# What is AI?

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

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knowhow+
haesung.github.io
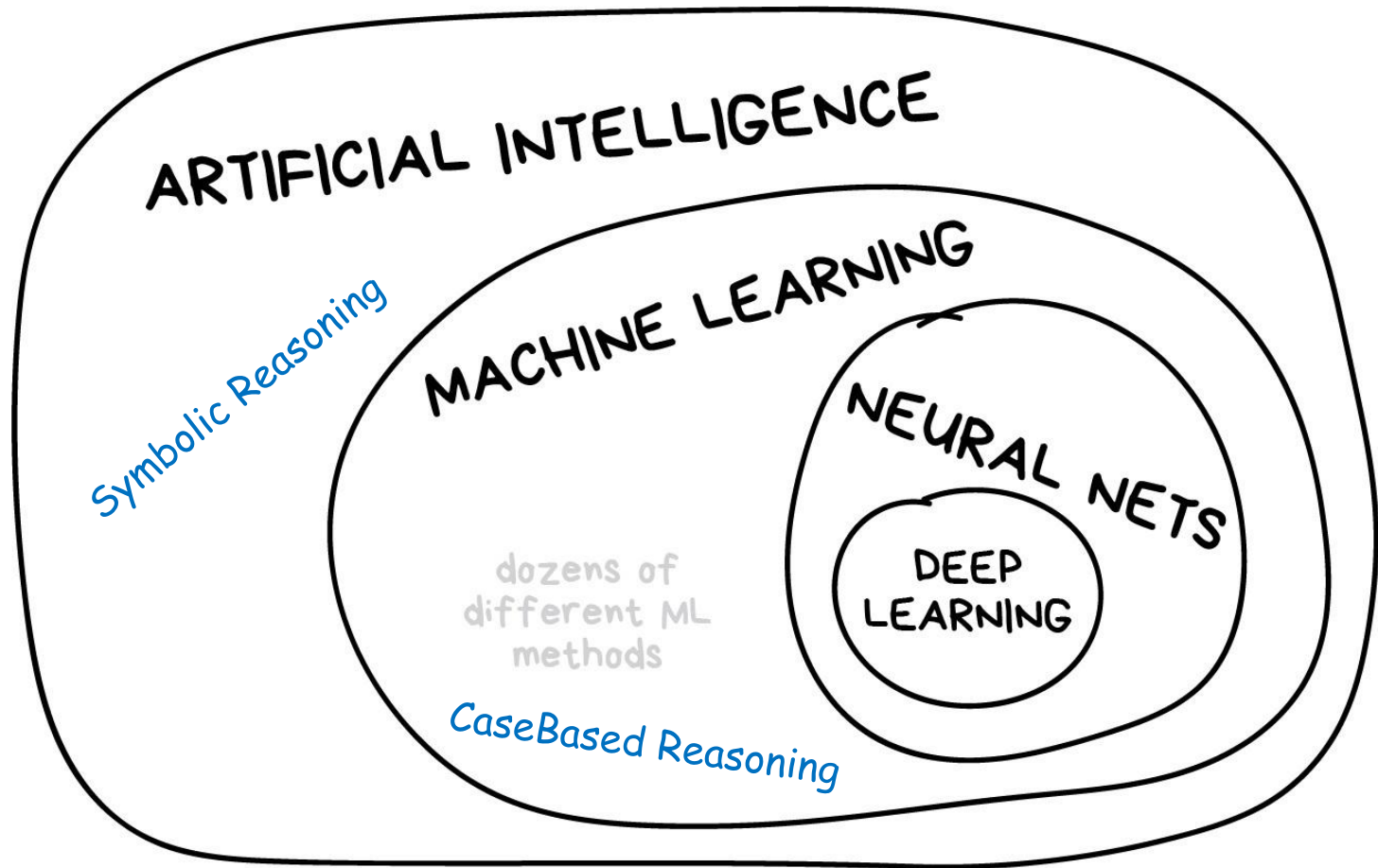
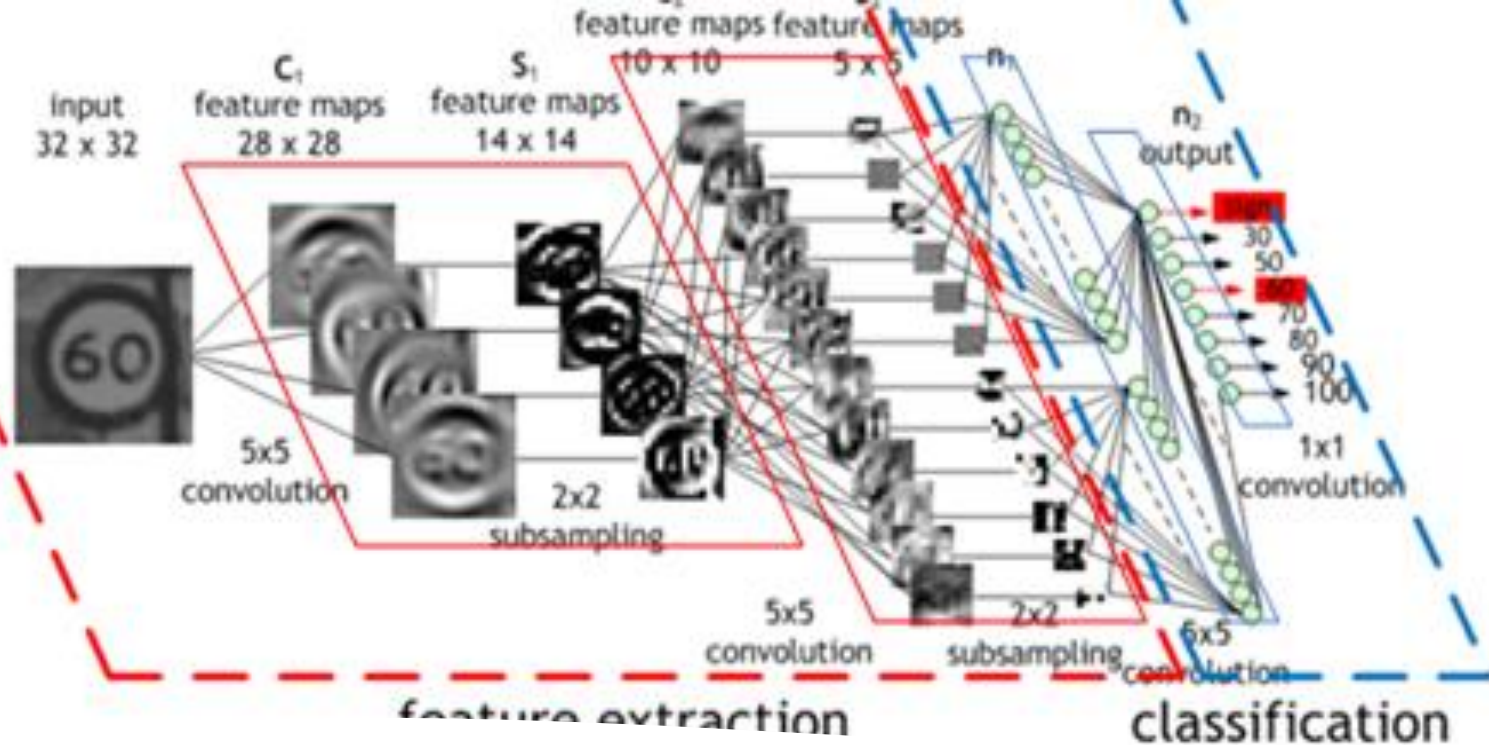# AI ?

- **What is being Intelligent?**
  - Triangle? Circle?
  - Marvin Minsky 1970

  NOT EASY !

  - Classify Image
  - Learn from Data

- **Hard Areas**
  - Classification
  - Prediction
  - Reasoning
  - Creation (Natural Language)

# Big Picture - AI, ML, DL, CBR, LLM
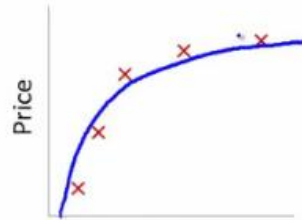
# Why Deep Learning is Popular

- 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/
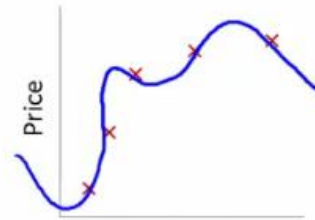
# Machine Learning Core Concept



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

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

High variance (overfit) — $\theta_0 + \theta_1 x + \theta_2 x^2 + \theta_3 x^3 + \theta_4 x^4$
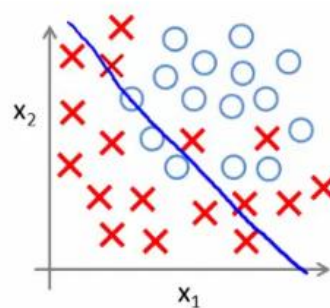
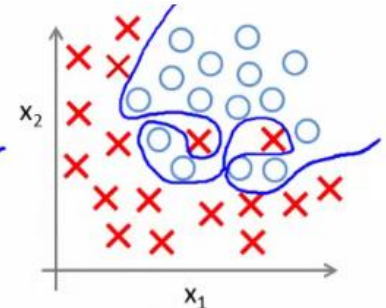UNDERFITTING (high bias) — $h_\theta(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$ ( $g$ = sigmoid function)
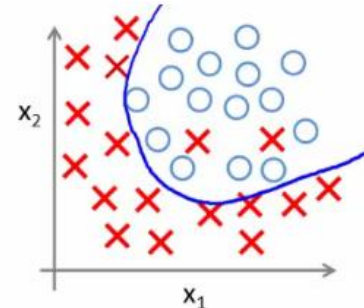
$g(\theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_1^2 + \theta_4 x_2^2 + \theta_5 x_1 x_2)$

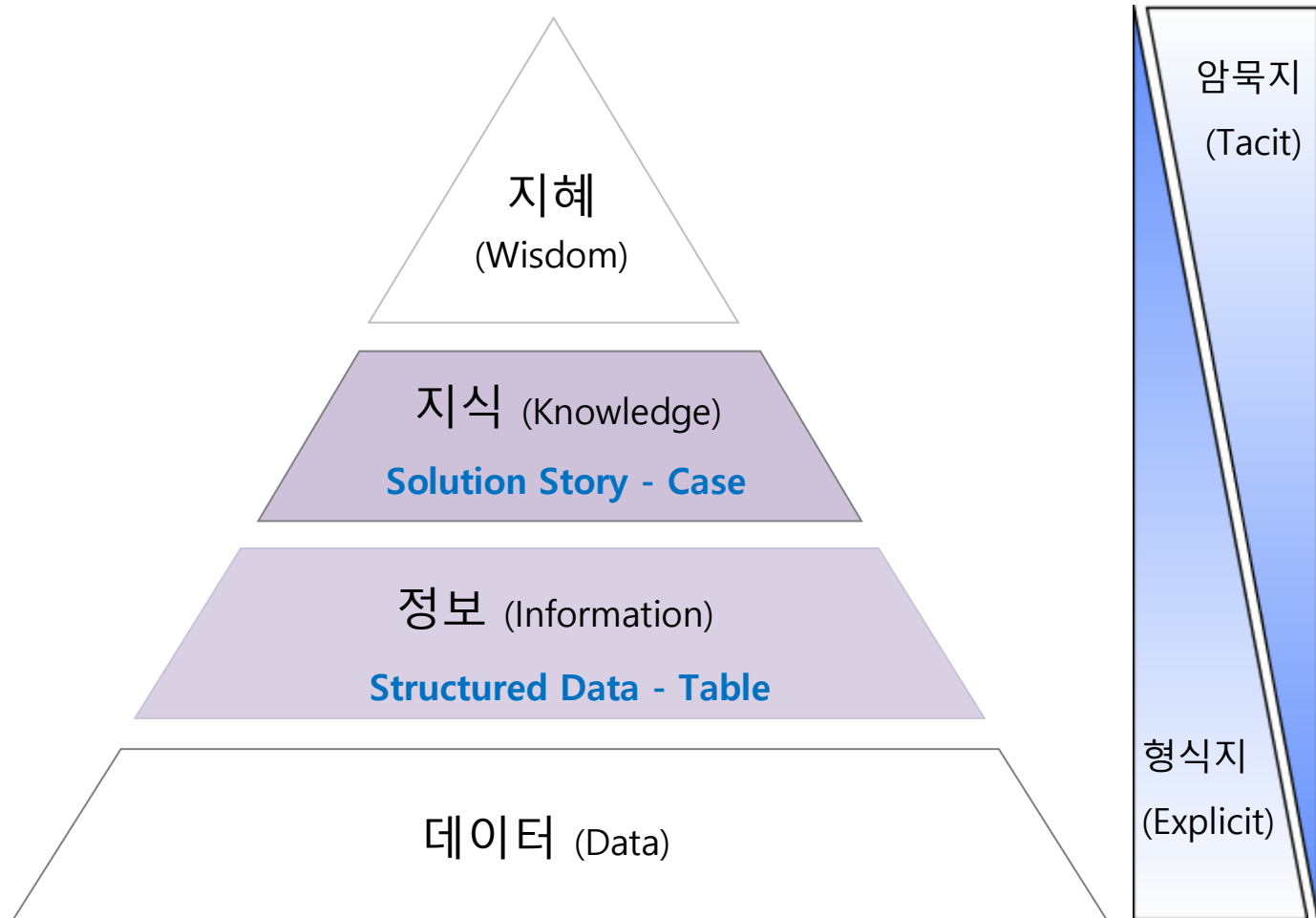OVERFITTING (high variance) — $g(\theta_0 + \theta_1 x_1 + \theta_2 x_1^2 + \theta_3 x_1^2 x_2 + \theta_4 x_1^2 x_2^2 + \theta_5 x_1^2 x_2^3 + \theta_6 x_1^3 x_2 + \ldots$

(Source: Coursera, Andrew Ng)

# Deep Learning Core Concept



(Source: Fast.ai, Jeremi Howard)

# Knowledge vs Data



지혜
(Wisdom)

지식 (Knowledge)

**Solution Story - Case**

정보 (Information)
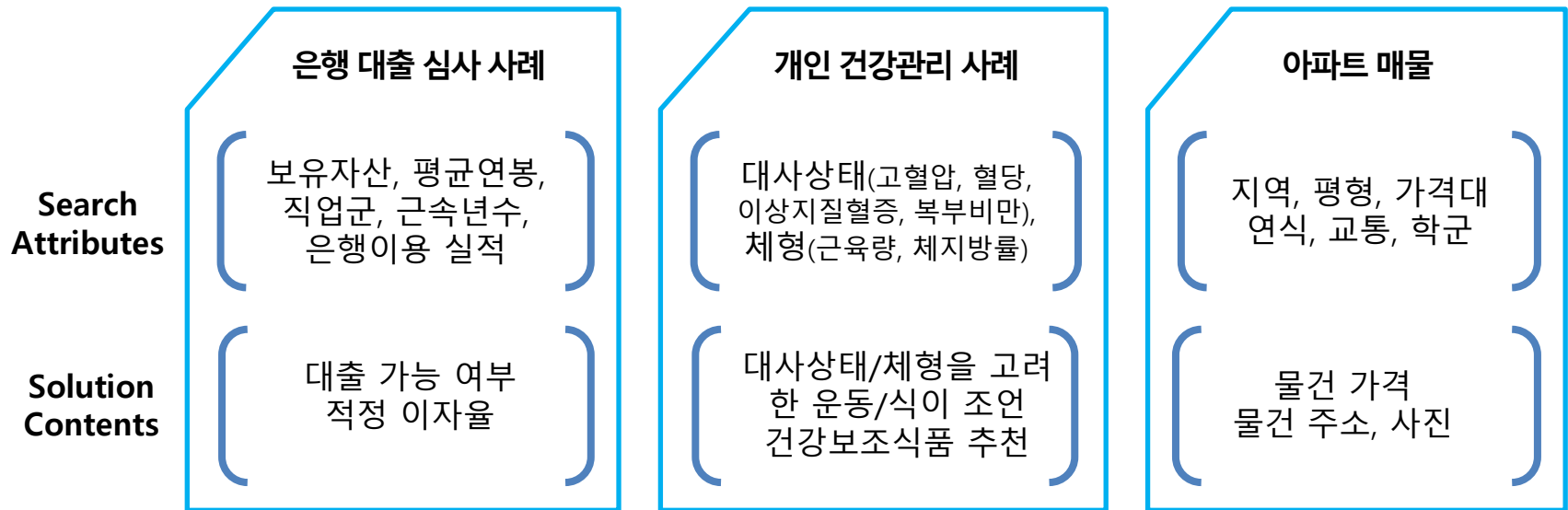
**Structured Data - Table**

데이터 (Data)

암묵지
(Tacit)

형식지
(Explicit)
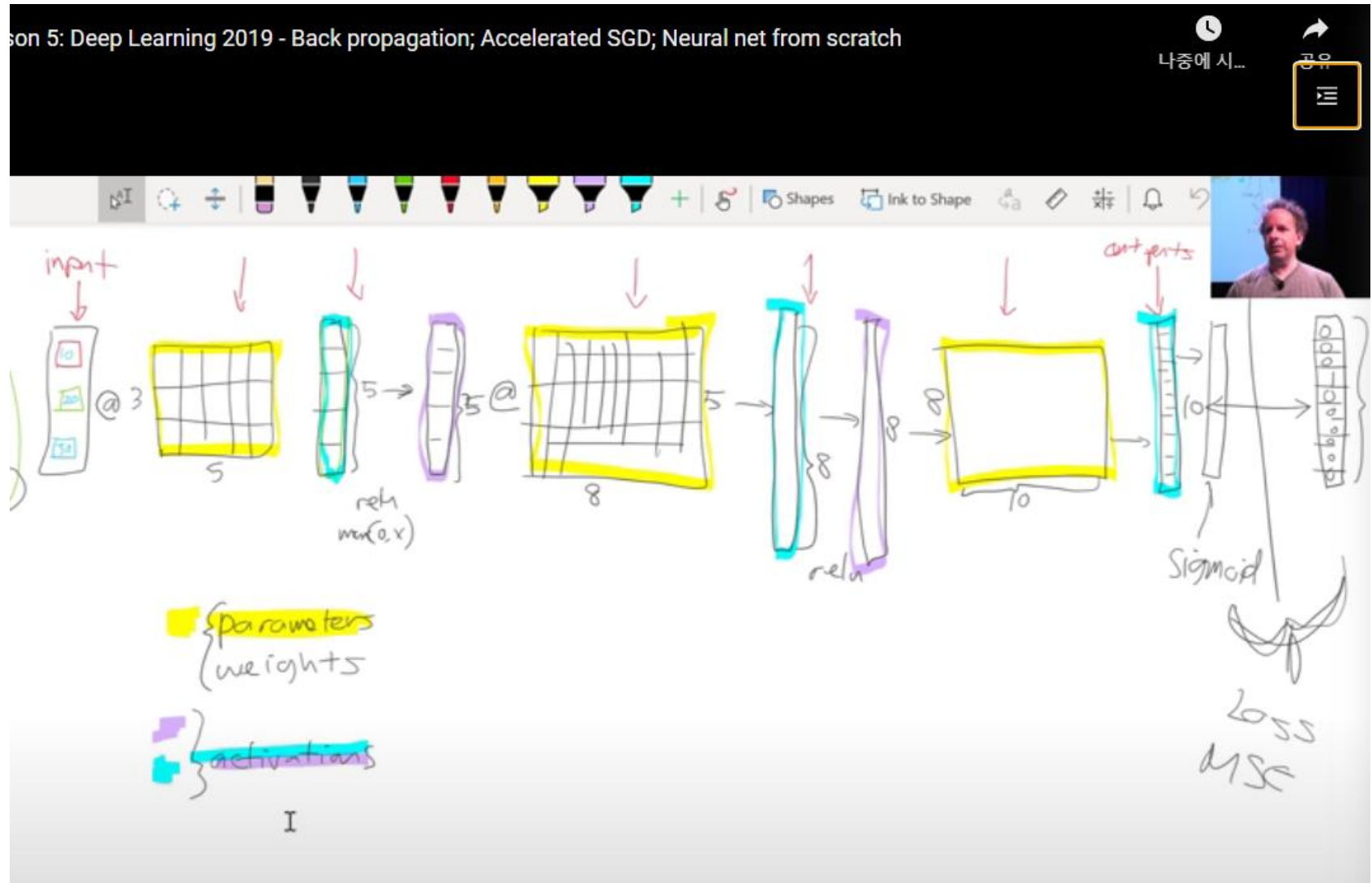
# What is CBR (Case-Based Reasoning)

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



과거의
경험과 노하우

CBR시스템에
사례로 저장

문제발생

**저장된 과거 사례들 중에서 유사도 검색을 통해
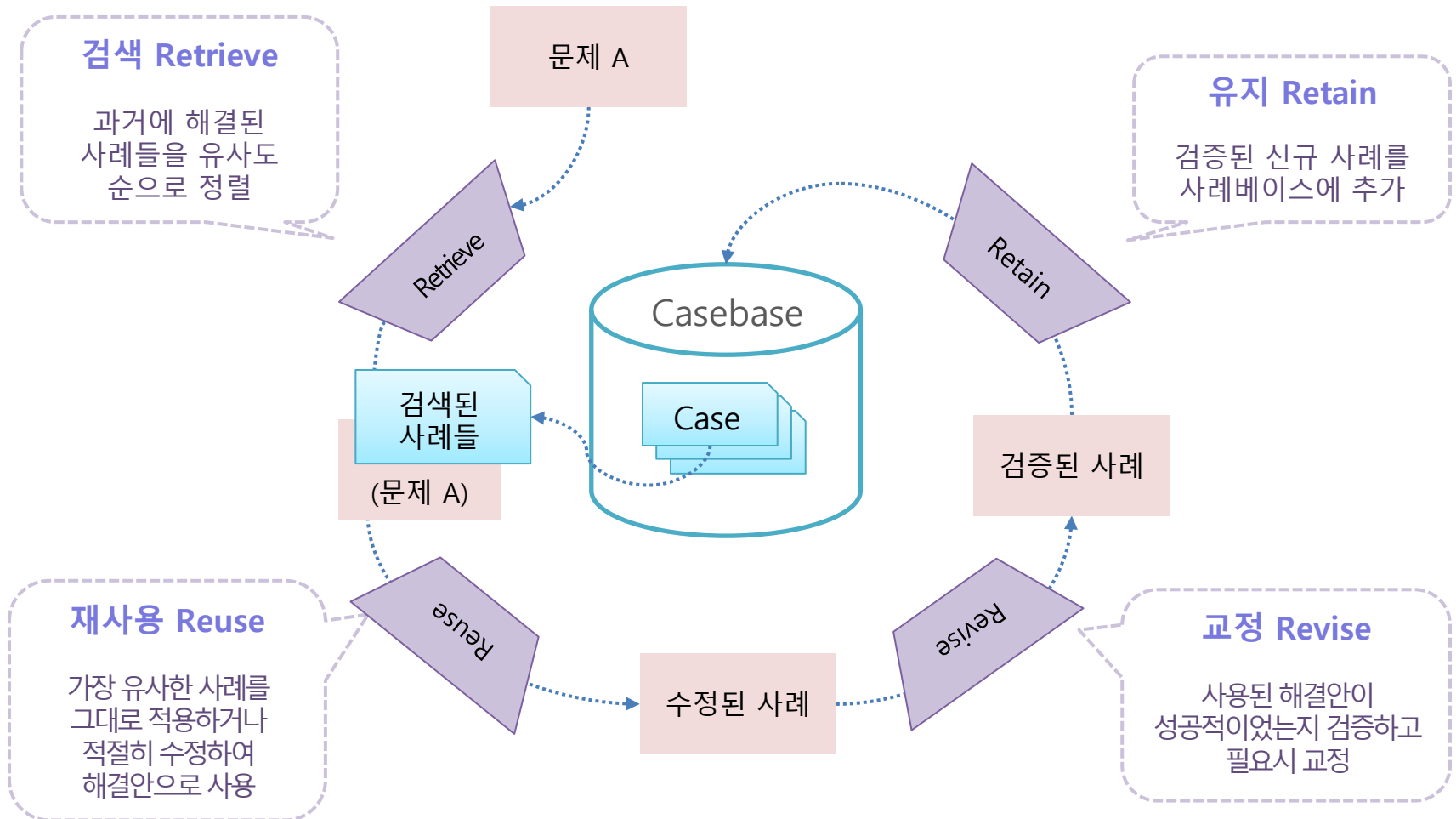문제 상황과 가장 비슷한 사례(해결책) 제시**
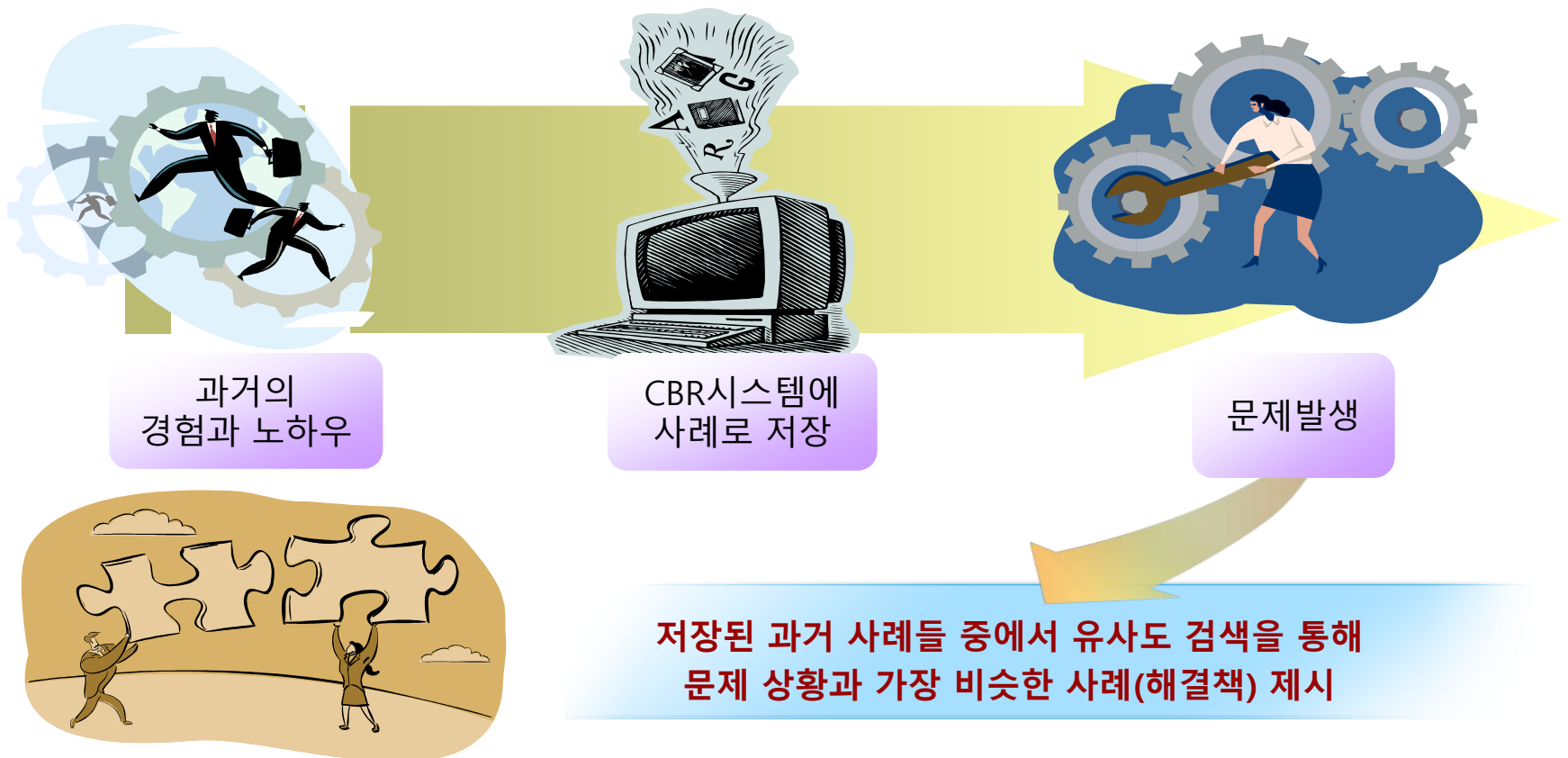
# CBR Case Structure (사례구조)

> ▪ **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)

| | 은행 대출 심사 사례 | 개인 건강관리 사례 | 아파트 매물 |
|---|---|---|---|
| **Search Attributes** | 보유자산, 평균연봉, 직업군, 근속년수, 은행이용 실적 | 대사상태(고혈압, 혈당, 이상지질혈증, 복부비만), 체형(근육량, 체지방률) | 지역, 평형, 가격대 연식, 교통, 학군 |
| **Solution Contents** | 대출 가능 여부 적정 이자율 | 대사상태/체형을 고려한 운동/식이 조언 건강보조식품 추천 | 물건 가격 물건 주소, 사진 |

# CBR 4R Process

**검색 Retrieve**

과거에 해결된
사례들을 유사도
순으로 정렬

문제 A

**유지 Retain**

검증된 신규 사례를
사례베이스에 추가

Retrieve

Retain

Casebase

Case

검색된
사례들

(문제 A)

검증된 사례

**재사용 Reuse**

가장 유사한 사례를
그대로 적용하거나
적절히 수정하여
해결안으로 사용

Reuse

Revise

수정된 사례

**교정 Revise**

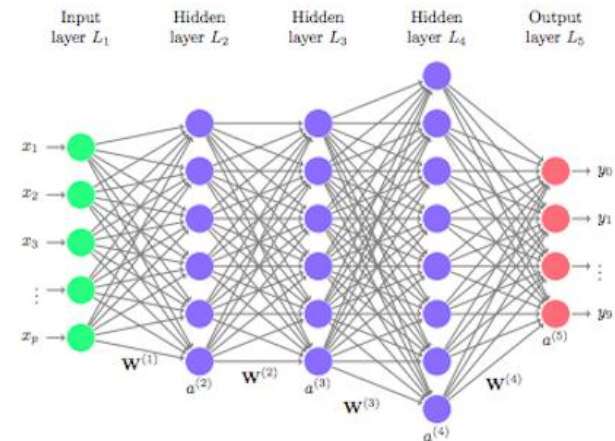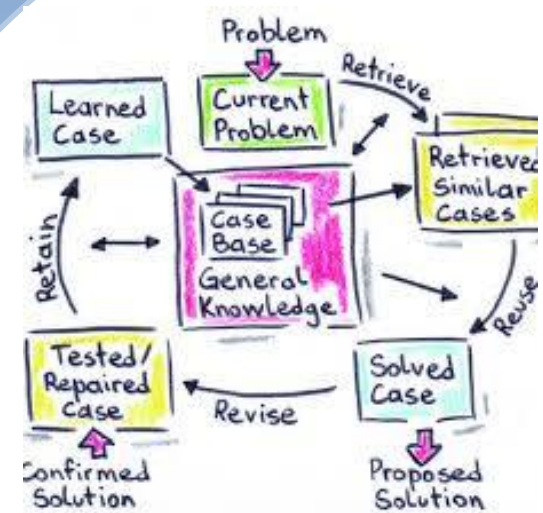사용된 해결안이
성공적이었는지 검증하고
필요시 교정

# DL vs CBR

# 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?
  - OpenAI ChatGPT 2022.11
  - Google Bard 2023.3 → Gemini 2023.12
  - Transformer/Pre-Trained/Generative/RL → Huge Parameters & Data
  - Open Source → Meta Llama 2, Google Gemma

- ChatGPT vs Gemini
  - Pros & Cons
    - Performance (Accuracy, Style, Multi-modal, Speed)
    - Ecosystem (GPTs, Extension)
    - Price
  - https://zapier.com/blog/chatgpt-vs-bard/
  - Just Use & Select

- Consciousness

# Opportunities

- Done!
  - Image data → CNN → Classification 분류
  - Tabular data → embedding → Prediction 예측
  - Know-how → CBR → Reasoning 사례기반추론
  - Language → LLM → Creation 이해/생성

- AI Assistant
  - Apple Siri
  - LLM + Custom Prompts + External Services → Automation
  - https://openai.com/blog/introducing-gpts

- Prepare!
  - Individual → Directive & Creative, Prompt Engineering
  - Company → 개인 암묵지 → 전사적 공유 및 재사용 가능한 형식지(사례)

# Opportunities
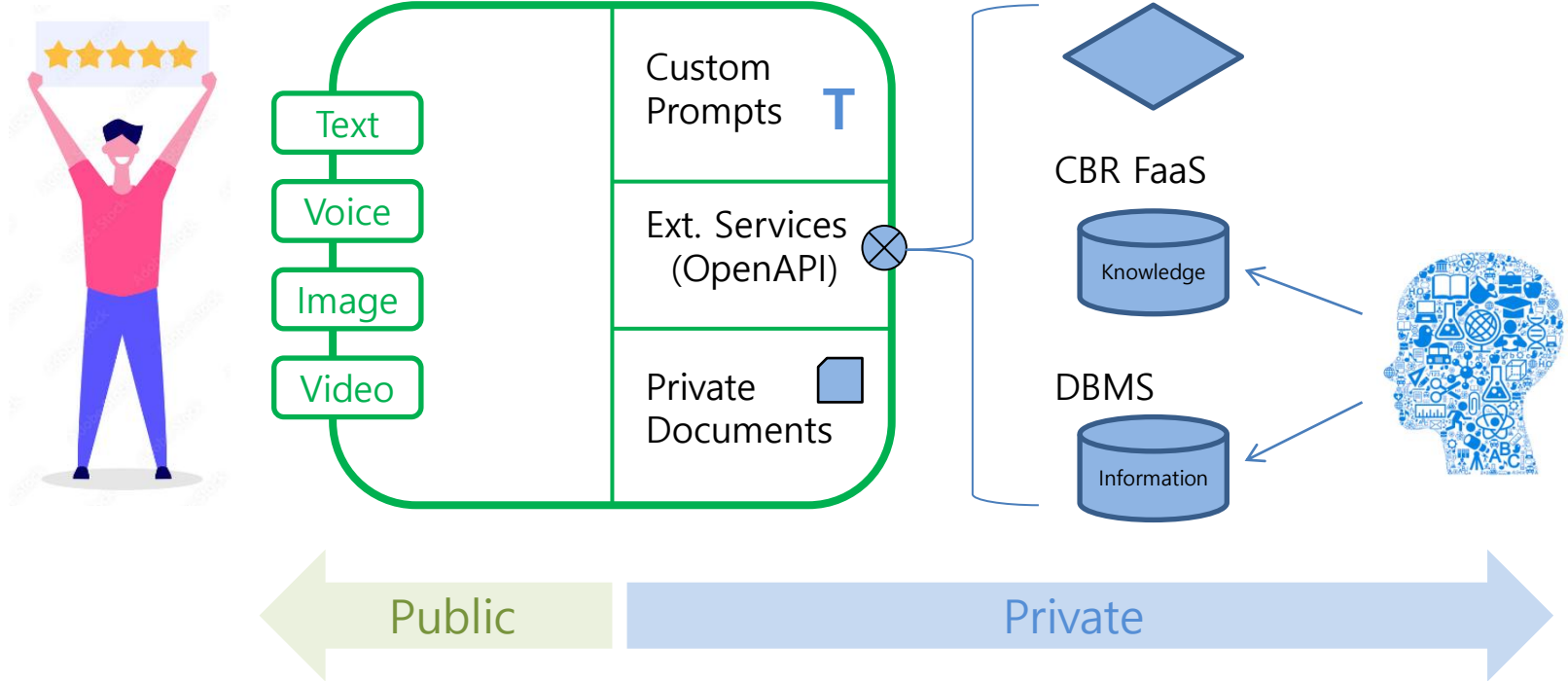
Machine Learning

Data & Answers (Image & Tag)

Rules => Parameter / Weight Matrix

# Machine Learning
# vs
# Programming