haesung kim
ai architect @healthmax
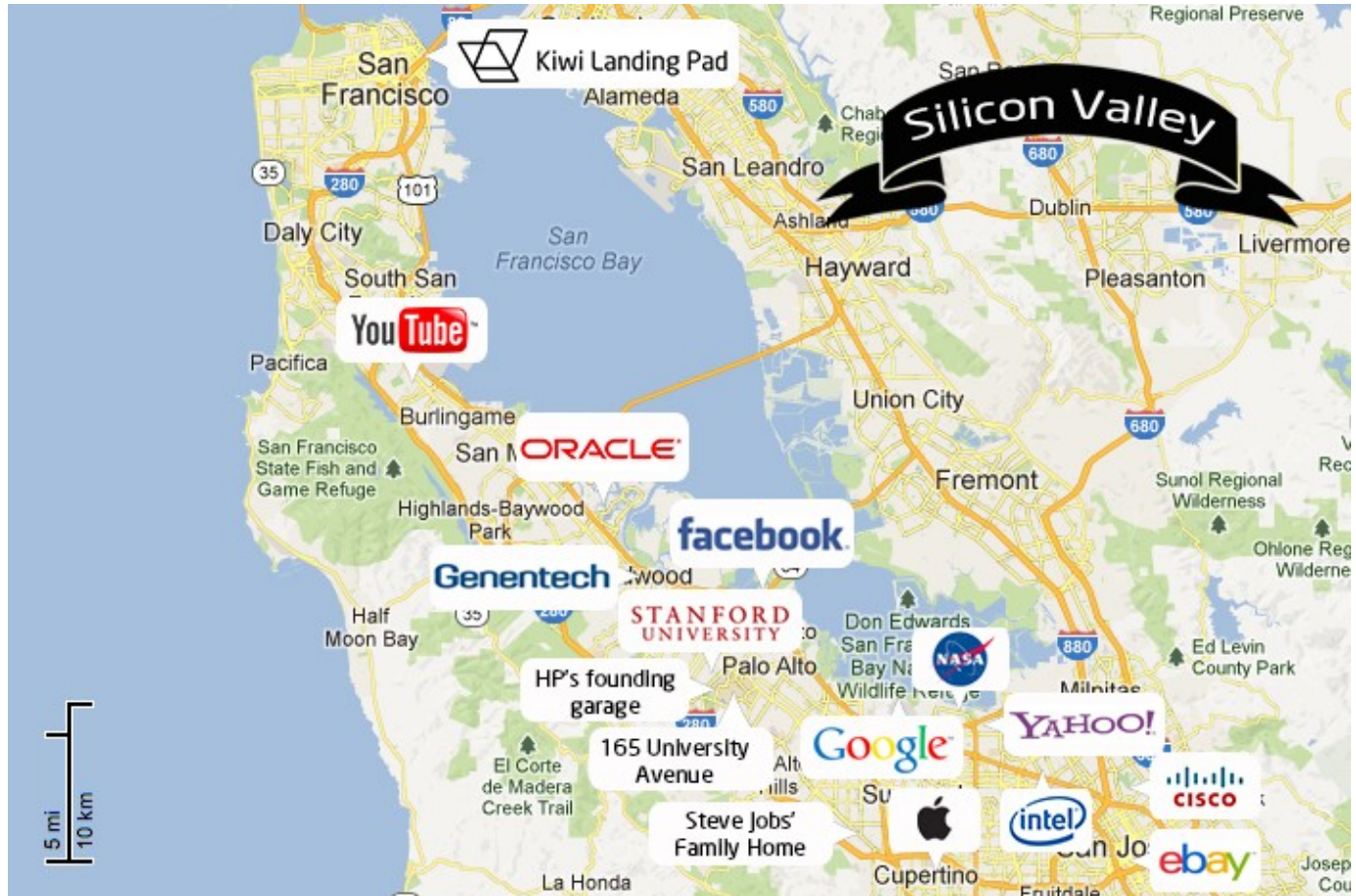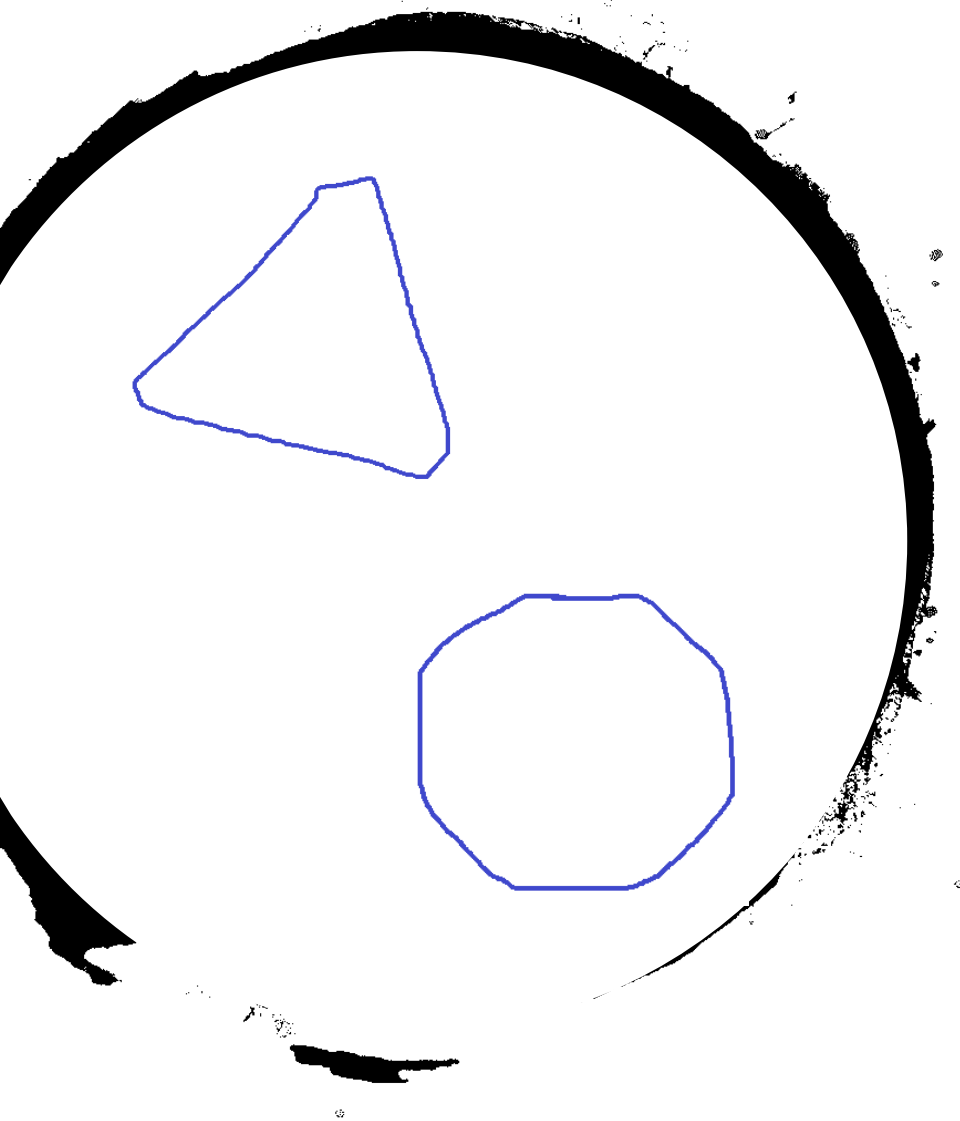haesung.github.io

Hands on Tips on
Machine Learning App Development

AI, Machine Learning, Deep Learning
CBR (Case-Based Reasoning) is ML (Machine Learning)
Machine Learning vs Classical Programming
Machine Learning & Deep Learning Core Concepts
Why Deep Learning is Popular
Tensorflow.js – JavaScript Machine Learning Platform
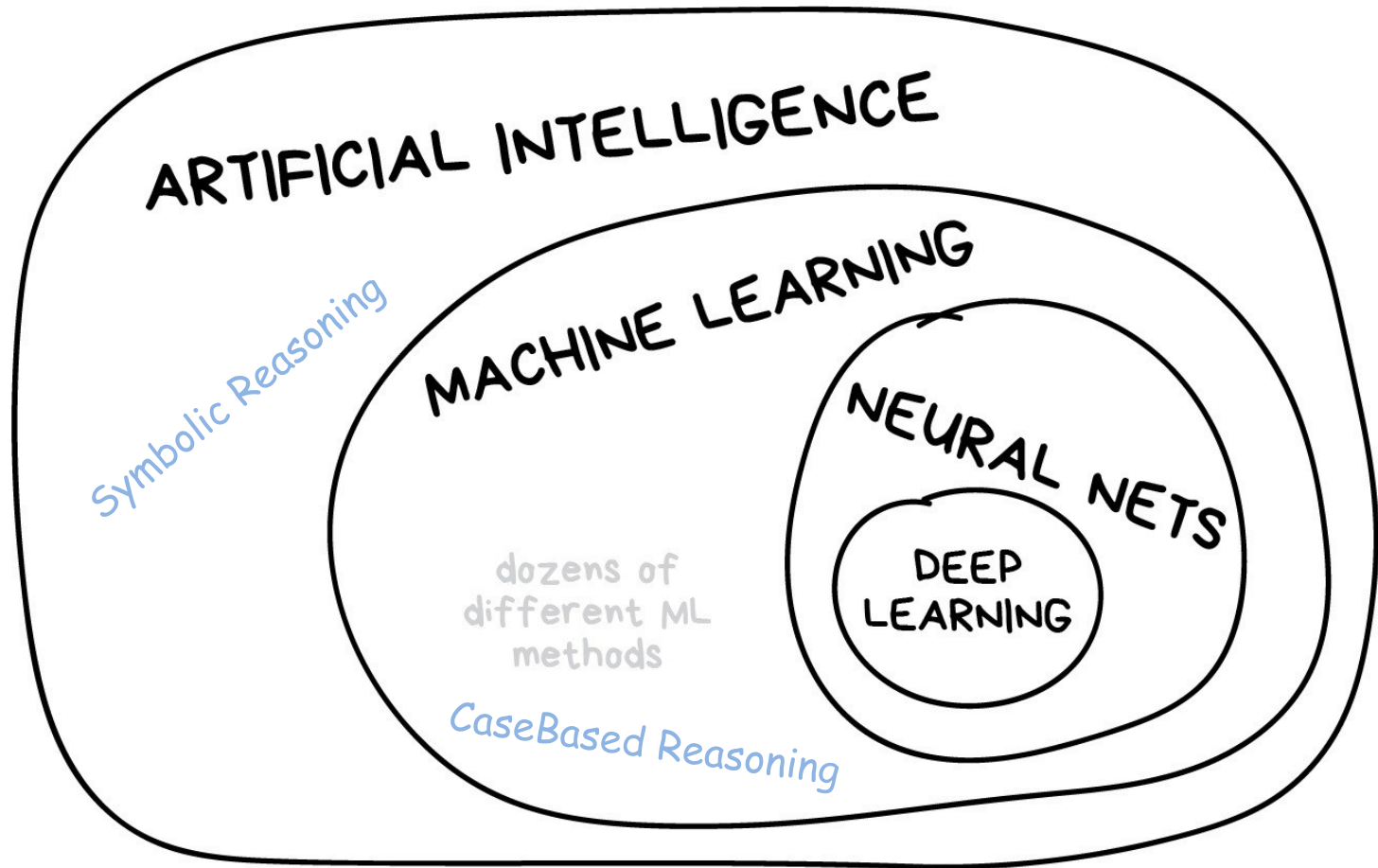Deep Learning or CBR or Rules
Demo

Why Bay Area

AI ?

- What is Intelligent or Smart?
  - Classify, Discern, Discriminate
  - Dog or Cat
  - Triangle, Circle
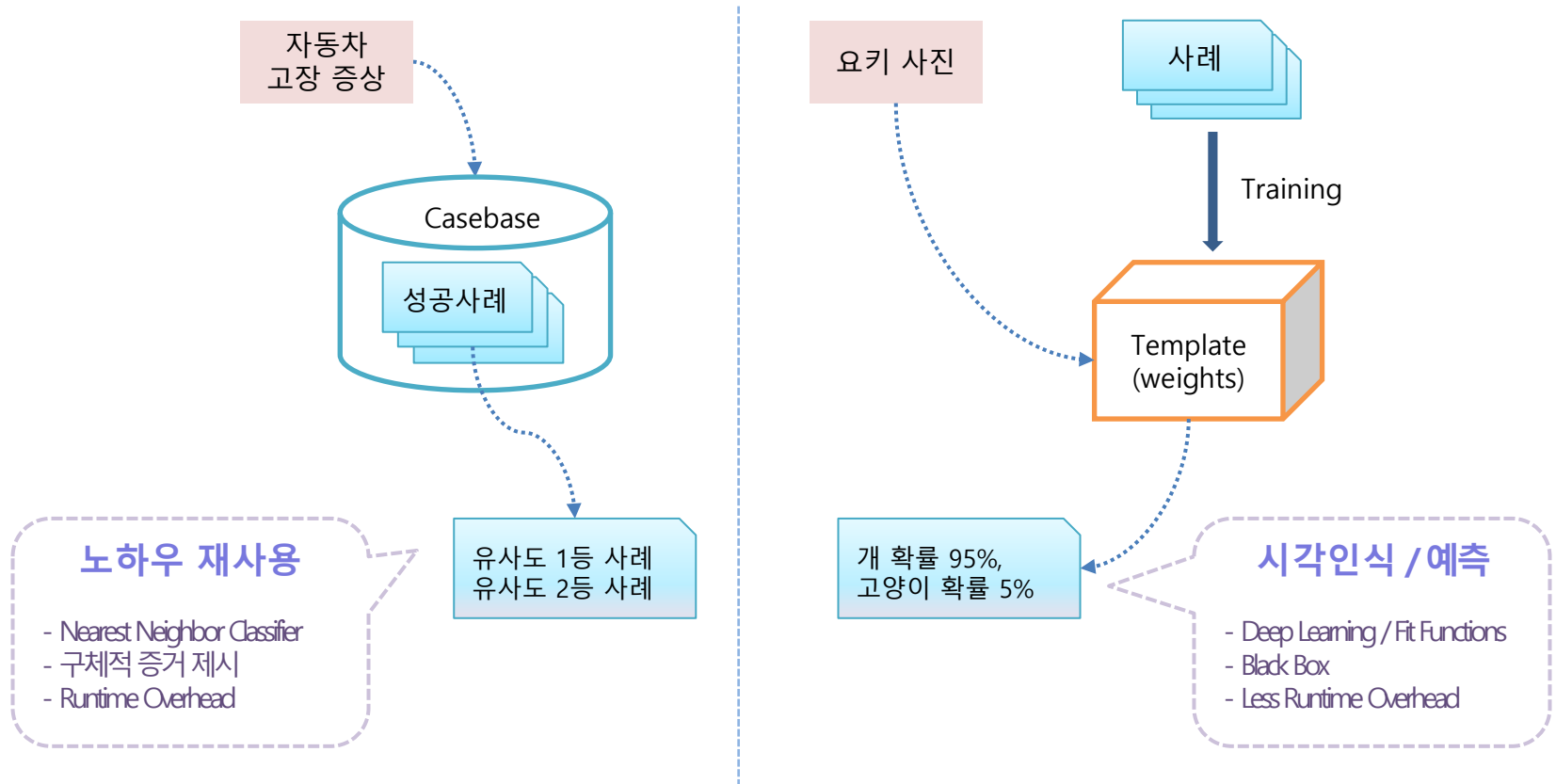
  NOT EASY !

- Learn – Get Smarter

- What is Artificial?

AI, ML, DL

ARTIFICIAL INTELLIGENCE

Symbolic Reasoning

MACHINE LEARNING

NEURAL NETS

dozens of different ML methods

DEEP LEARNING

CaseBased Reasoning

CBR (Case-Based Reasoning) is ML

자동차
고장 증상

Casebase

성공사례

노하우 재사용

- Nearest Neighbor Classifier
- 구체적 증거 제시
- Runtime Overhead

유사도 1등 사례
유사도 2등 사례

요키 사진

사례

Training

Template
(weights)

개 확률 95%,
고양이 확률 5%

시각인식 / 예측

- Deep Learning / Fit Functions
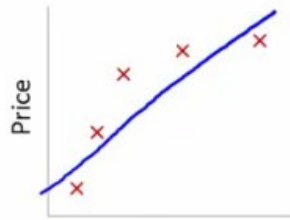- Black Box
- Less Runtime Overhead

Machine Learning

Data & Answers => Image & Tag

Rules => Parameter / Weight Matrix

Machine Learning
vs
Classical Programming
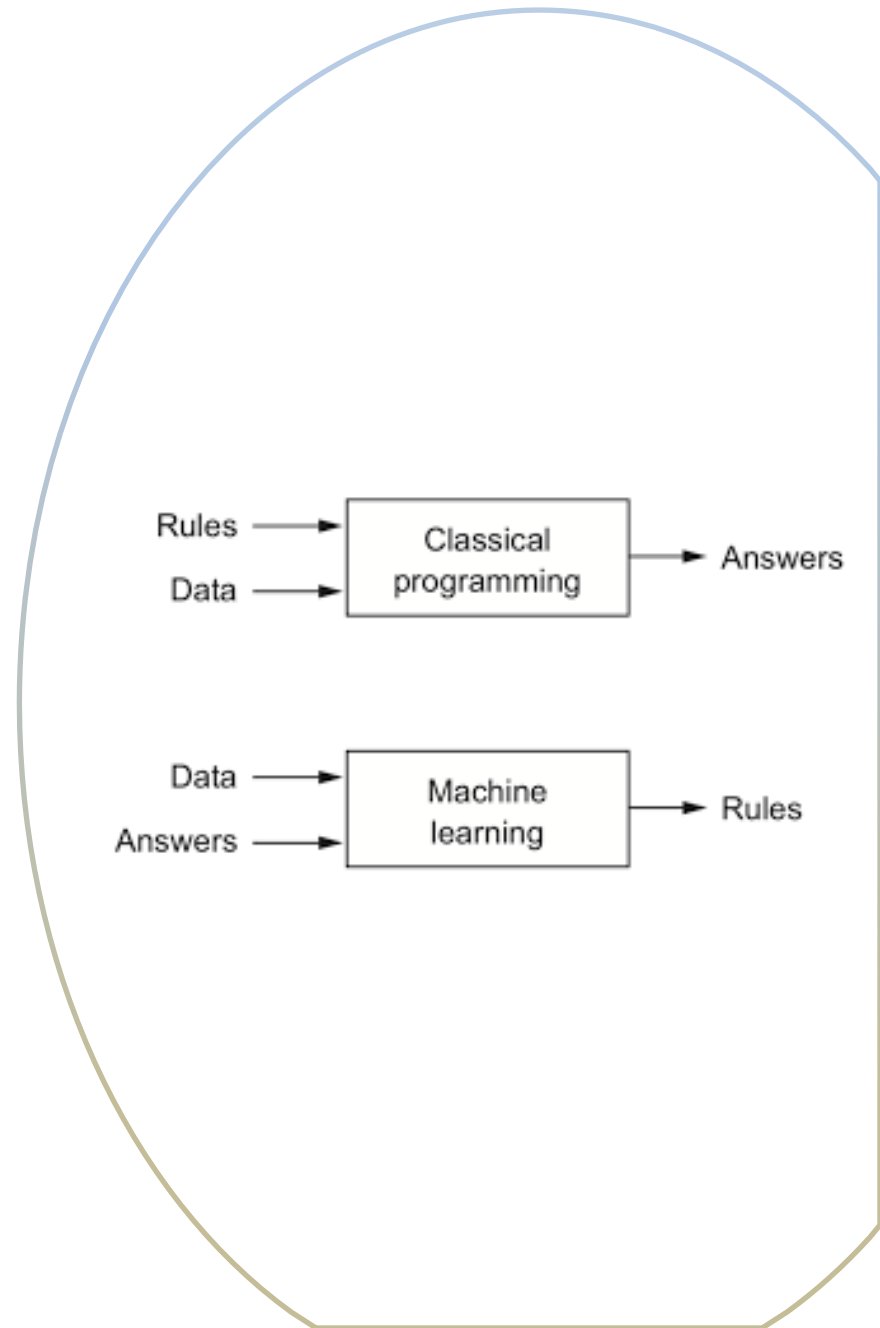
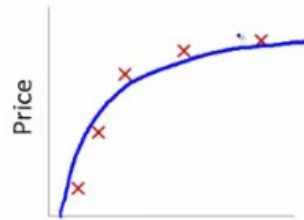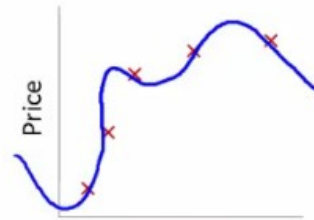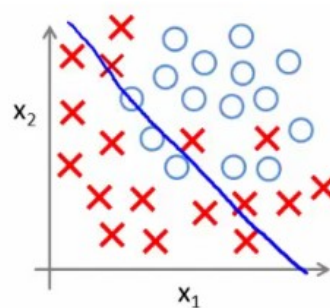# Machine Learning Core Concept

High bias (underfit): $\theta_0 + \theta_1 x$

"Just right": $\theta_0 + \theta_1 x + \theta_2 x^2$

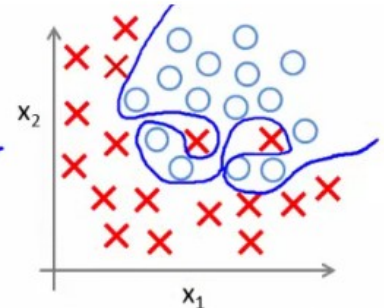High variance (overfit): $\theta_0 + \theta_1 x + \theta_2 x^2 + \theta_3 x^3 + \theta_4 x^4$

UNDERFITTING (high bias): $h_\theta(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$ (g = sigmoid function)
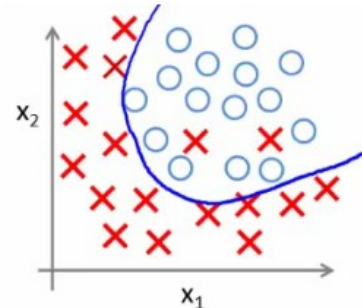
$g(\theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_1^2 + \theta_4 x_2^2 + \theta_5 x_1 x_2)$
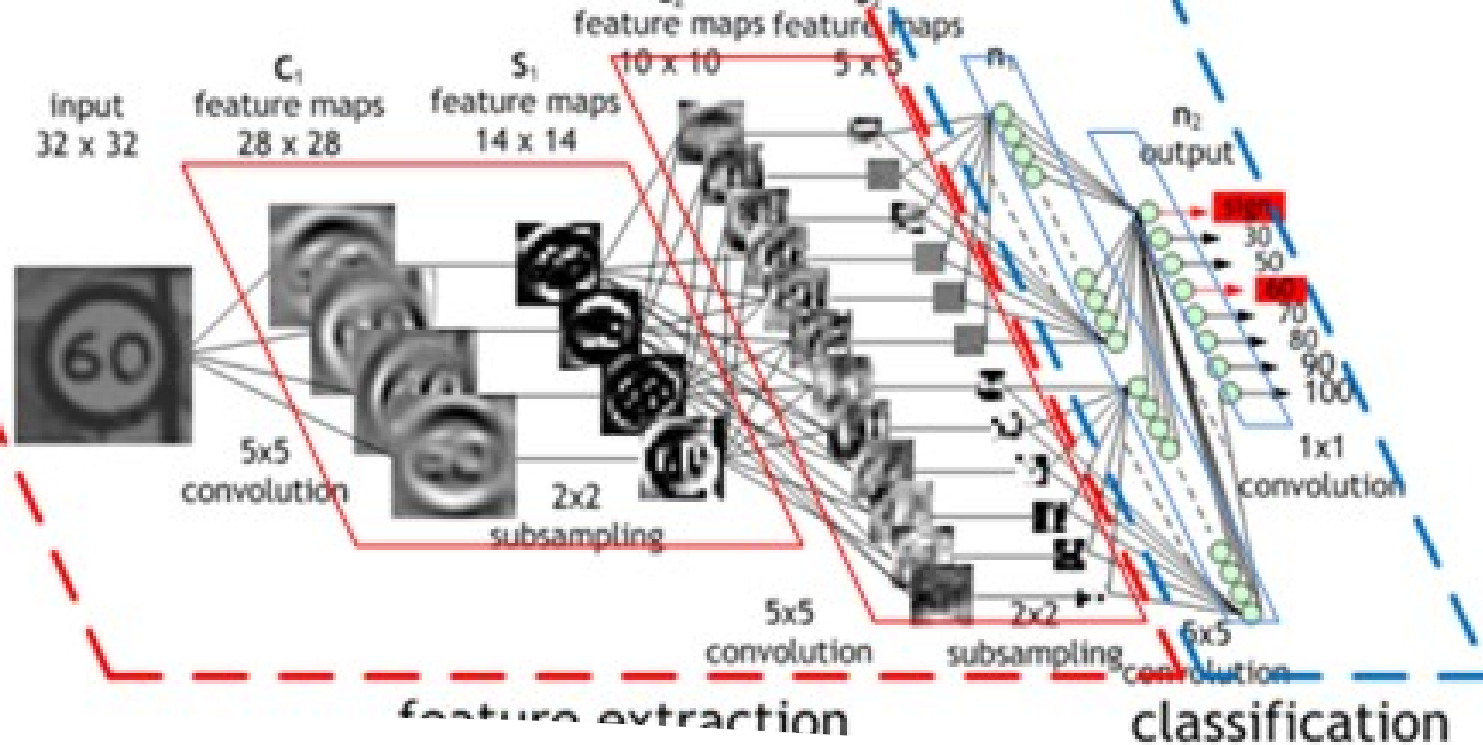
OVERFITTING (high variance): $g(\theta_0 + \theta_1 x_1 + \theta_2 x_1^2 + \theta_3 x_1^2 x_2 + \theta_4 x_1^2 x_2^2 + \theta_5 x_1^2 x_2^3 + \theta_6 x_1^3 x_2 + \ldots)$

(Source: Coursera, Andrew Ng)

Deep Learning Core Concept

(Source: Fast.ai, Jeremi Howard)
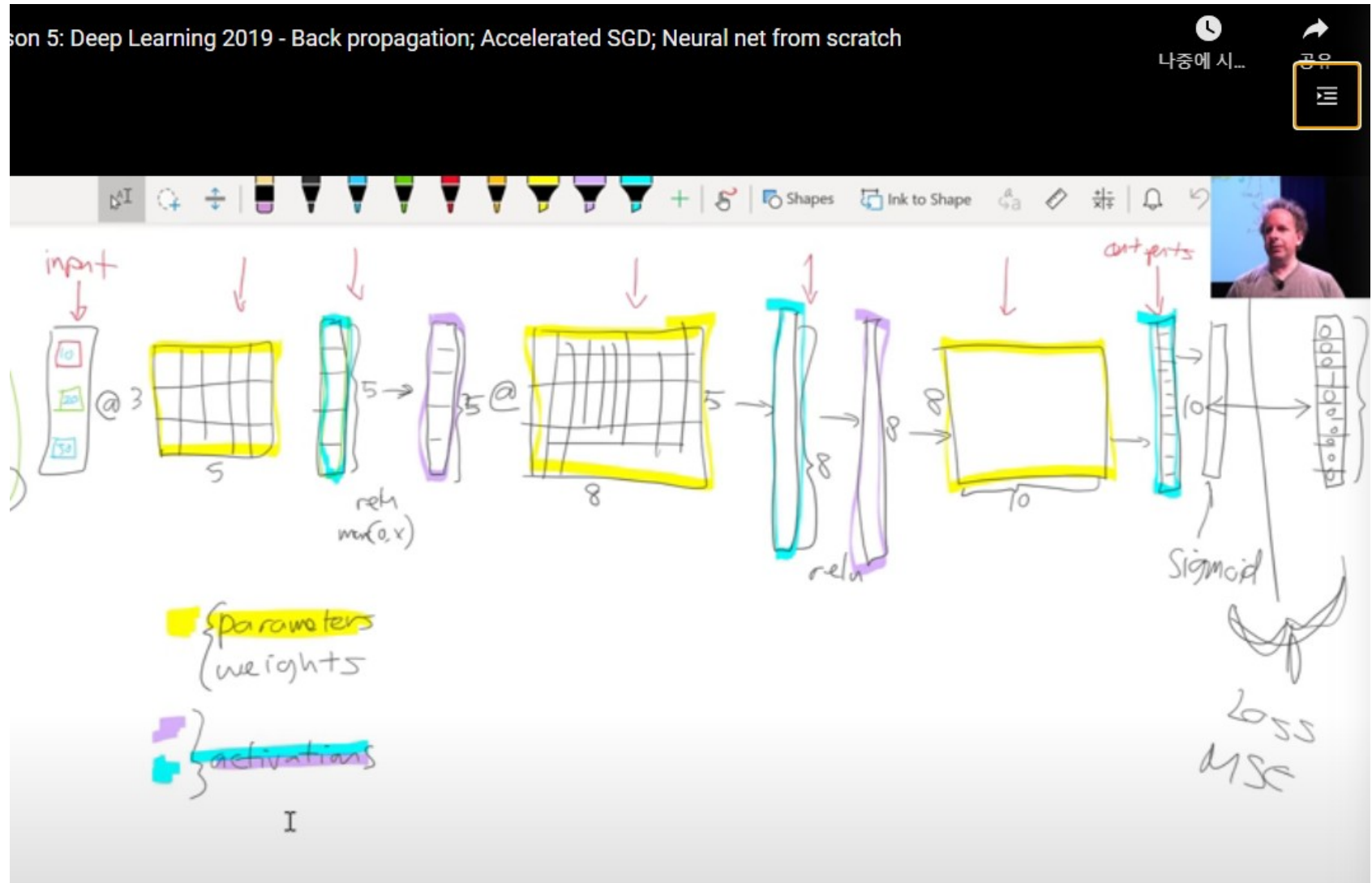
Why Deep Learning is Popular

- New fancy word of Neural Net
  - Fast = cheap graphic card
  - Data = huge tagged data
  - Easy = CNN (auto feature extraction)

- Vision
  - 97% accuracy better than human expert 95%
  - http://cs231n.stanford.edu/

Tensorflow.js – JavaScript Machine Learning Platform

- Why Tensorflow.js
  - ✓ Easy – chromium browser debugger
  - ✓ Fast - webGL, wasm backend
  - ✓ Secure – embedded model in app

- JavaScript
  - ✓ Full stack developer language (web, server, ai)
  - ✓ Simple, functional, modular
  - ✓ The good parts - Douglas Crockford

- Best courses
  - ✓ Andrew Ng, https://www.coursera.org/learn/machine-learning
  - ✓ Jeremi Howard, https://course.fast.ai/
  - ✓ Stanford CNN Course, http://cs231n.stanford.edu/

DL or CBR or Rules

1. Car Repair Support System

2. Amazon Recommendation

3. My Home Finder

4. Cancer Detection & Treatment

5. Metabolic Syndrome Detection