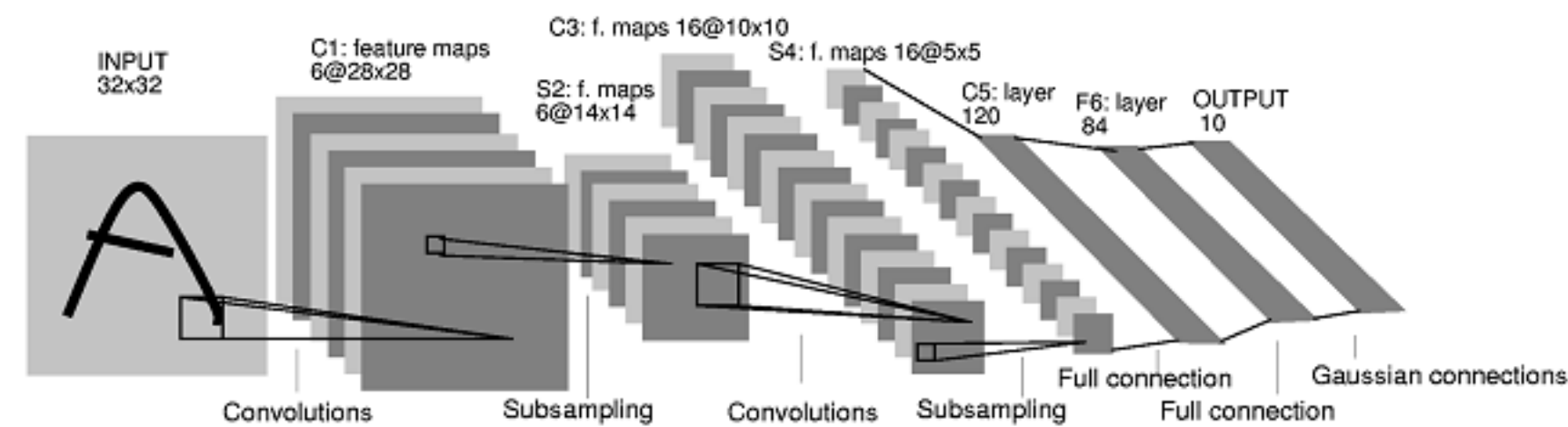The Image Classification Challenge:

1,000 object classes
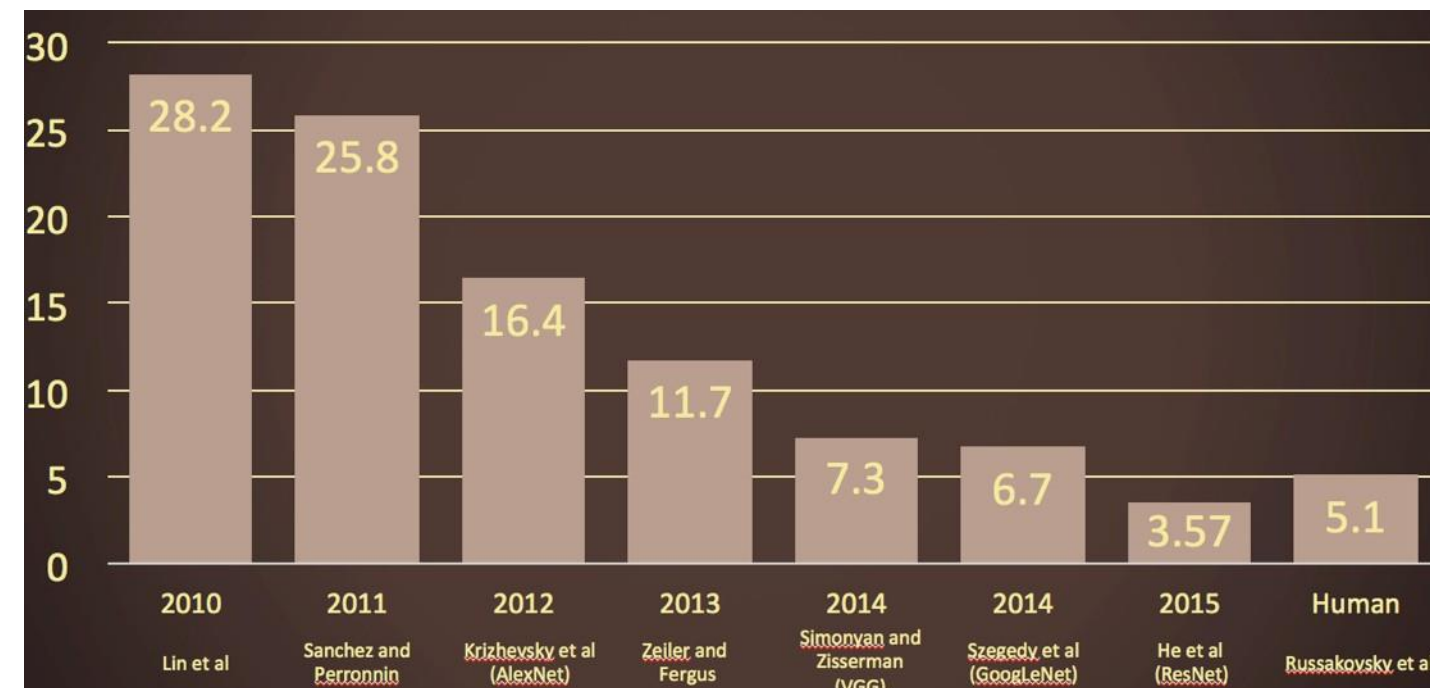
1,431,167 images
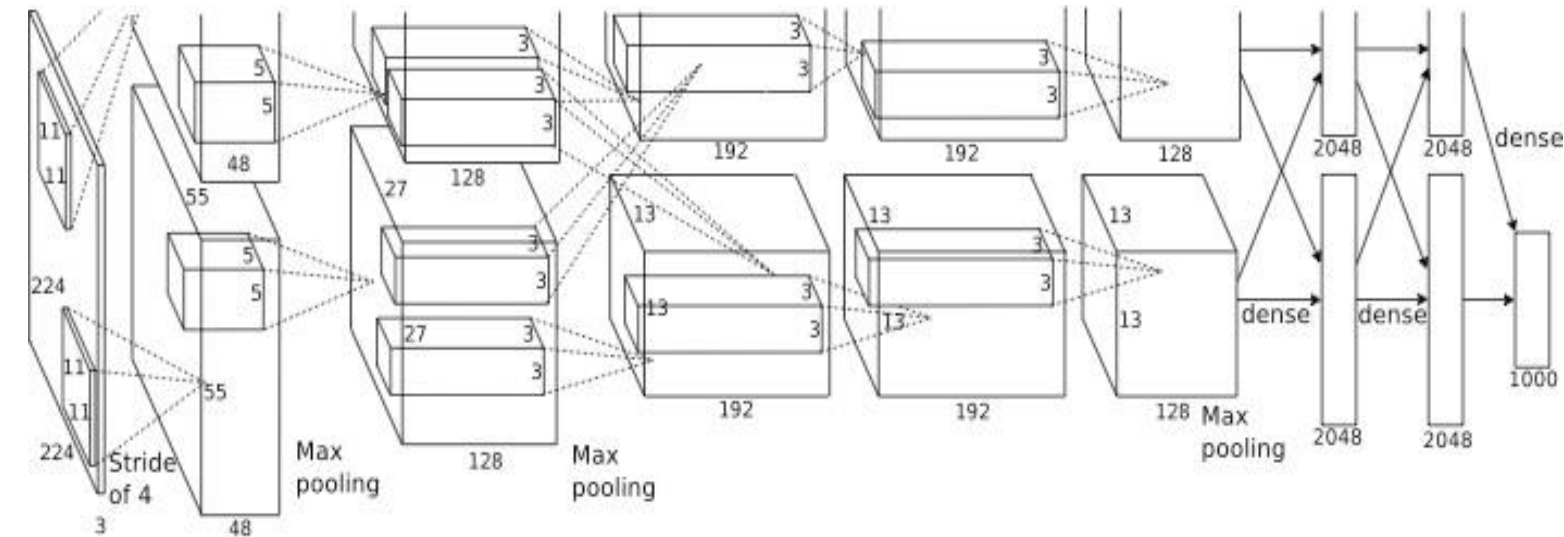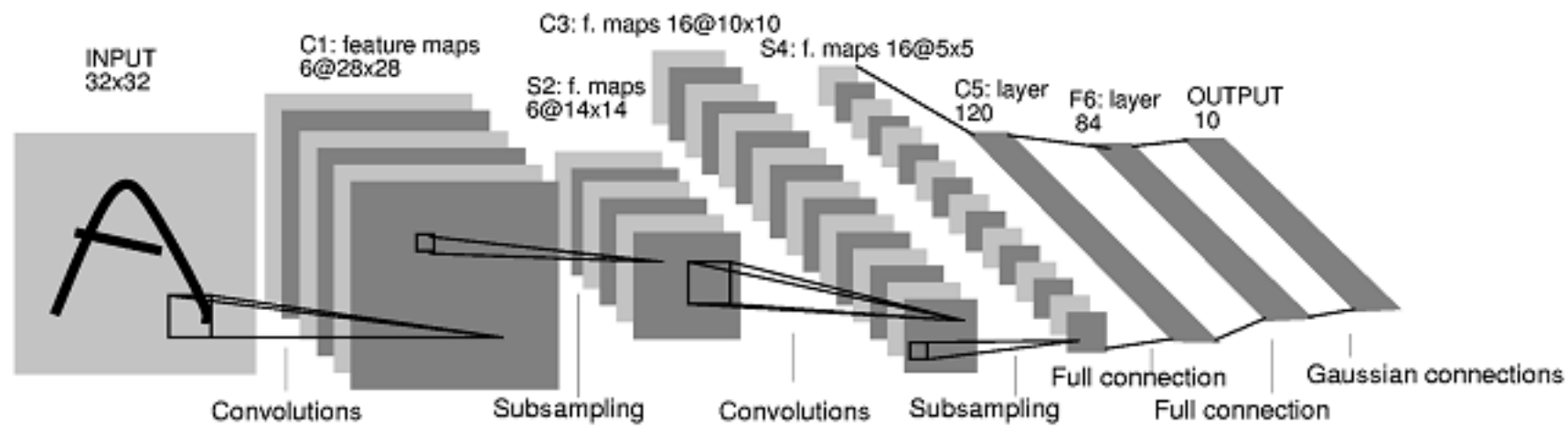
Overfitting을 극복하면서,
세상의 모든 객체를 인식 해보자!

IM.GENET **Large Scale Visual Recognition Challenge**

The Image Classification Challenge:

1,000 object classes

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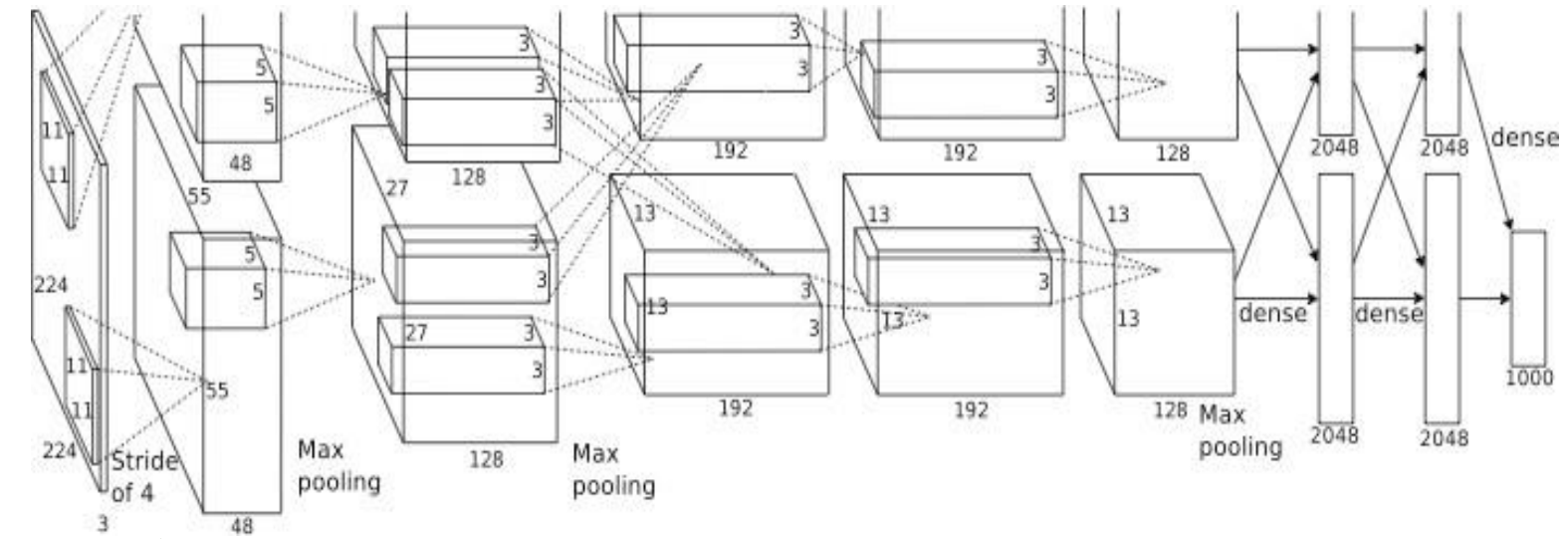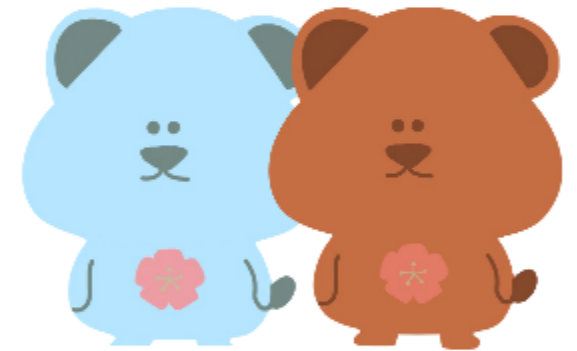

CNN 기반의 AlexNet

LeNet (1998)

AlexNet (2012)

LeNet (1998)

AlexNet (2012)

1. 연산량 증가 (컴퓨터의 계산속도, GPU)
2. 데이터의 증가

Various tasks of Computer Vision

03 Various tasks of Computer Vision

Computer Vision

2667 benchmarks • 949 tasks • 1755 datasets • 23343 papers with code

Image Classification

Image Classification	**Knowledge Distillation**	**Few-Shot Image Classification**	**Fine-Grained Image Classification**	**Semi-Supervised Image Classification**
299 benchmarks	3 benchmarks	80 benchmarks	32 benchmarks	34 benchmarks
2167 papers with code	456 papers with code	121 papers with code	94 papers with code	81 papers with code

▸ **See all 22 tasks**

Semantic Segmentation

Semantic Segmentation	**Tumor Segmentation**	**3D Semantic Segmentation**	**Panoptic Segmentation**	**Scene Segmentation**
128 benchmarks	1 benchmark	8 benchmarks	10 benchmarks	6 benchmarks
2499 papers with code	115 papers with code	78 papers with code	77 papers with code	66 papers with code

▸ **See all 19 tasks**

Object Detection

03 Various tasks of Computer Vision

Image Classification
Object Detection
Generation
Semantic Segmentation
Human Pose Estimation
Deepfake Detection
Activity Recognition
Facial Recognition
Depth Estimation
Medical Image Segmentation
Video Classification
...

Computer Vision

+

Multimodal

VQA
Image Captioning
Image-text matching
Text-to-Image
...

Semantic Segmentation — GRASS, CAT, TREE, SKY — No objects, just pixels

Classification + Localization — CAT — Single Object

Object Detection — DOG, DOG, CAT — Multiple Object

Instance Segmentation — DOG, DOG, CAT — Multiple Object

This image is CC0 public domain

GAN(Generative Adversarial Network)

StarGan   CycleGan

Image Captioning

VQA

THANK YOU