

# Quick Introduction

## Neural Networks Theory

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[github.com/yungbyun/neuralnetworks](https://github.com/yungbyun/neuralnetworks)

# Neural Networks?



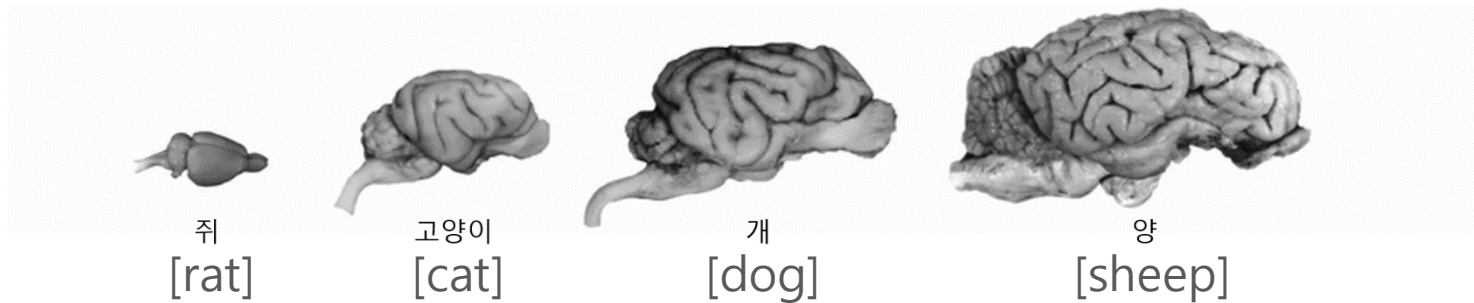
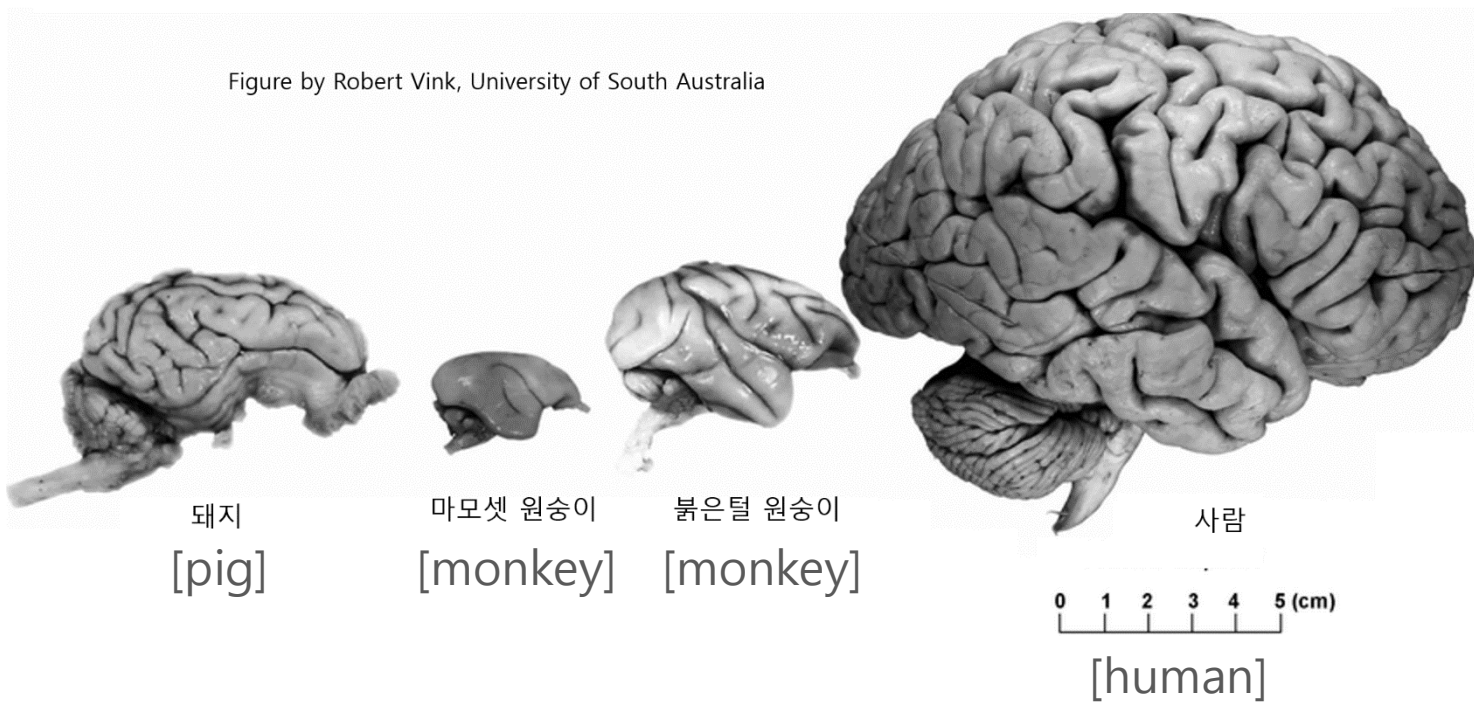


Figure by Robert Vink, University of South Australia





So, neural networks is ...

뇌에 있는 신경세포의 연결

# Artificial Neural Networks

made by people, 사람이 만든

"...a computing system made up of a number of simple, highly interconnected processing elements, which process information by their dynamic state response to external inputs."

Frank Rosenblatt, Cornell Aeronautical Lab  
(1957)

Why? What for?

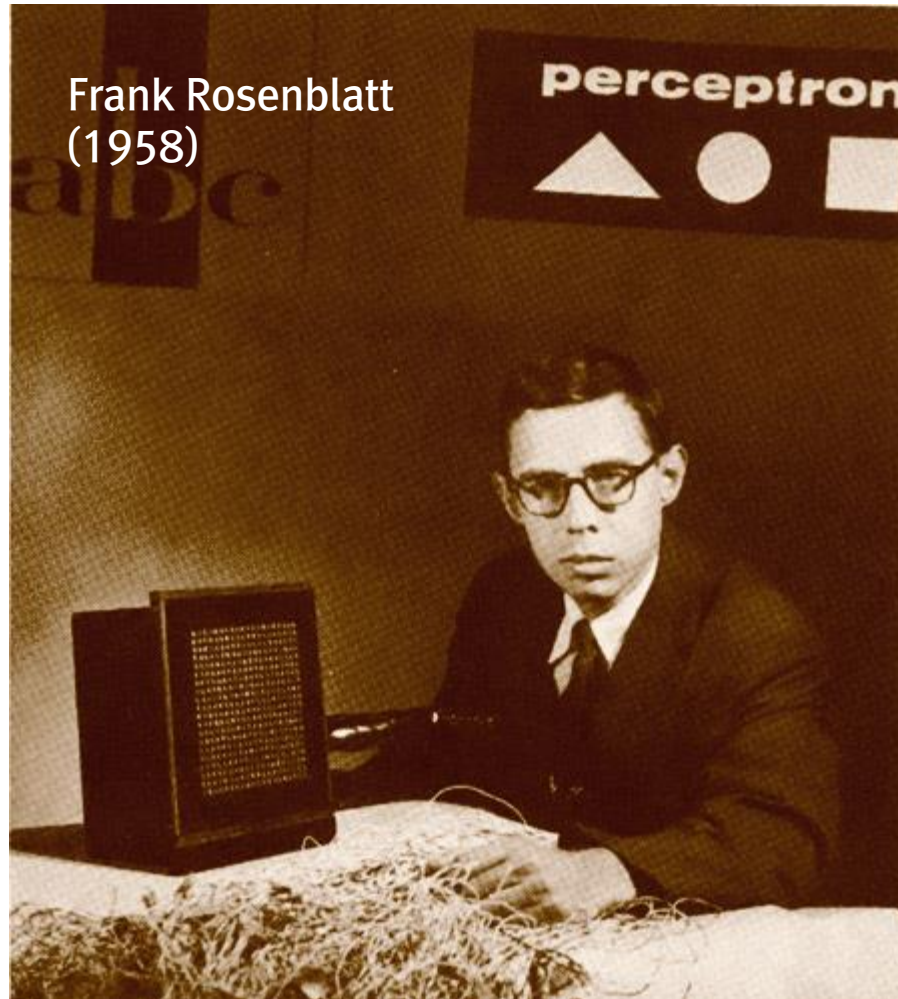
# Intelligence

The ability to **perceive** or infer information, and to **retain** it as knowledge to **be applied** towards adaptive behaviors within an environment or context.



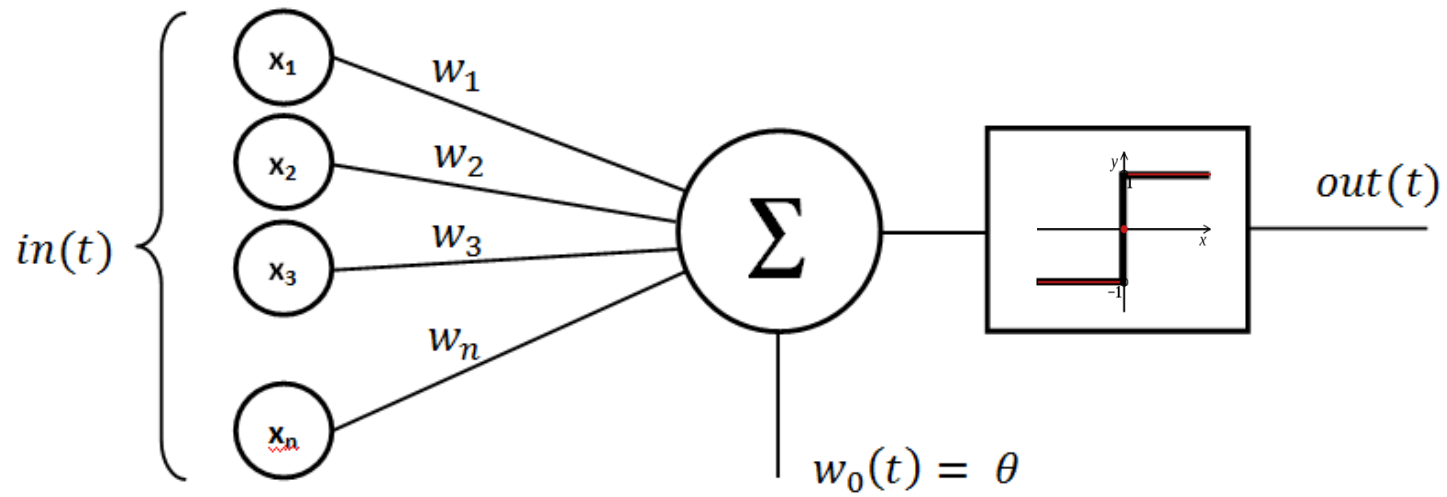
# Artificial Intelligence

사람이 만든 지능



Rosenblatt, F. (1958). The **perceptron**: A probabilistic model for information storage and organization in the brain. *Psychological Review*, 65(6), 386–408. <https://doi.org/10.1037/h0042519>

# Perceptron



# ANN and **rosy** **prospects** in 1950s

ANN에 대한 장미빛 전망

# NEW NAVY DEVICE LEARNS BY DOING; Psychologist Shows Embryo of Computer Designed to Read and Grow Wiser

July 8, 1958



See the article in its original context from  
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# 1<sup>st</sup> Period of Depression in 1960s

Rosy Period → 1차 침체기

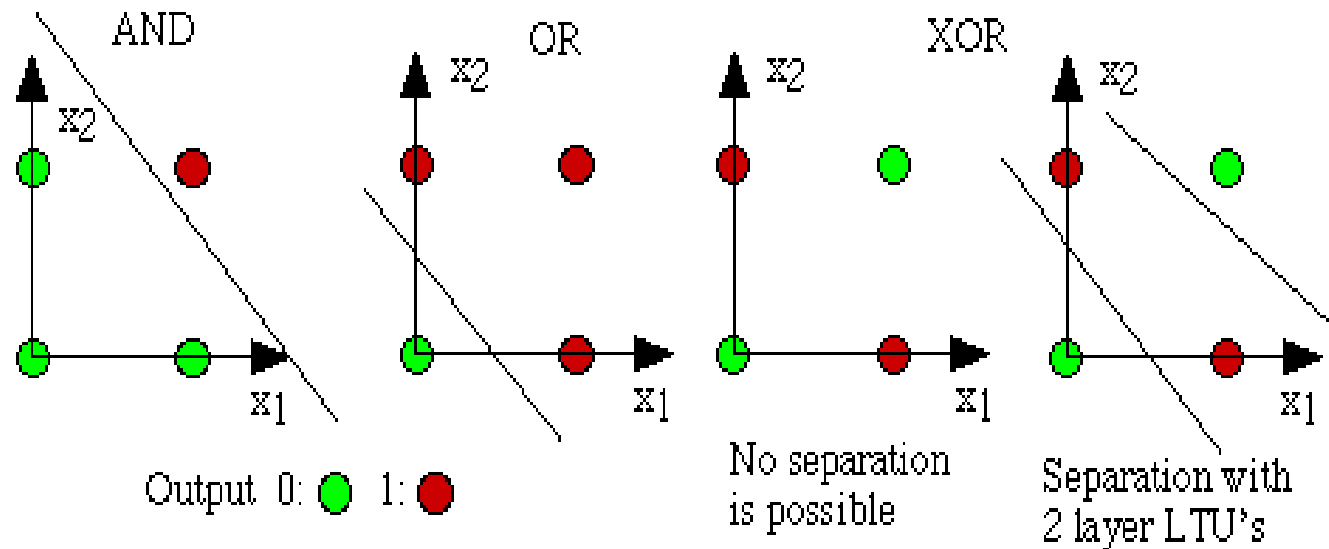


by **Marvin Minsky**, MIT AI Lab.

in 1969

with Perceptron

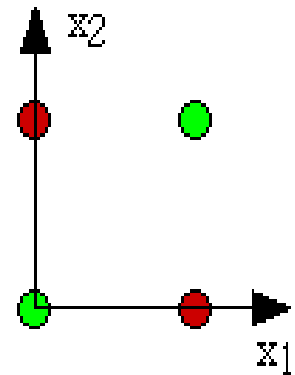
# No solution for XOR problem





# Muti-Layer Perceptron

by Rumelhart, Hinton, Williams  
in 1986

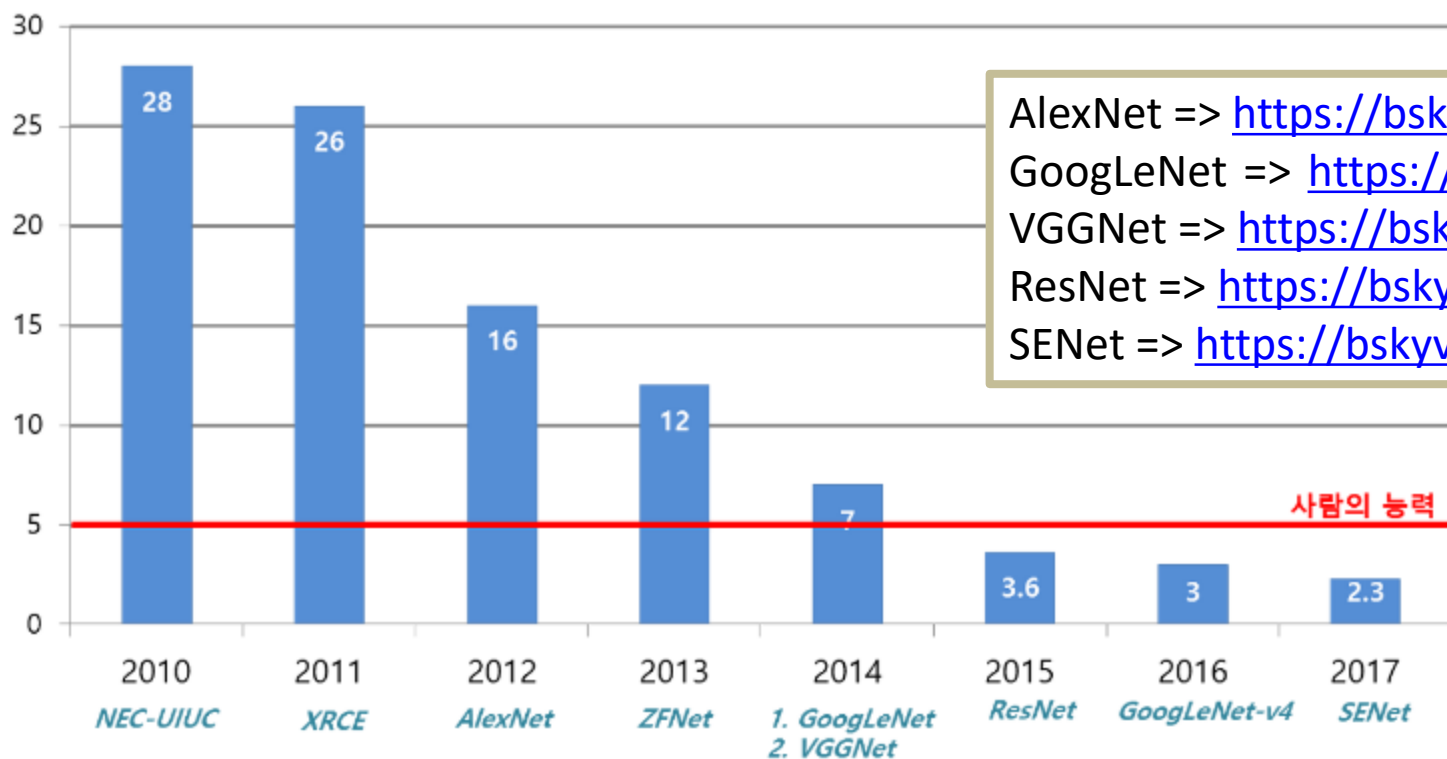


# 2<sup>st</sup> Period of Depression in 1990s

2차 침체기

- Difficulties in training MLP (sigmoid function)
- Not enough data
- Long Learning Time
- Overfitting

# Deep Learning in 2000s



AlexNet => <https://bskyvision.com/421>

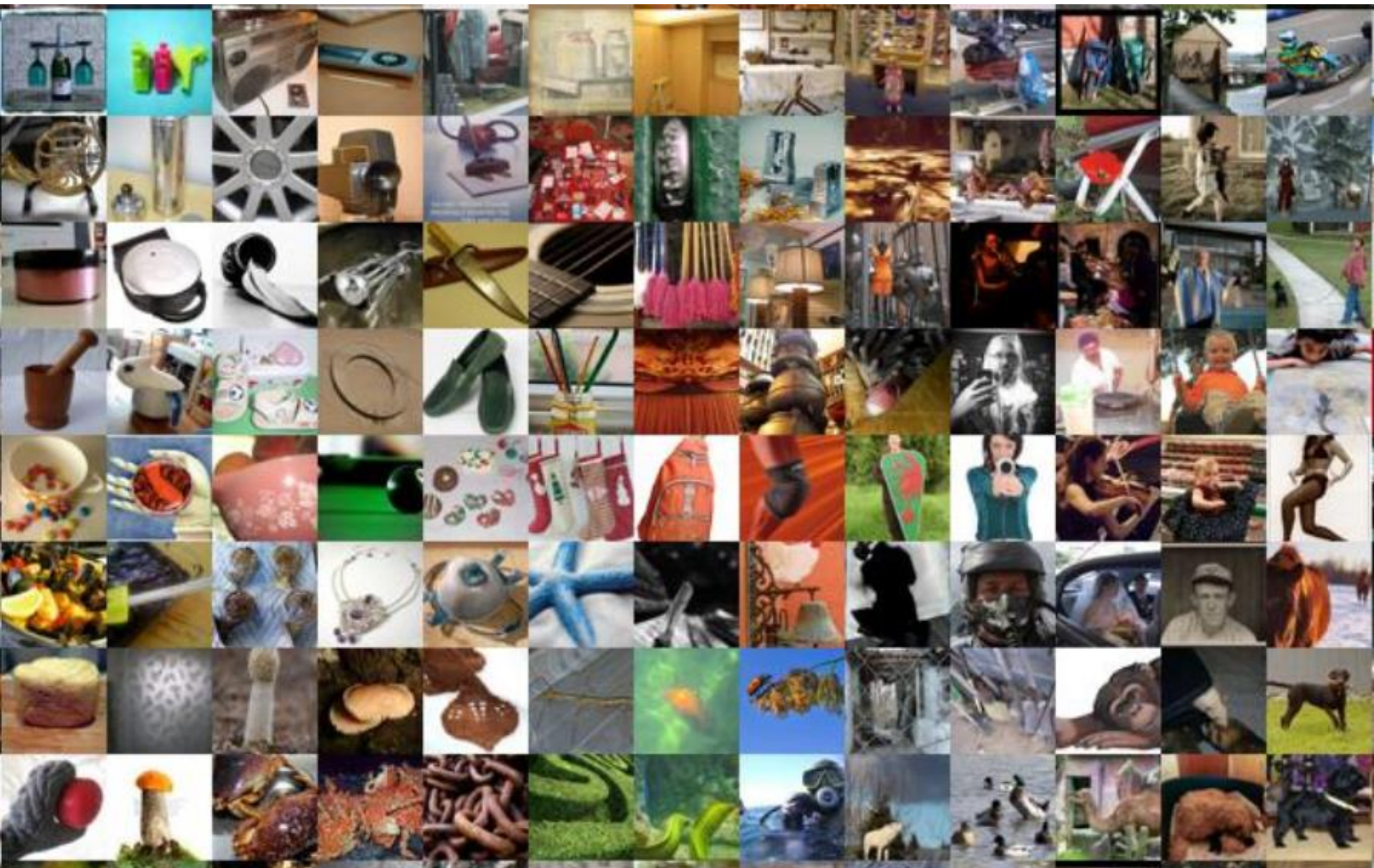
GoogLeNet => <https://bskyvision.com/539>

VGGNet => <https://bskyvision.com/504>

ResNet => <https://bskyvision.com/644>

SENet => <https://bskyvision.com/640>







# AlphaGo

2016

**Many applications**  
**using DL**



# Agenda of this class

- Human Brain
- Machine Learning
- Linear Regression
- Minimizing Cost
- Logistic Classification
- Softmax Regression
- MLP, Deep Learning
- CNN

# Framework for ML





kaggle



# Schedule

Week	Subject
1	
2	Introduction (Y. Byun)
3	Self-Introduction
4	Brain and Artificial Neural Networks
5	Linear Regression
6	Minimizing Cost
7	Logistic Classification and Softmax
8	(Exam)

# Schedule

Week	Subject
9	Multilayer NN
10	Deep Learning
11	Convolutional Neural Network
12	Presentation#1
13	Presentation#2
14	Presentation#3
15	Presentation#4

# Self-Introduction

(More than 10 slides in English)

- Personal information (Lab., Marital Status, Family Info., etc)
- Nationality/Birthplace/Tourism Place (Photo)
- Hobbies / Specialty
- Education and Experience
- Current Major and Research Interests
- and others