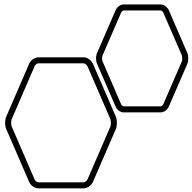
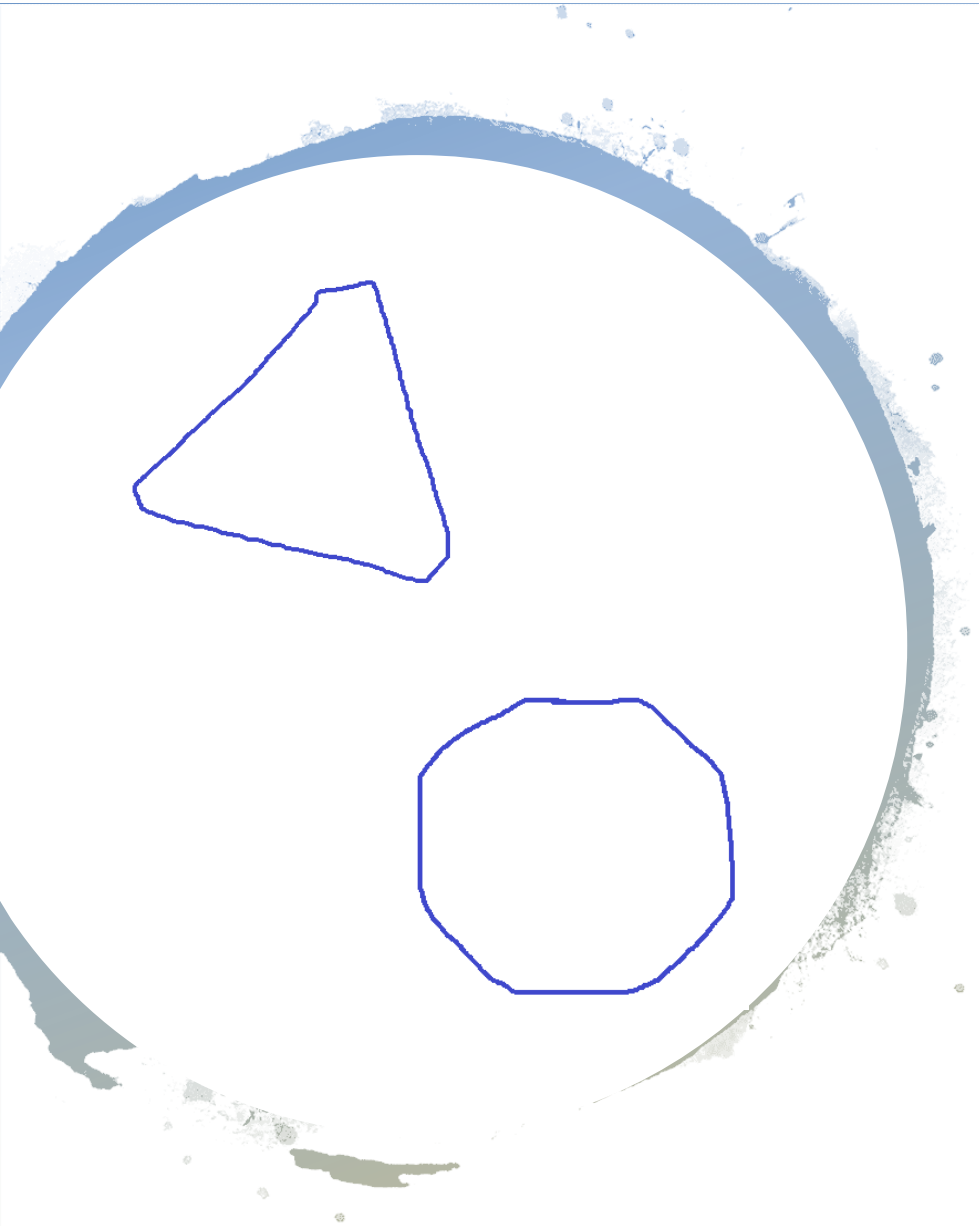


What is AI?

Understand Core Concept of
AI, ML, DL, CBR, LLM
Applications
Opportunities

haesung kim
knowhow+
haesung.github.io

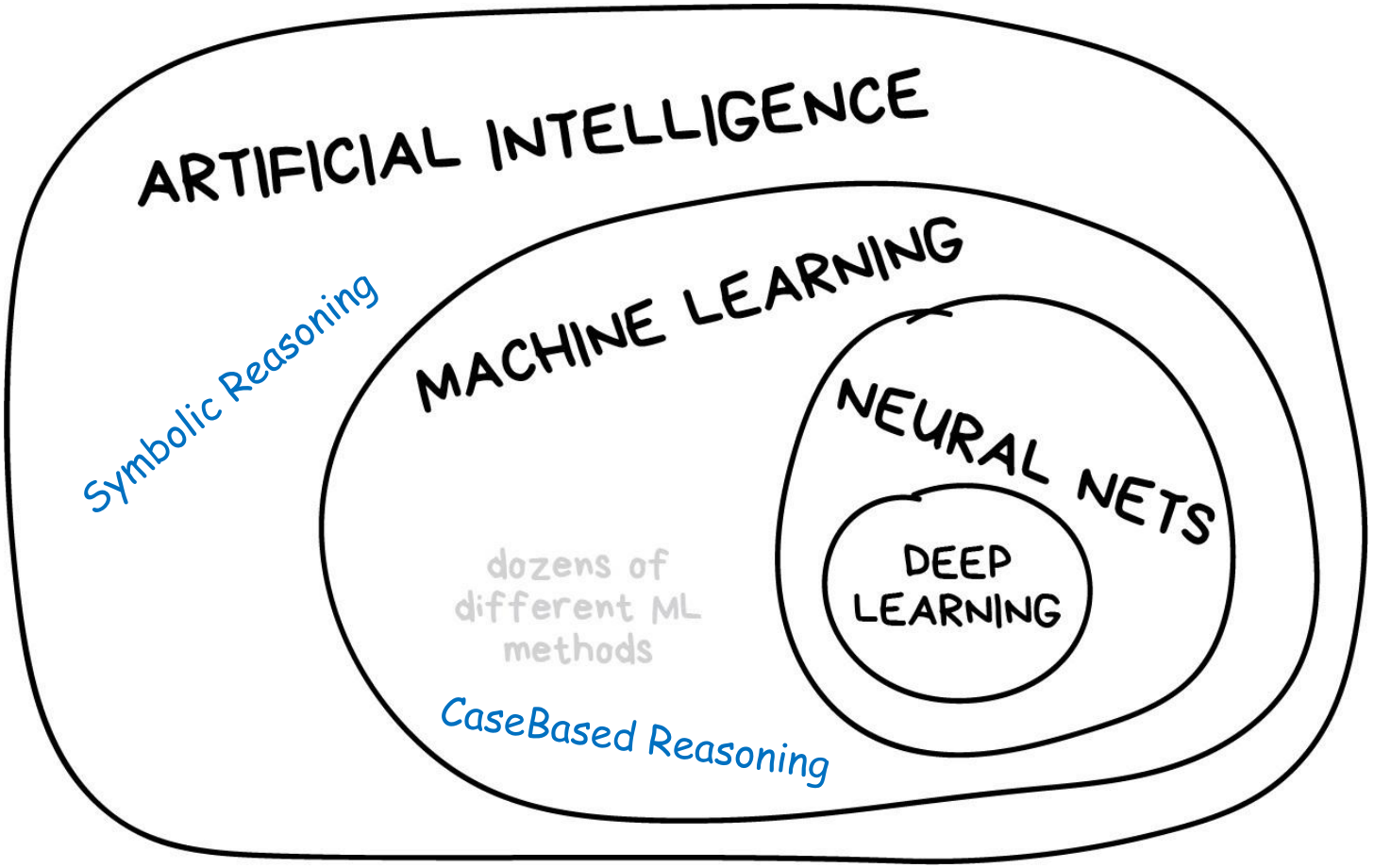


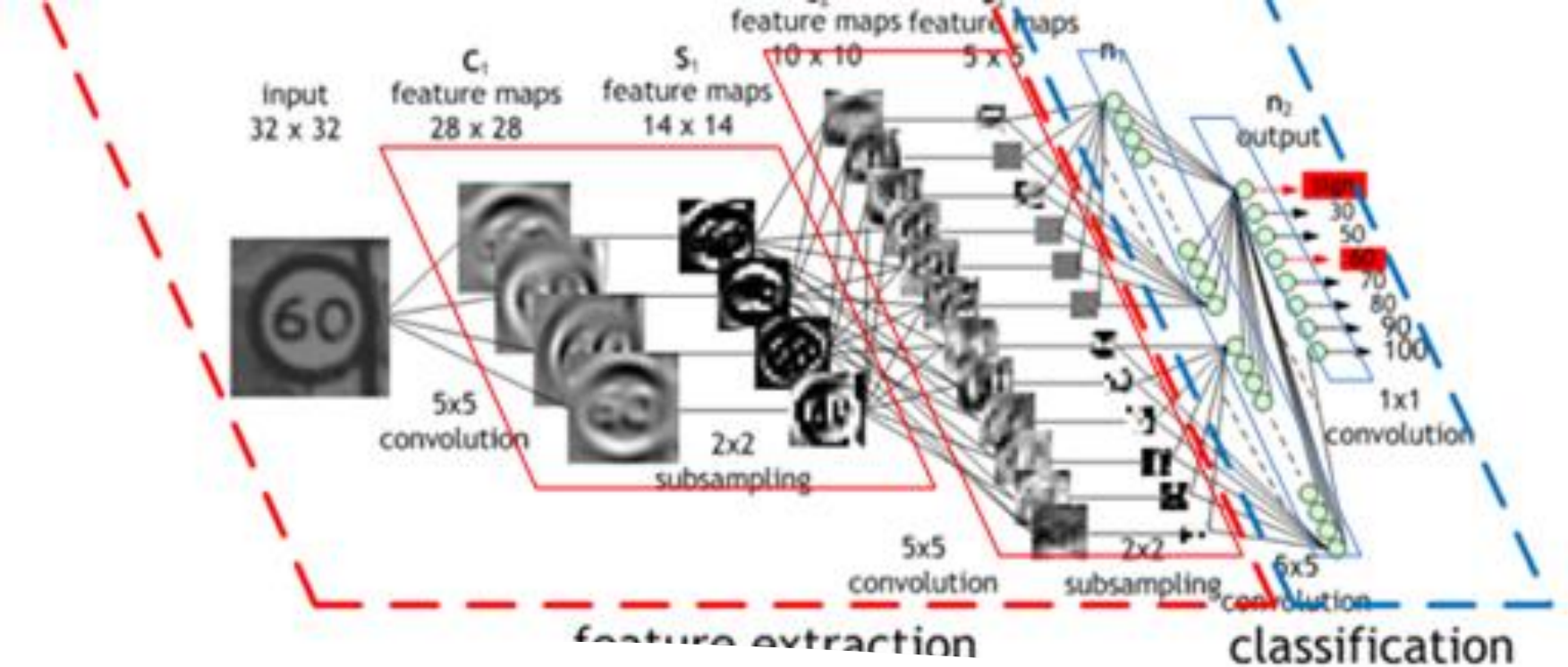
AI ?

- What is being Intelligent?
  - Marvin Minsky 1970

  NOT EASY !
  - Cannot Code
  - Learn from Data
- Hard Areas
  - Classification 분류
  - Prediction 예측
  - Reasoning 추론
  - Creation 생성 (LLM)

Big Picture - AI, ML, DL, CBR, LLM

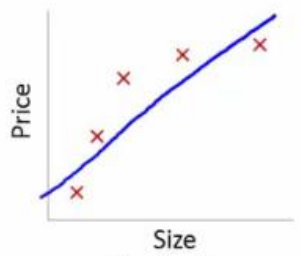




Why Deep Learning is Popular

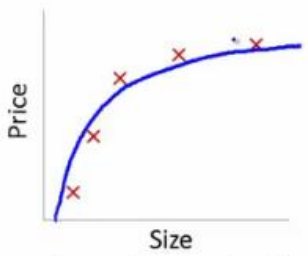
- New fancy word of Neural Net
  - Fast = cheap graphic card
  - Data = huge tagged data
  - Easy = CNN (auto feature extraction)
- Vision
  - 97% accuracy better than human expert 95%
  - http://cs231n.stanford.edu/

Machine Learning Core Concept



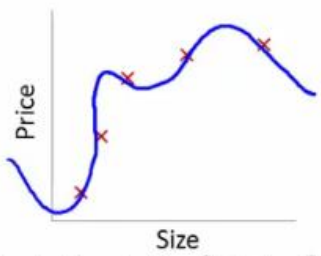
$\theta_0 + \theta_1 x$

High bias
(underfit)



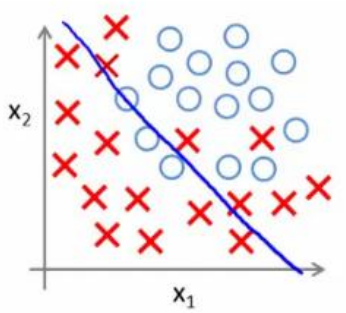
$\theta_0 + \theta_1 x + \theta_2 x^2$

"Just right"



$\theta_0 + \theta_1 x + \theta_2 x^2 + \theta_3 x^3 + \theta_4 x^4$

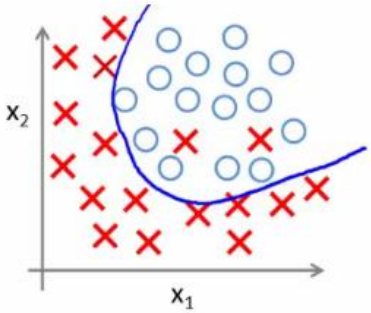
High variance
(overfit)



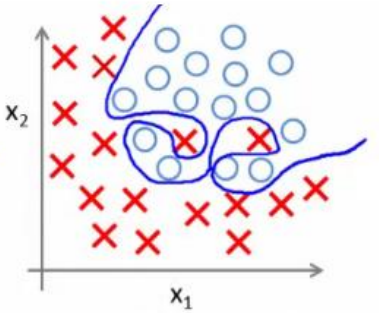
$h_\theta(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$

(g = sigmoid function)

UNDERFITTING
(high bias)



$g(\theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_1^2 + \theta_4 x_2^2 + \theta_5 x_1 x_2)$

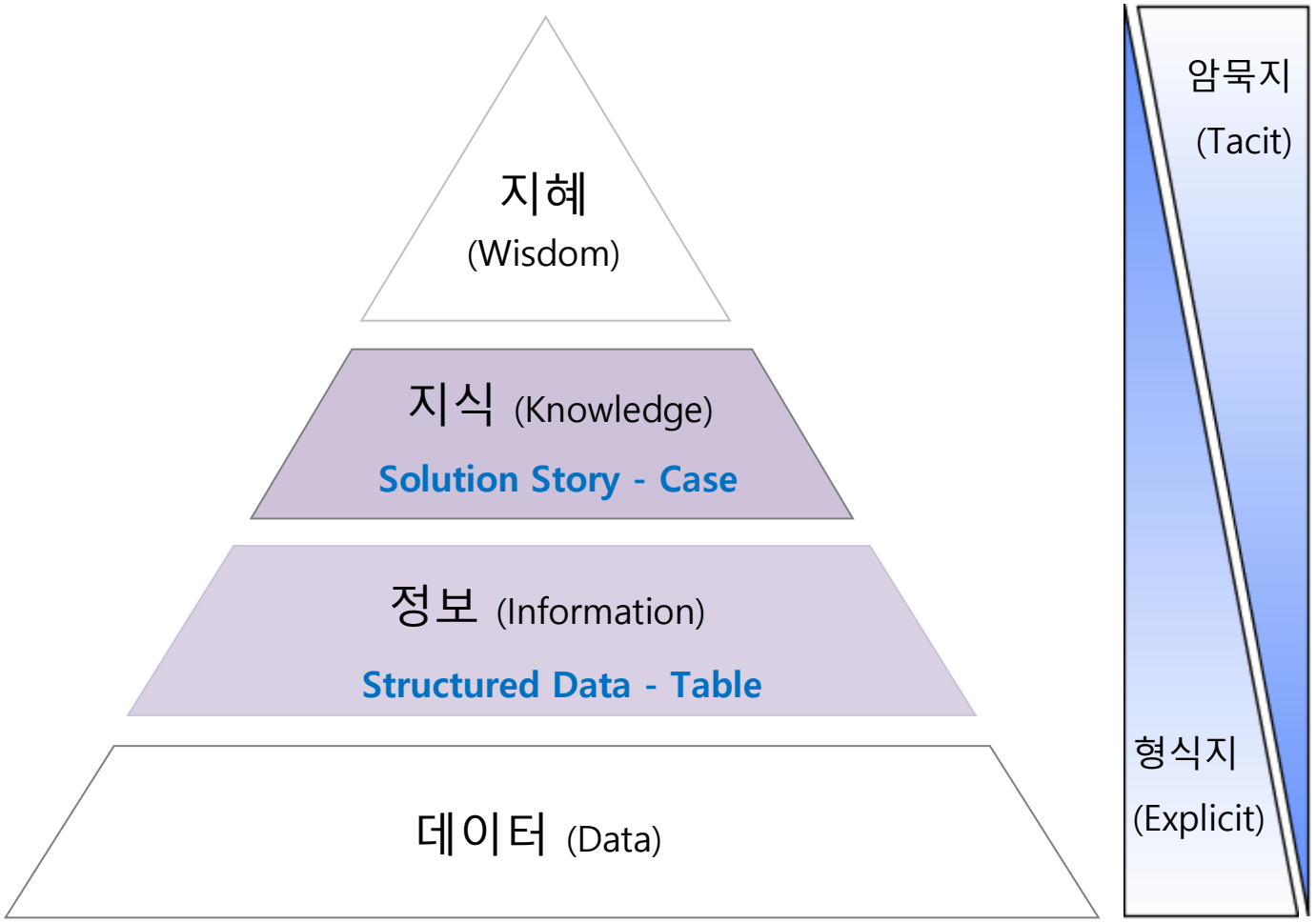


$g(\theta_0 + \theta_1 x_1 + \theta_2 x_1^2 + \theta_3 x_1^2 x_2 + \theta_4 x_1^2 x_2^2 + \theta_5 x_1^2 x_2^3 + \theta_6 x_1^3 x_2 + \ldots$

OVERFITTING
(high variance)

(Source: Coursera, Andrew Ng)

Knowledge vs Data

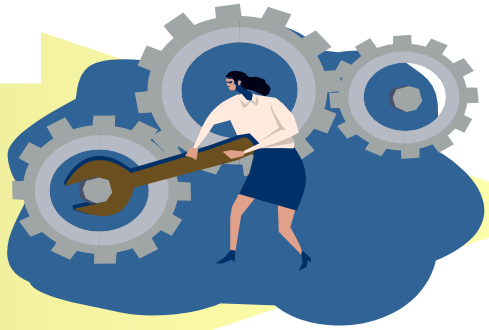


What is CBR (Case-Based Reasoning)

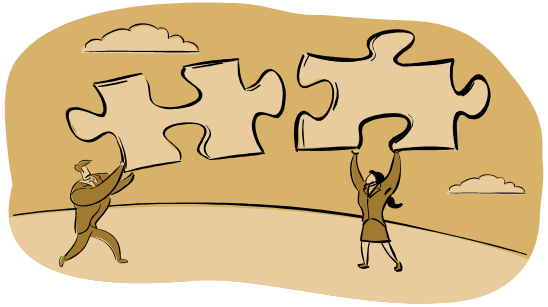
사람이 문제를 해결하기 위하여 추론하는 프로세스를 모델링 한 방법 (Bergmann)

과거의
경험과 노하우

CBR시스템에
사례로 저장



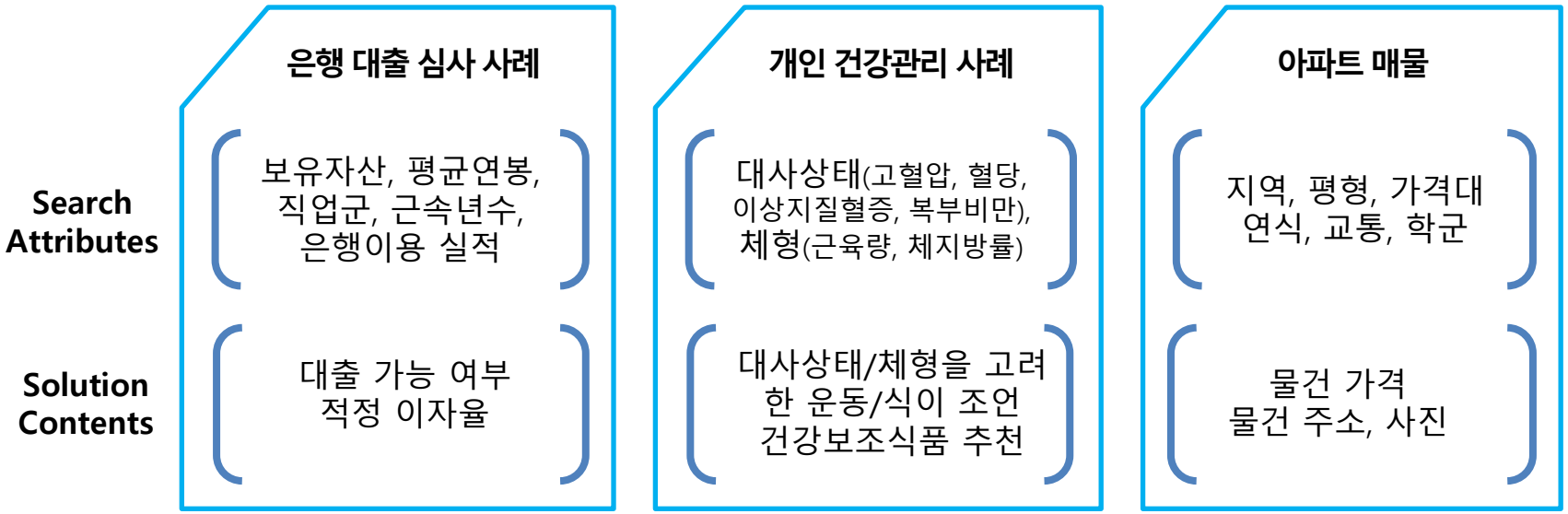
문제발생



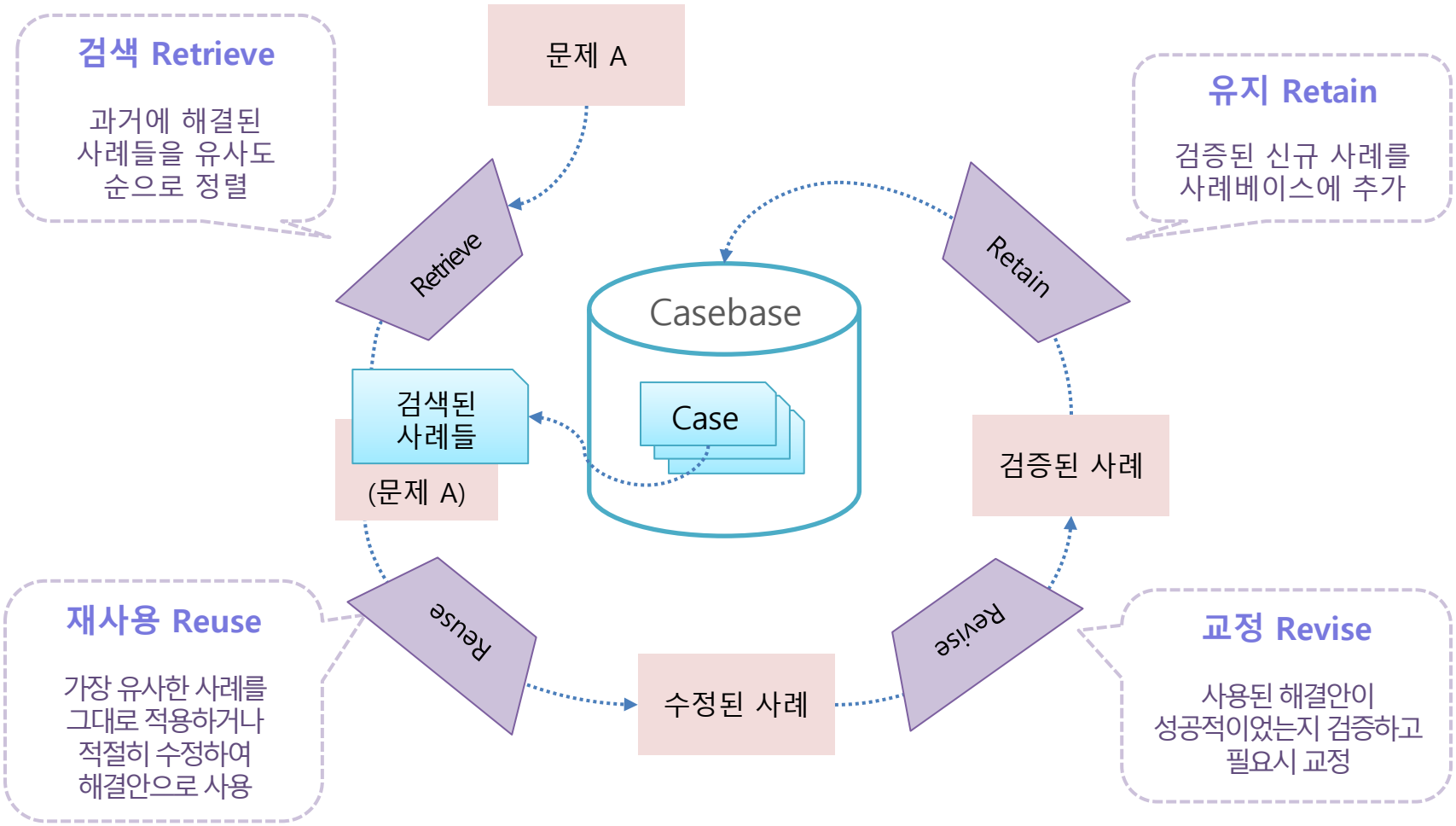
저장된 과거 사례들 중에서 유사도 검색을 통해
문제 상황과 가장 비슷한 사례(해결책) 제시

CBR Case Structure (사례구조)

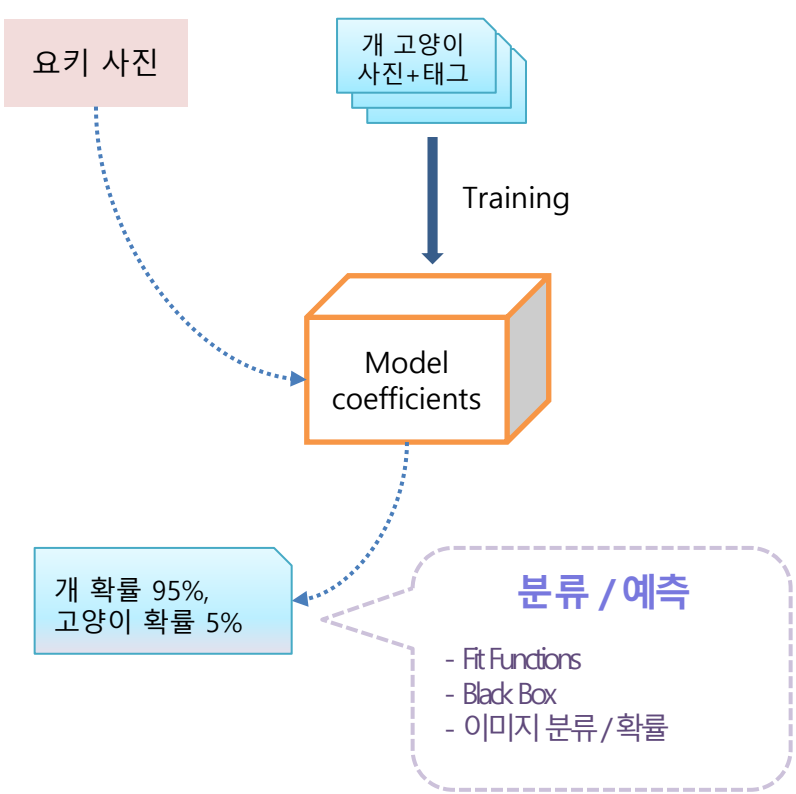
- **Case** (사례) = **Search Attributes** (검색속성) + **Solution Contents** (해결방안)
  - Search Attributes : 문제/상황을 표현하는 **Key/Value - 유사도검색**에 사용
  - Solution Contents : 실제 해결방안, 처방, 구체적 정보 등 (텍스트, 이미지, 동영상)

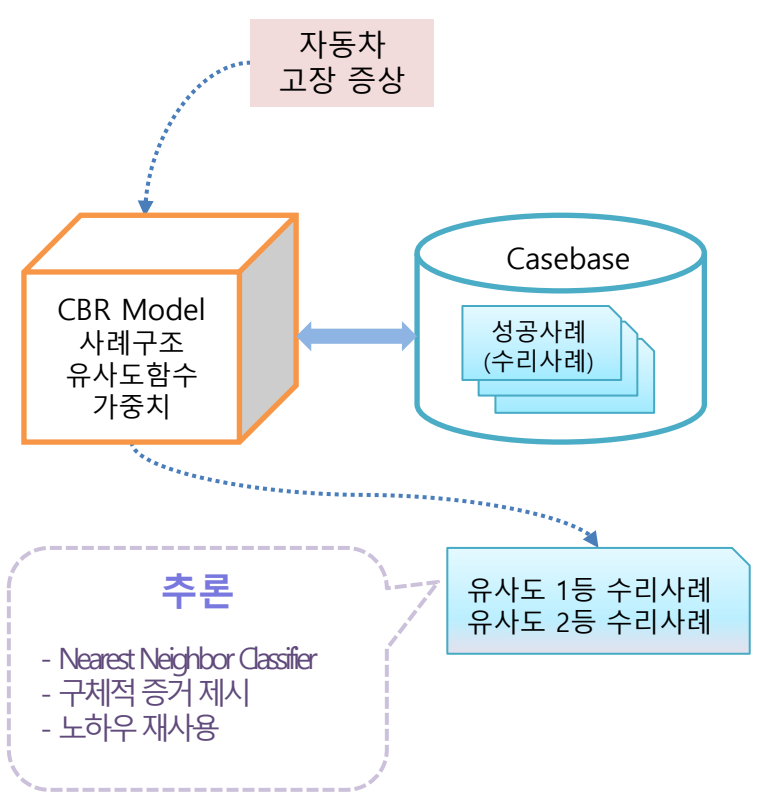


CBR 4R Process



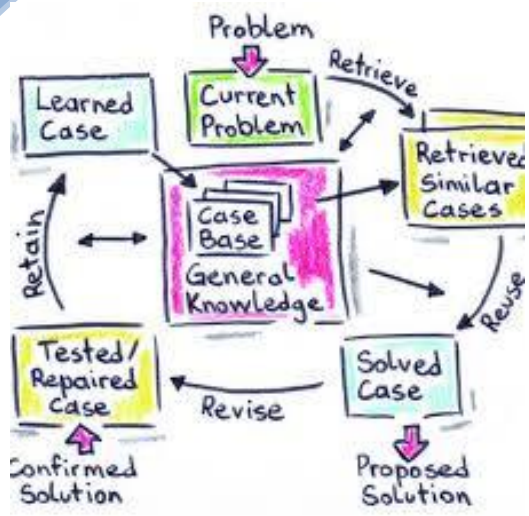
DL vs CBR

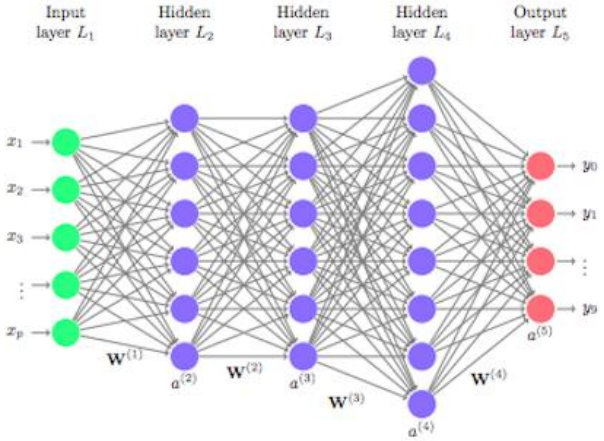

요키 사진
개 고양이
사진+태그
Training
Model
coefficients
개 확률 95%,
고양이 확률 5%
분류 / 예측
- Fit Functions
- Black Box
- 이미지 분류 / 확률


자동차
고장 증상
CBR Model
사례구조
유사도함수
가중치
Casebase
성공사례
(수리사례)
추론
- Nearest Neighbor Classifier
- 구체적 증거 제시
- 노하우 재사용
유사도 1등 수리사례
유사도 2등 수리사례

DL or CBR or Rules

1. Car Repair Support System
2. Health Status Prediction
3. My Home Finder
4. Cancer Detection & Treatment
5. Metabolic Syndrome Detection





LLM (Large Language Model)

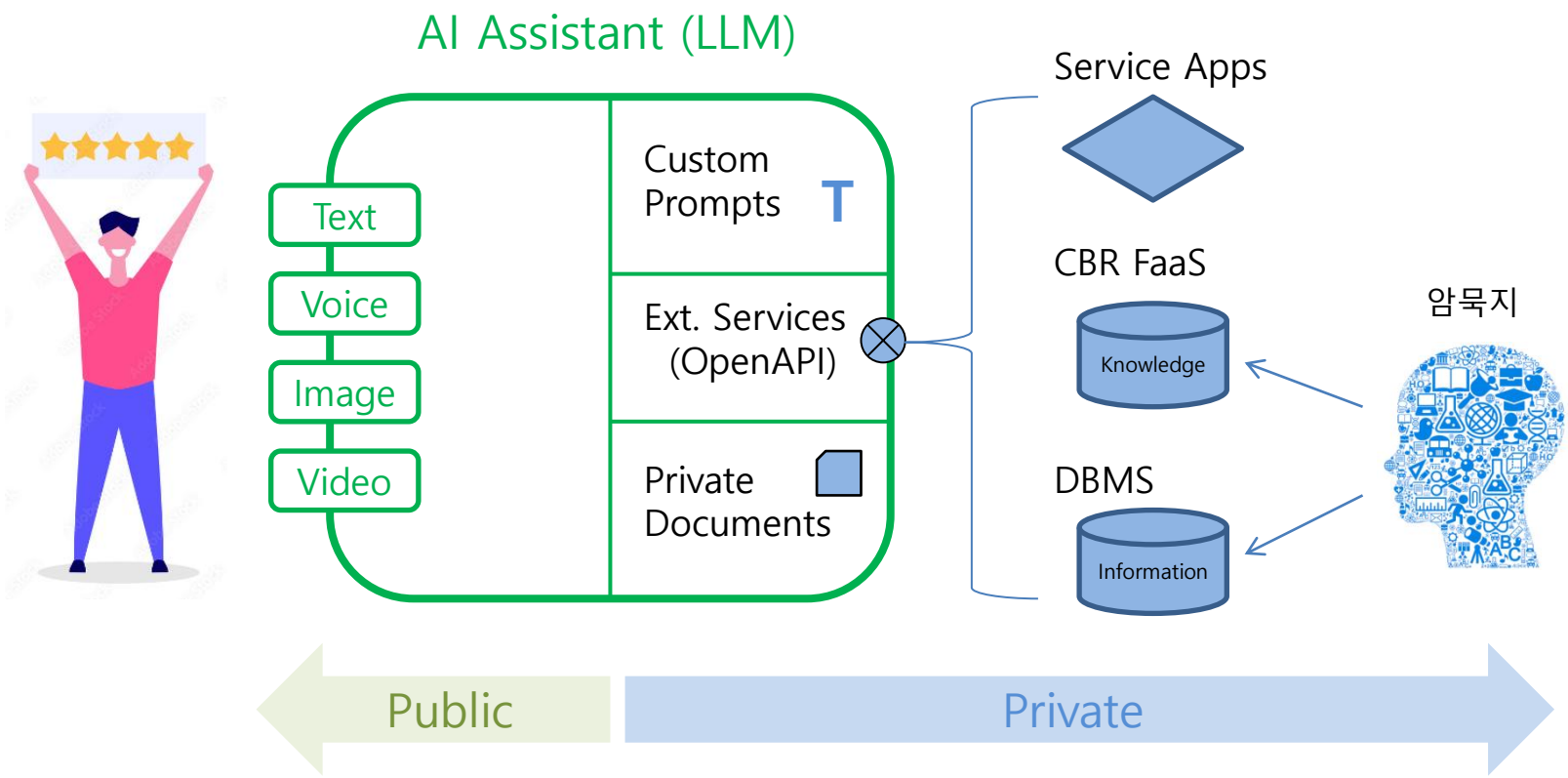
- Why is so Shocking?
  - 2022.11 OpenAI ChatGPT
  - 2023.03 Google Bard → 2023.12 Gemini
  - Transformer/Pre-Trained/Generative/RL
    - Huge Parameters & Training Data & Human Feedback
    - Google Search Autocomplete

- ChatGPT vs Gemini
- Open Source LLMs – Meta Llama, etc
- Consciousness

Opportunities

- Done!
  - Image data → CNN → Classification 분류
  - Tabular data → NN → Prediction 예측/분류
  - Know-how → CBR → Reasoning 추론
  - Language → LLM → Creation 생성
- AI Assistant
  - Apple Siri
  - LLM + External Services → Automation
  - OpenAI Assistants API

Opportunities

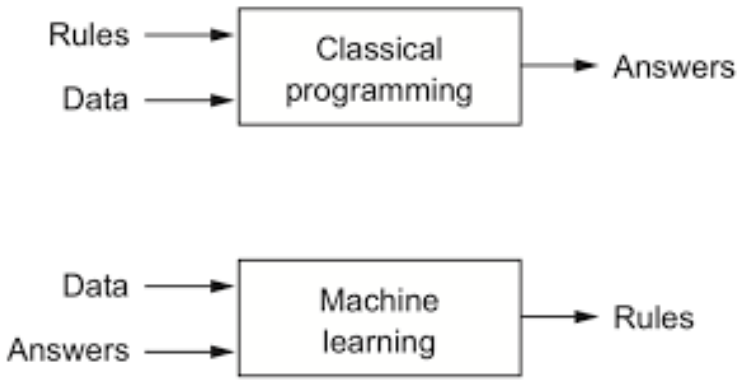


Machine Learning

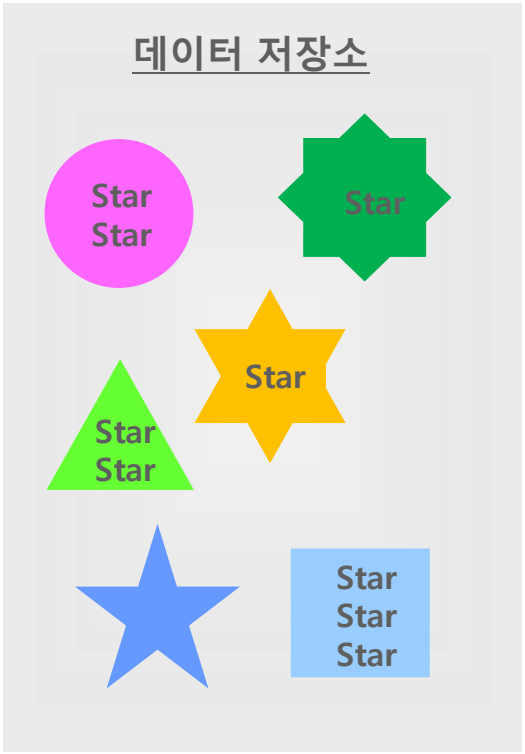
Data & Answers (Image & Tag)

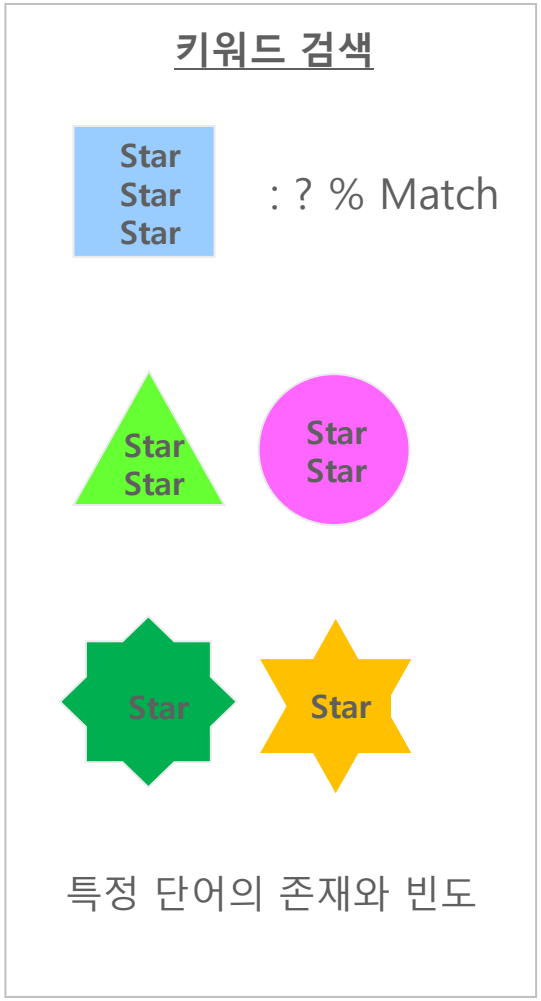
Rules => Parameter / Weight Matrix

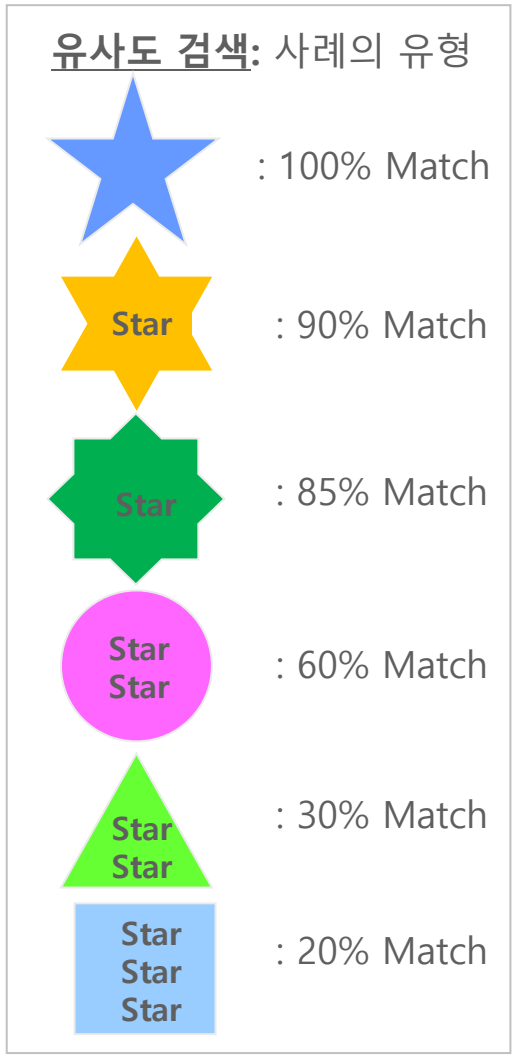
Machine Learning vs Programming



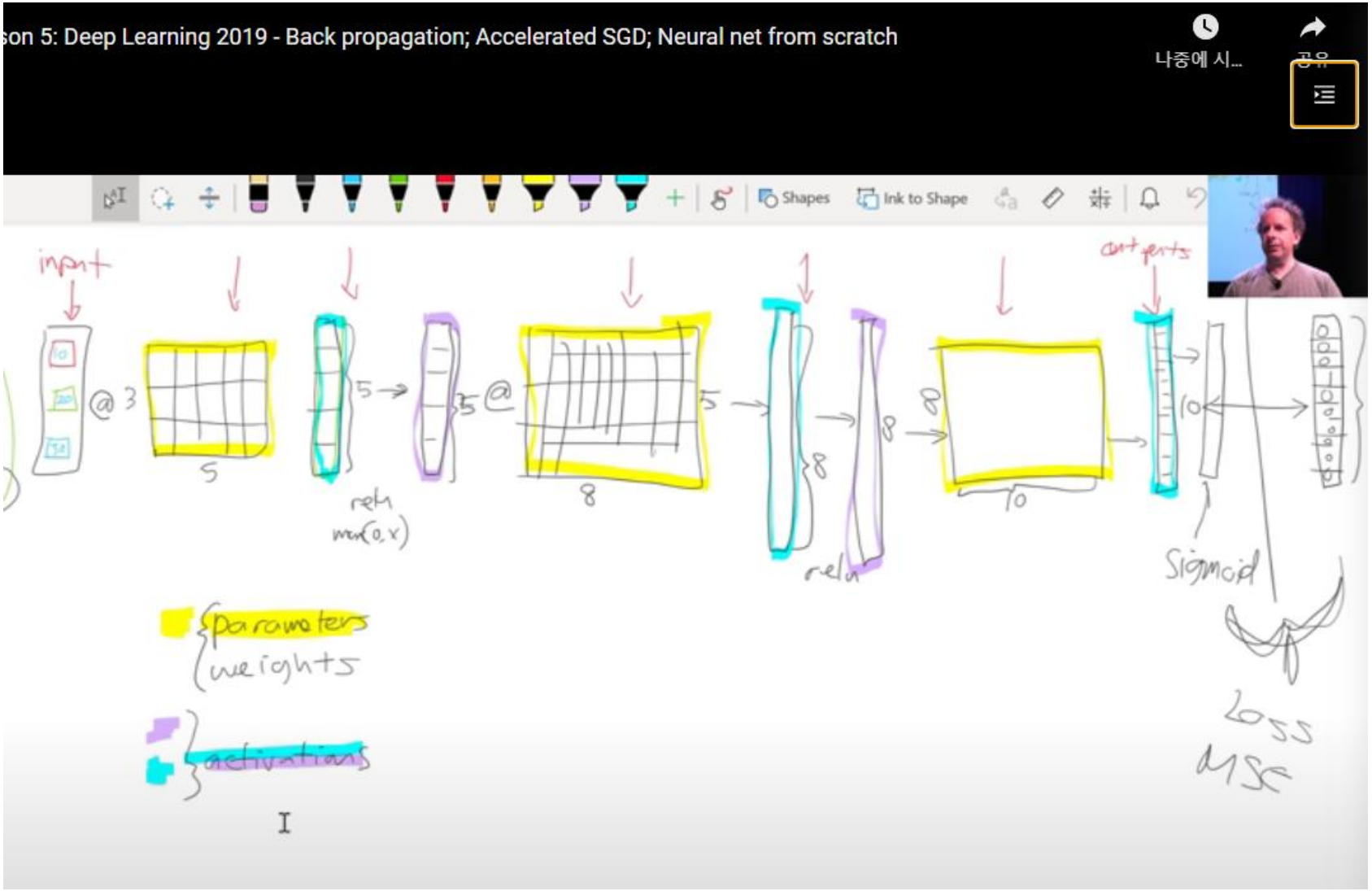
키워드검색 vs 유사도(Similarity)검색







Deep Learning Core Concept



(Source: Fast.ai, Jeremi Howard)