



# What is AI?

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

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[haesung.github.io](https://haesung.github.io)

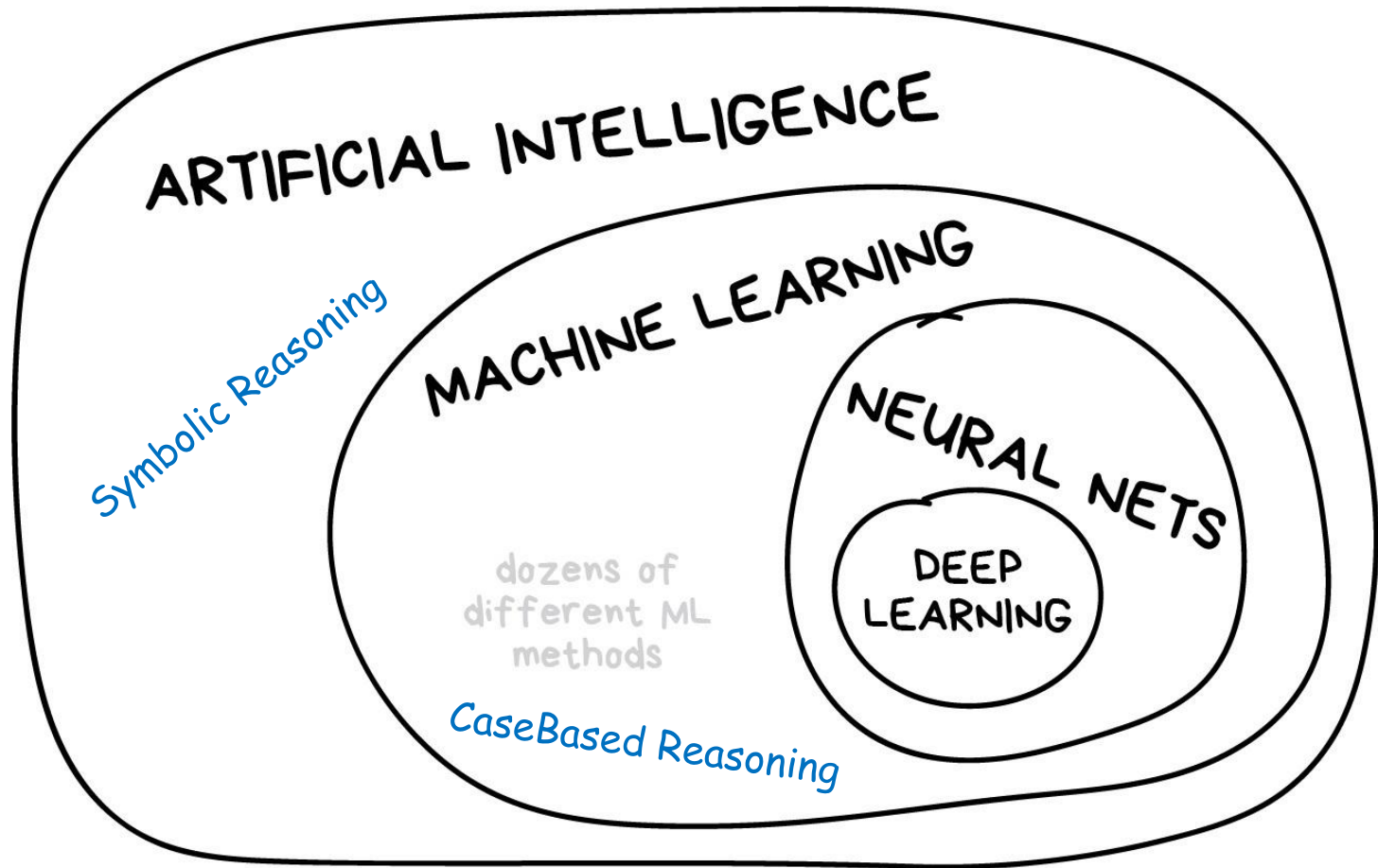
# AI ?

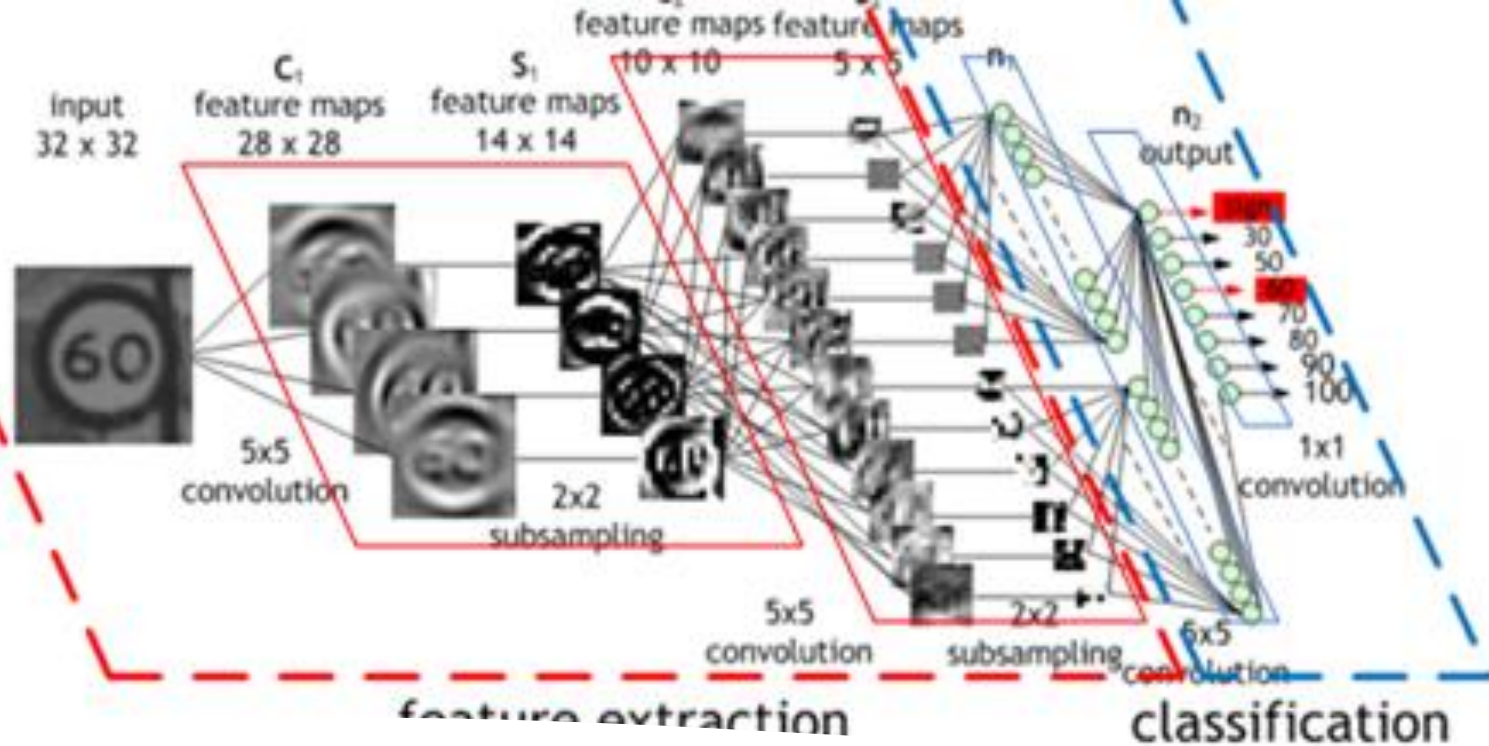
- What is being Intelligent?
  - Triangle? Circle?
  - Marvin Minsky 1970

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

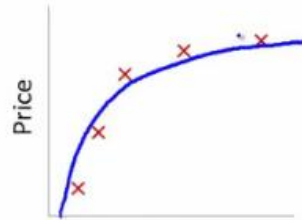
- New fancy word of Neural Net
  - Fast = cheap graphic card
  - Data = huge tagged data
  - Easy = CNN (auto feature extraction)
- Vision
  - 97% accuracy better than human expert 95%
  - <http://cs231n.stanford.edu/>

# Machine Learning Core Concept



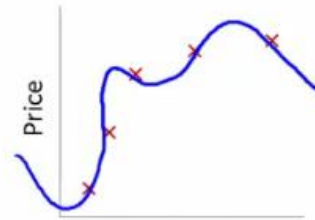
$$\theta_0 + \theta_1 x$$

High bias  
(underfit)



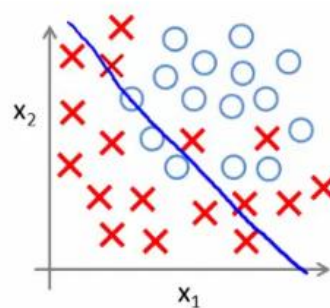
$$\theta_0 + \theta_1 x + \theta_2 x^2$$

"Just right"



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

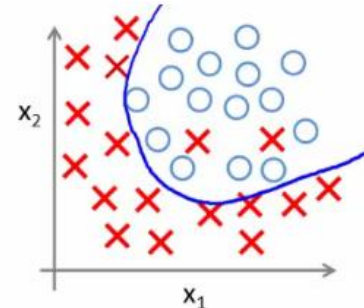
High variance  
(overfit)



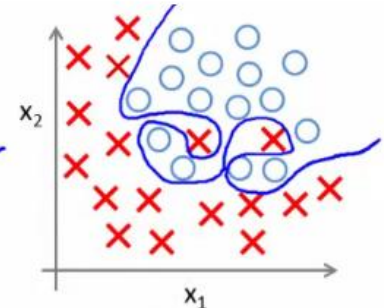
$$h_{\theta}(x) = g(\theta_0 + \theta_1 x_1 + \theta_2 x_2)$$

( $g$  = sigmoid function)

**UNDERFITTING**  
(high bias)



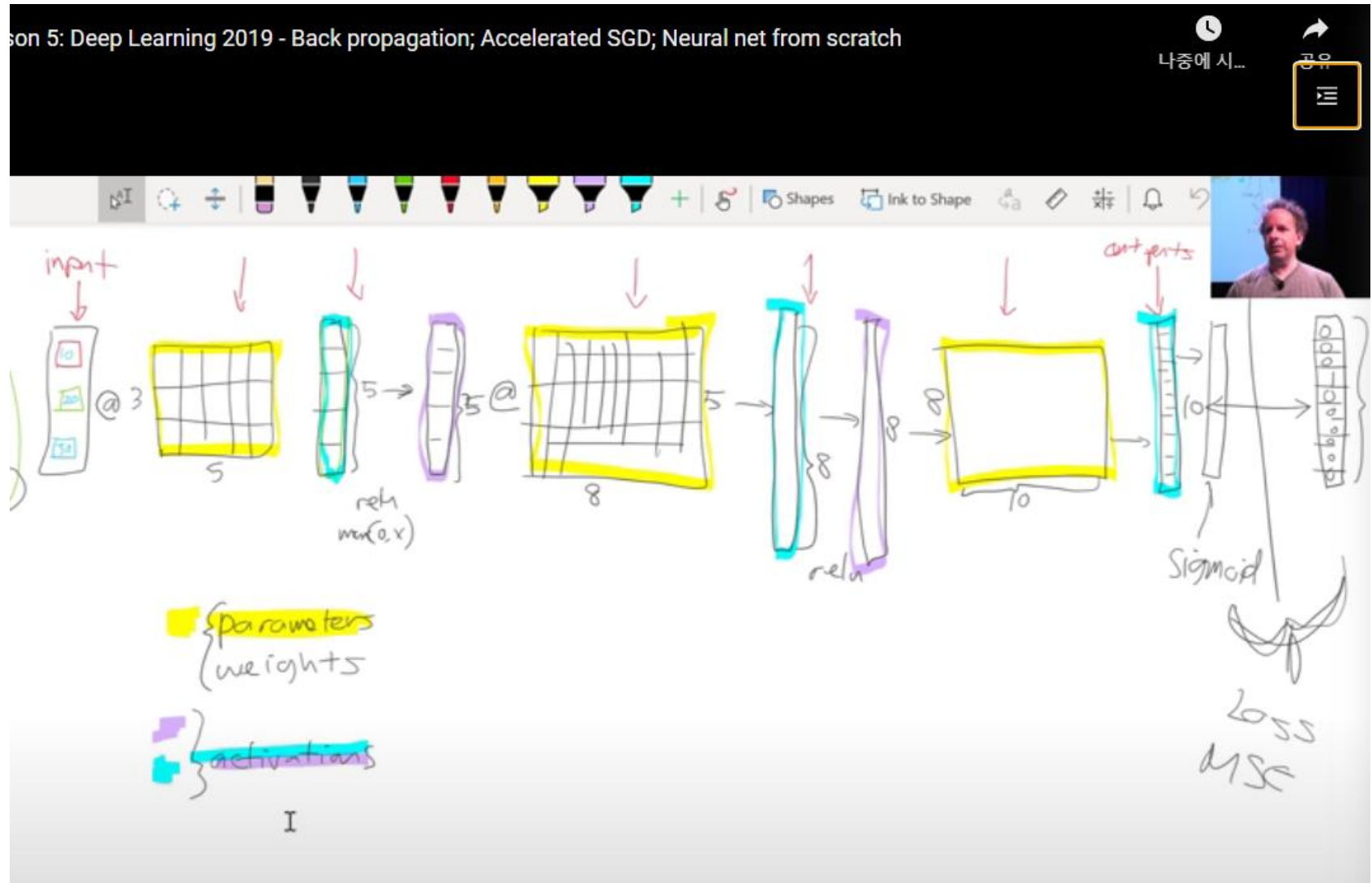
$$g(\theta_0 + \theta_1 x_1 + \theta_2 x_2 + \theta_3 x_1^2 + \theta_4 x_2^2 + \theta_5 x_1 x_2)$$



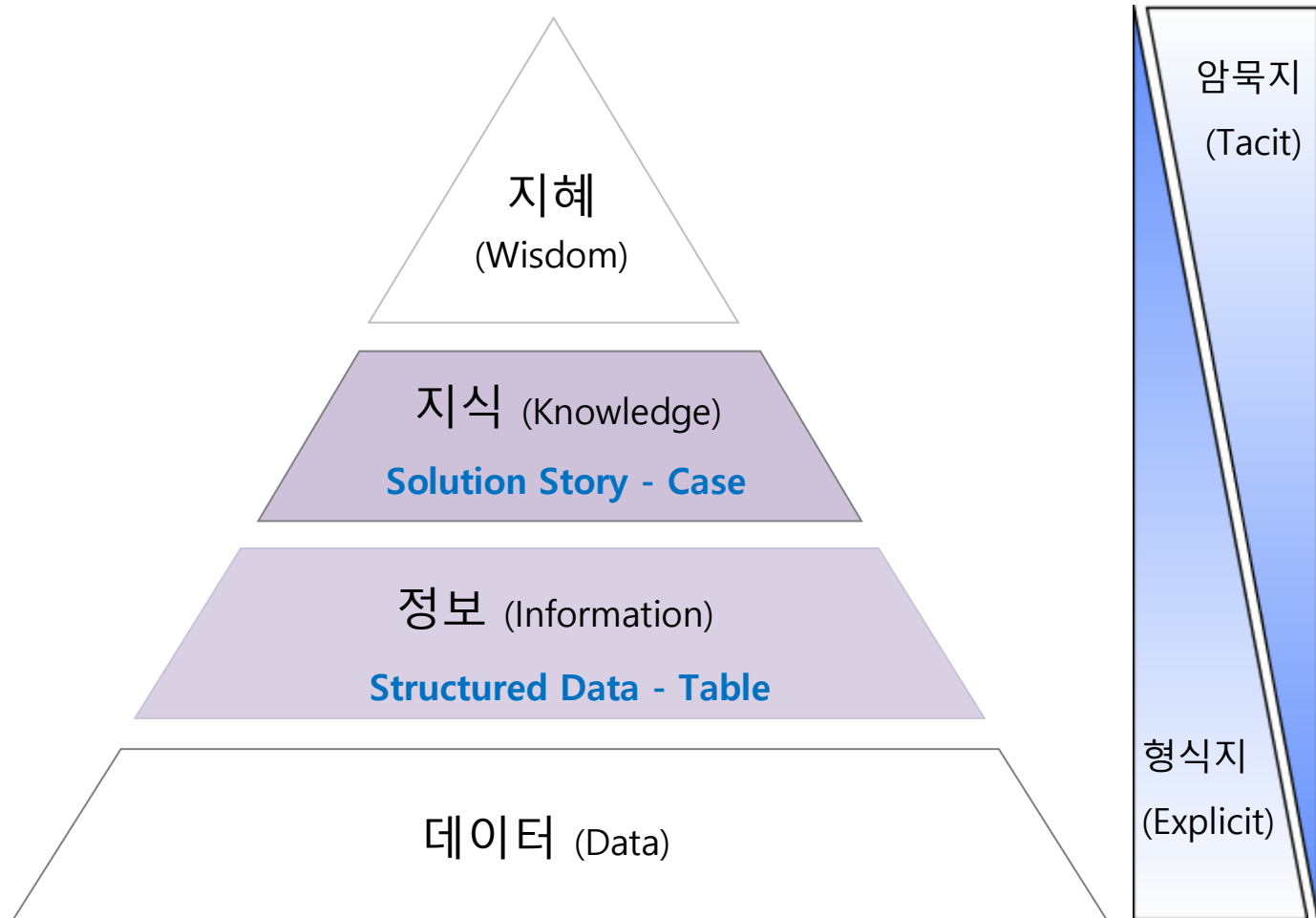
$$g(\theta_0 + \theta_1 x_1 + \theta_2 x_1^2 + \theta_3 x_1^2 x_2 + \theta_4 x_1^2 x_2^2 + \theta_5 x_1^2 x_2^3 + \theta_6 x_1^3 x_2 + \dots)$$

**OVERFITTING**  
(high variance)

# Deep Learning Core Concept

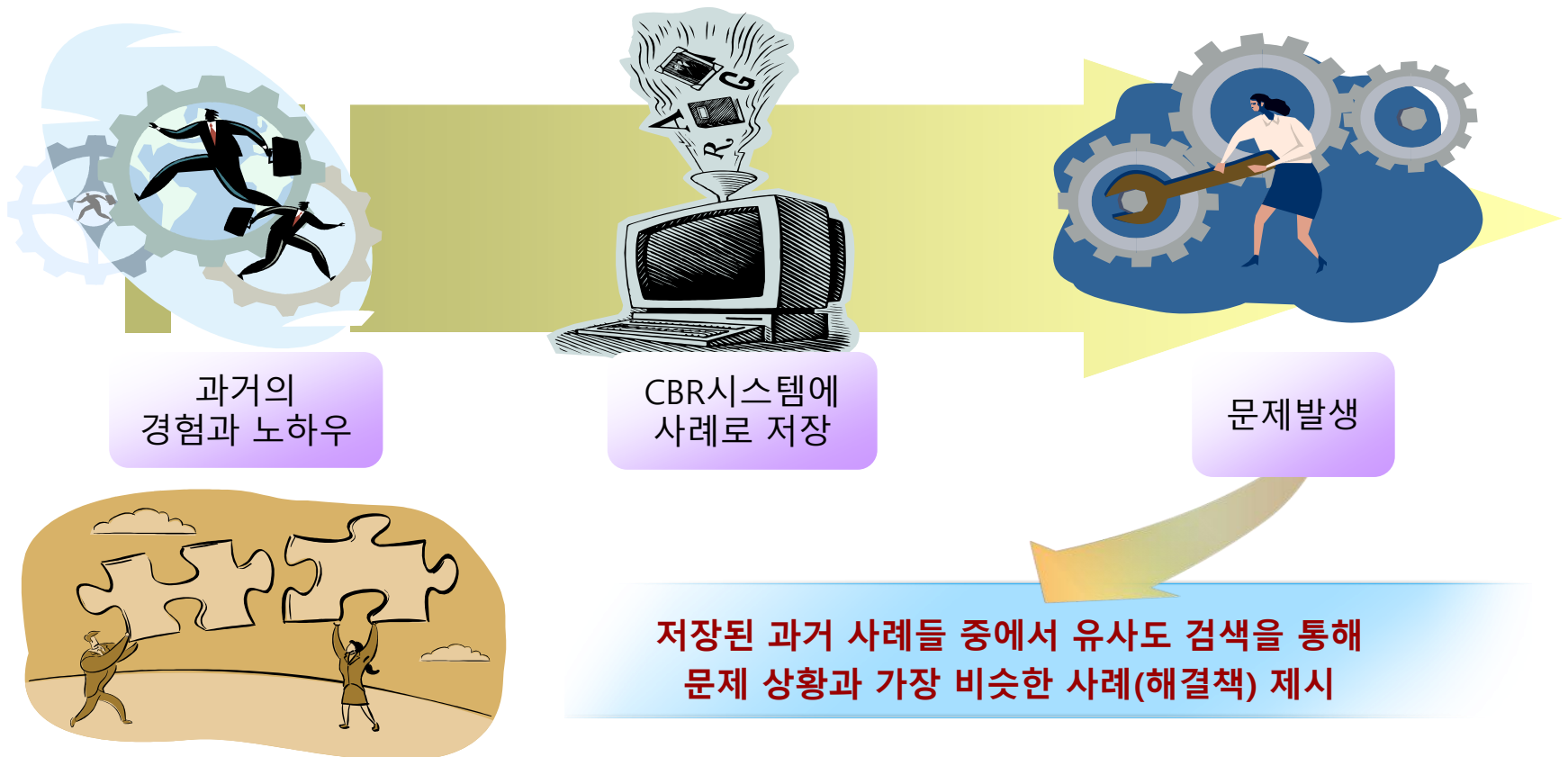


# Knowledge vs Data



# What is CBR (Case-Based Reasoning)

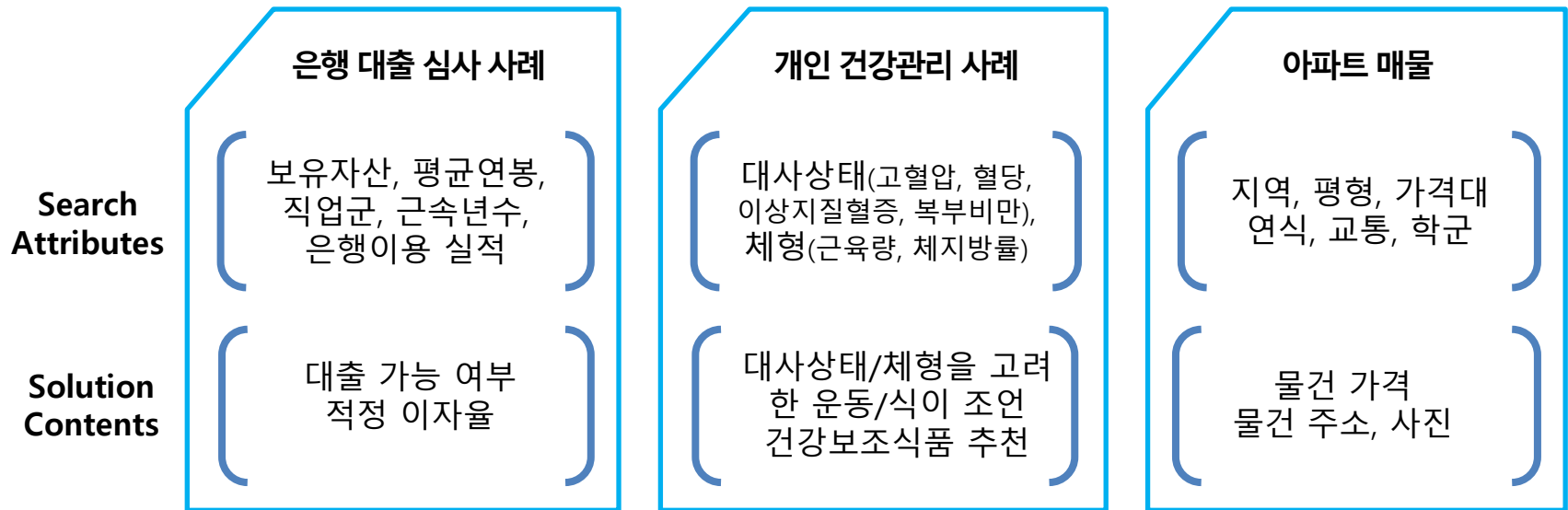
사람이 문제를 해결하기 위하여 추론하는 프로세스를 모델링 한 방법 (Bergmann)



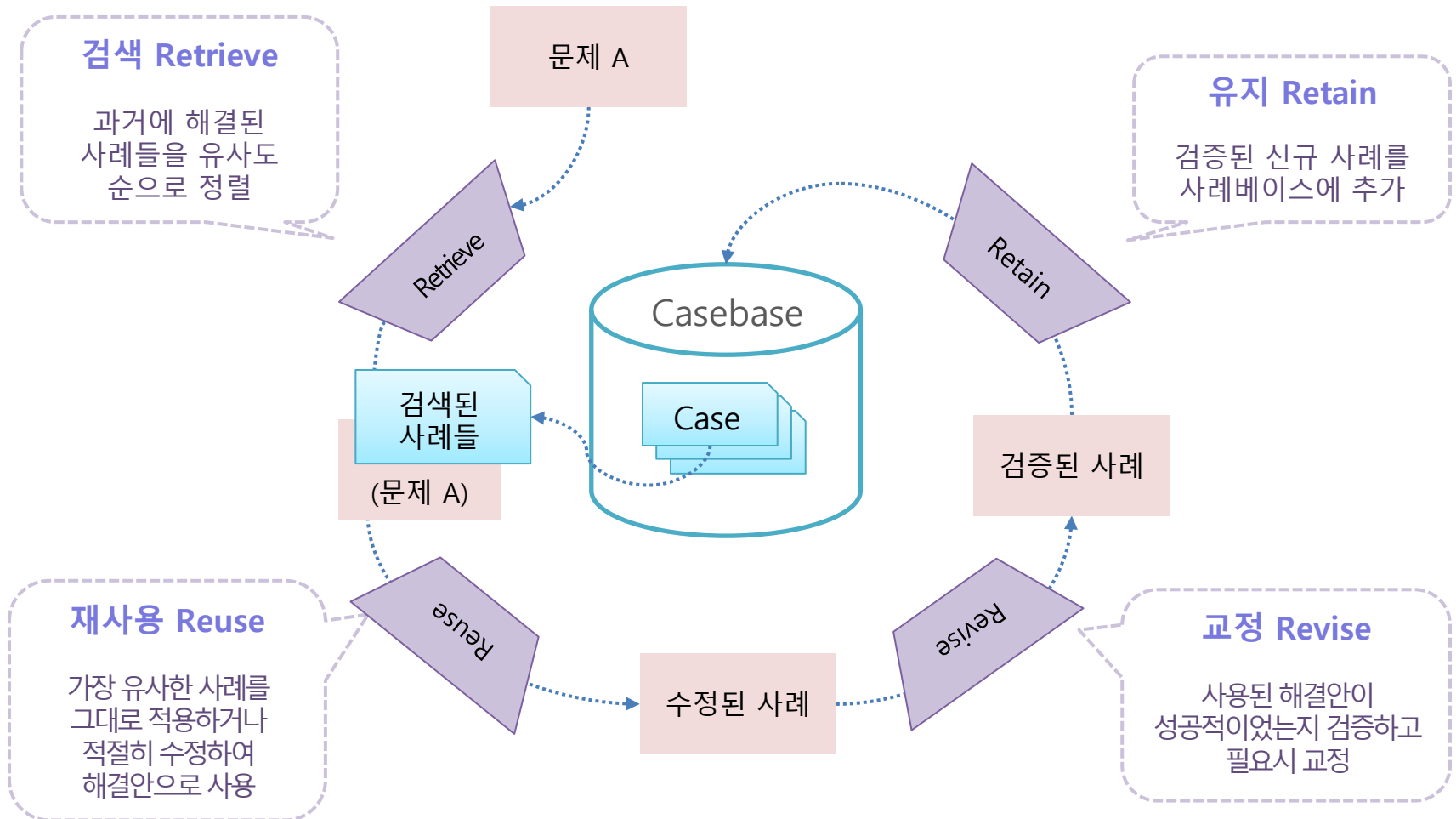


# CBR Case Structure (사례구조)

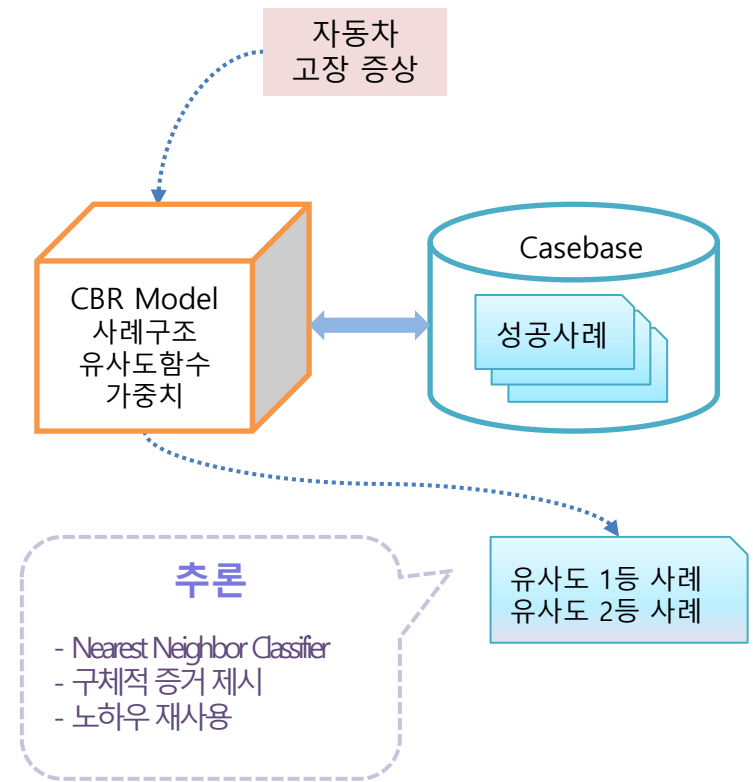
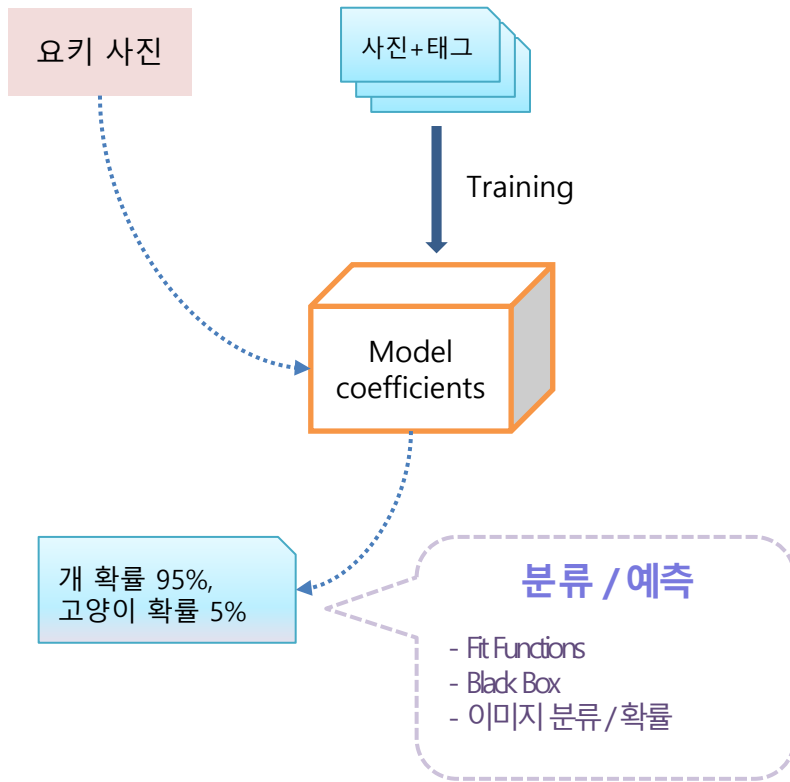
- **Case (사례) = Search Attributes (검색속성) + Solution Contents (해결방안)**
  - Search Attributes : 문제/상황을 표현하는 **Key/Value** - 유사도검색에 사용
  - Solution Contents : 실제 해결방안, 처방, 구체적 정보 등 (텍스트, 이미지, 동영상)



# CBR 4R Process

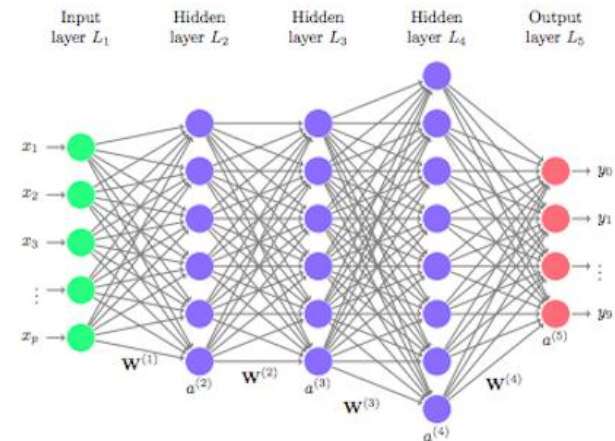
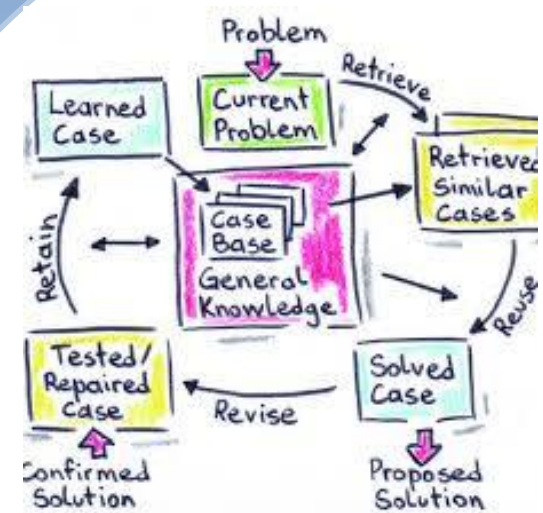


# DL vs CBR



# 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)

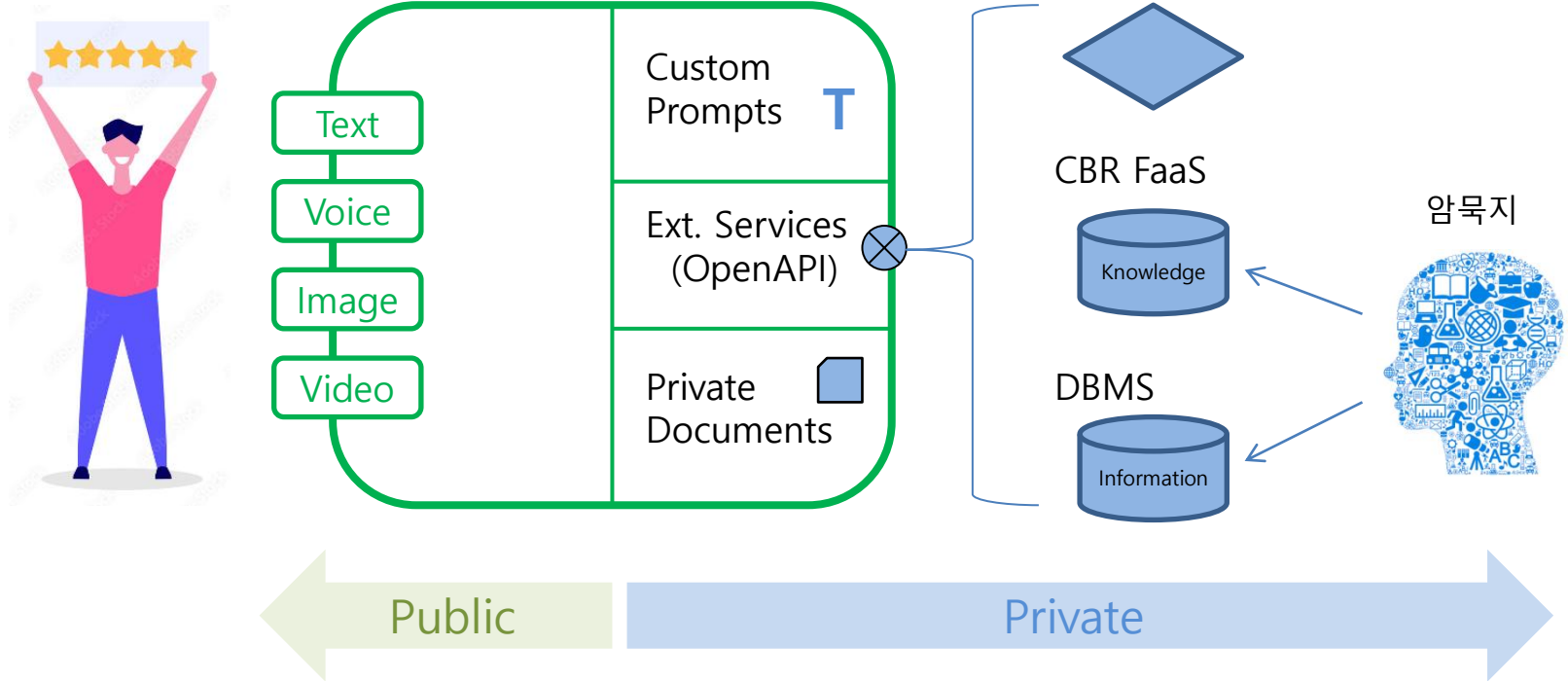
- Why is so Shocking?
  - 2022.11 OpenAI ChatGPT
  - 2023.03 Google Bard → 2023.12 Gemini
  - Transformer/Pre-Trained/Generative/RL
    - Huge Parameters & Training Data & Human Feedback
    - Google Search Autocomplete
- [ChatGPT vs Gemini](#)
- [Open Source LLMs](#) – Meta Llama, etc
- Consciousness

# Opportunities

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

# Opportunities

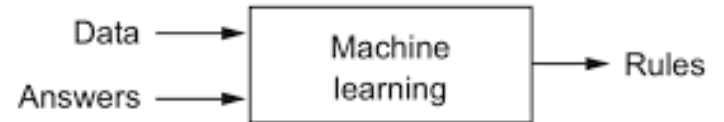
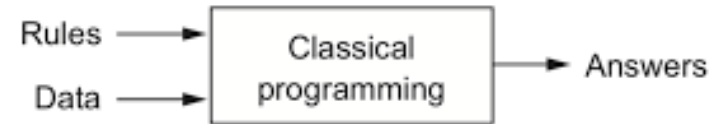
## AI Assistant (LLM)



# Machine Learning

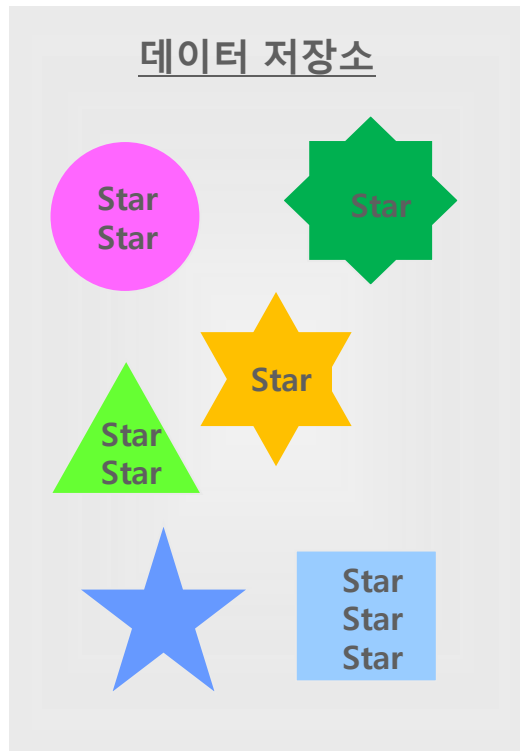
Data & Answers (Image & Tag)  
Rules => Parameter / Weight Matrix

## Machine Learning vs Programming





# 키워드검색 vs 유사도(Similarity) 검색



Search: **Penta Star**

## 키워드 검색

Star  
Star  
Star : ? % Match

Star  
Star (green triangle)      Star  
Star (pink circle)

Star (green 8-pointed star)      Star (yellow 7-pointed star)

특정 단어의 존재와 빈도

## 유사도 검색: 사례의 유형

Star (blue 5-pointed star) : 100% Match

Star (yellow 7-pointed star) : 90% Match

Star (green 8-pointed star) : 85% Match

Star  
Star (pink circle) : 60% Match

Star  
Star (green triangle) : 30% Match

Star  
Star  
Star (blue rectangle) : 20% Match