Computer Vision Deep Learning

YBIGTA Science Team 12기 최동민

'딥러닝 개론' 난이도 설문조사

* 필수항목

'딥러닝 개론' 수업의 난이도가 어떠셨나요? *

- ◯ 매우 어려웠다
- ◯ 어려웠다
- ◯ 보통
- ◯ 쉬웠다
- ◯ 매우 쉬웠다

오늘 수업에서 이런걸 해주세요! (선택)

내 답변

https://goo.gl/forms/h29bSwJthBklz3JG3

Deep Learning

Deep Learning이란?

딥러닝

Deep Learning이란?

인공지능

딥러닝

Deep Learning이란?

인공지능

딥러닝

머신러닝

Deep Learning이란?

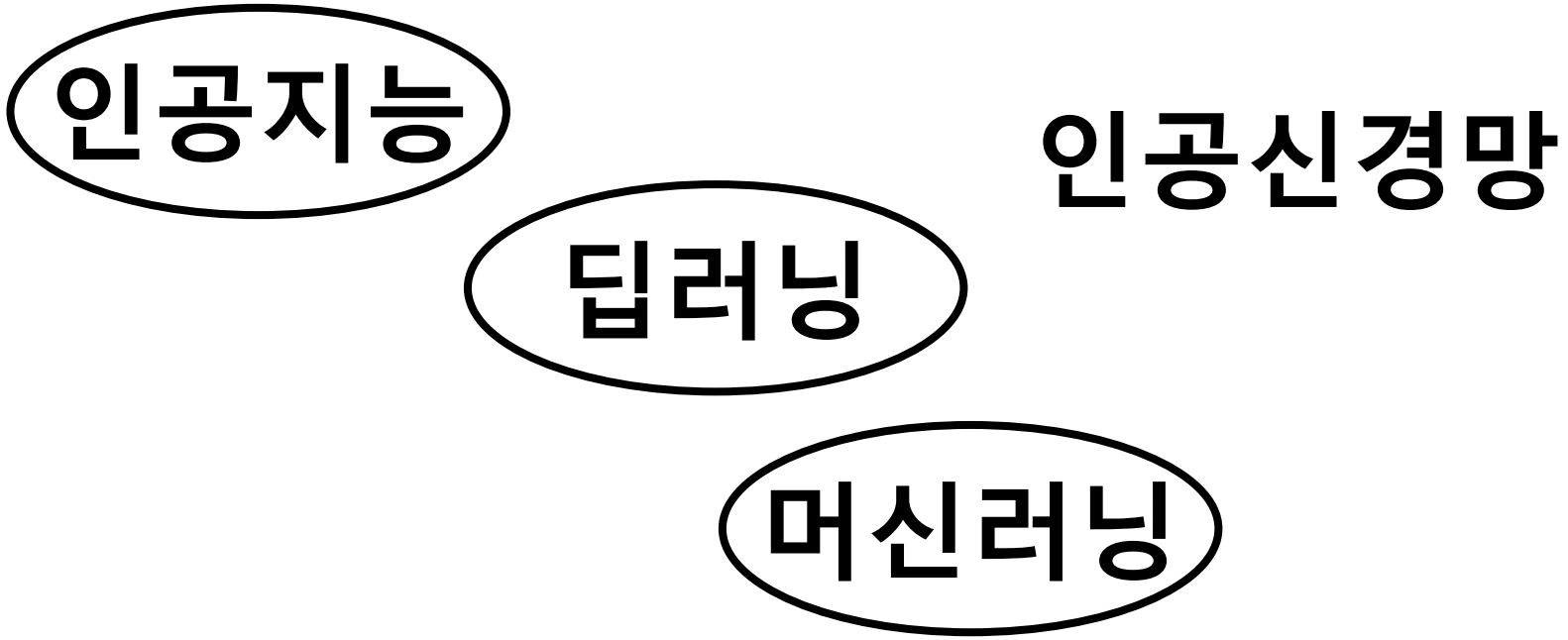
인공지능

인공신경망

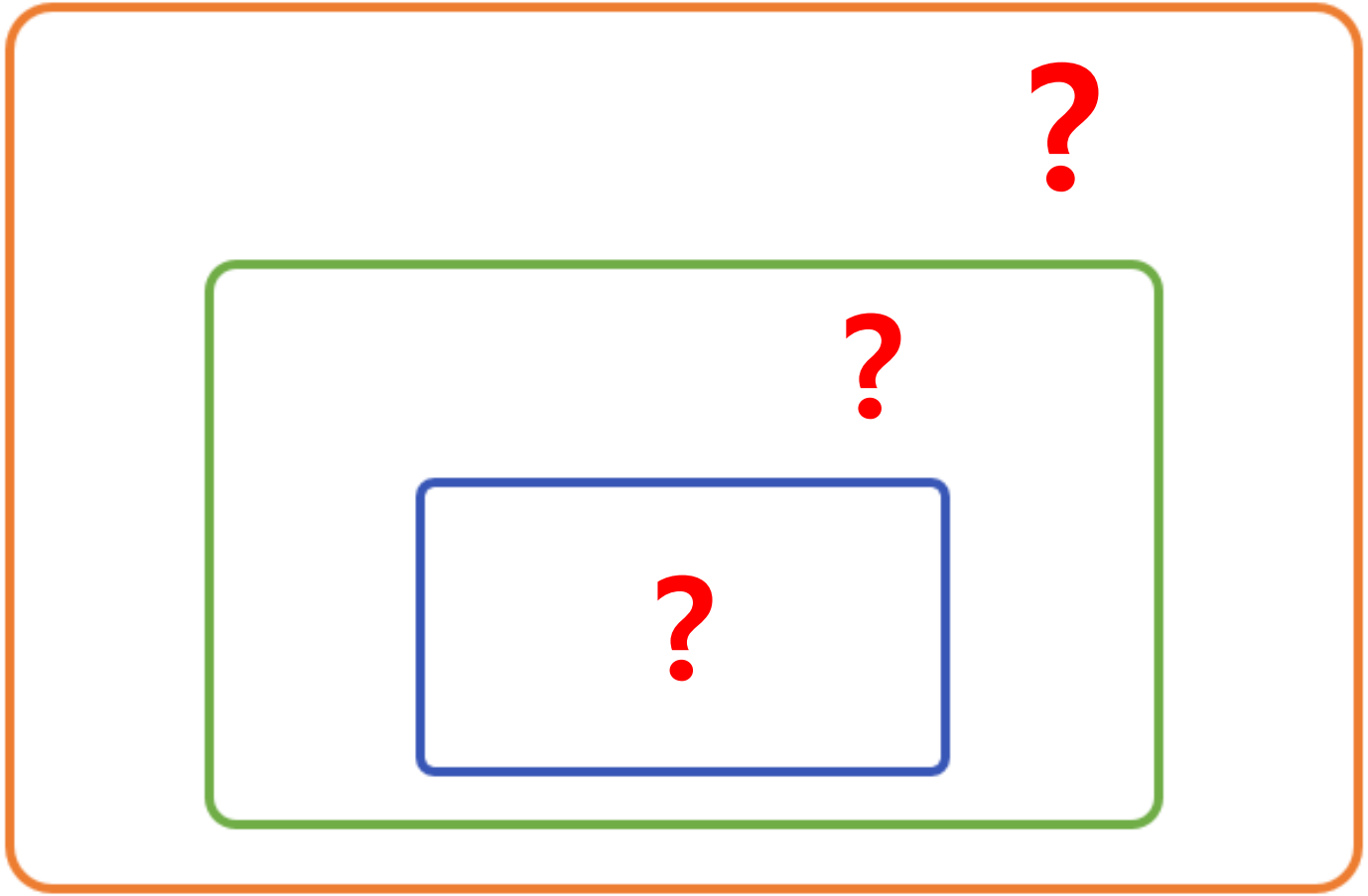
딥러닝

머신러닝

Deep Learning이란?



Deep Learning이란?



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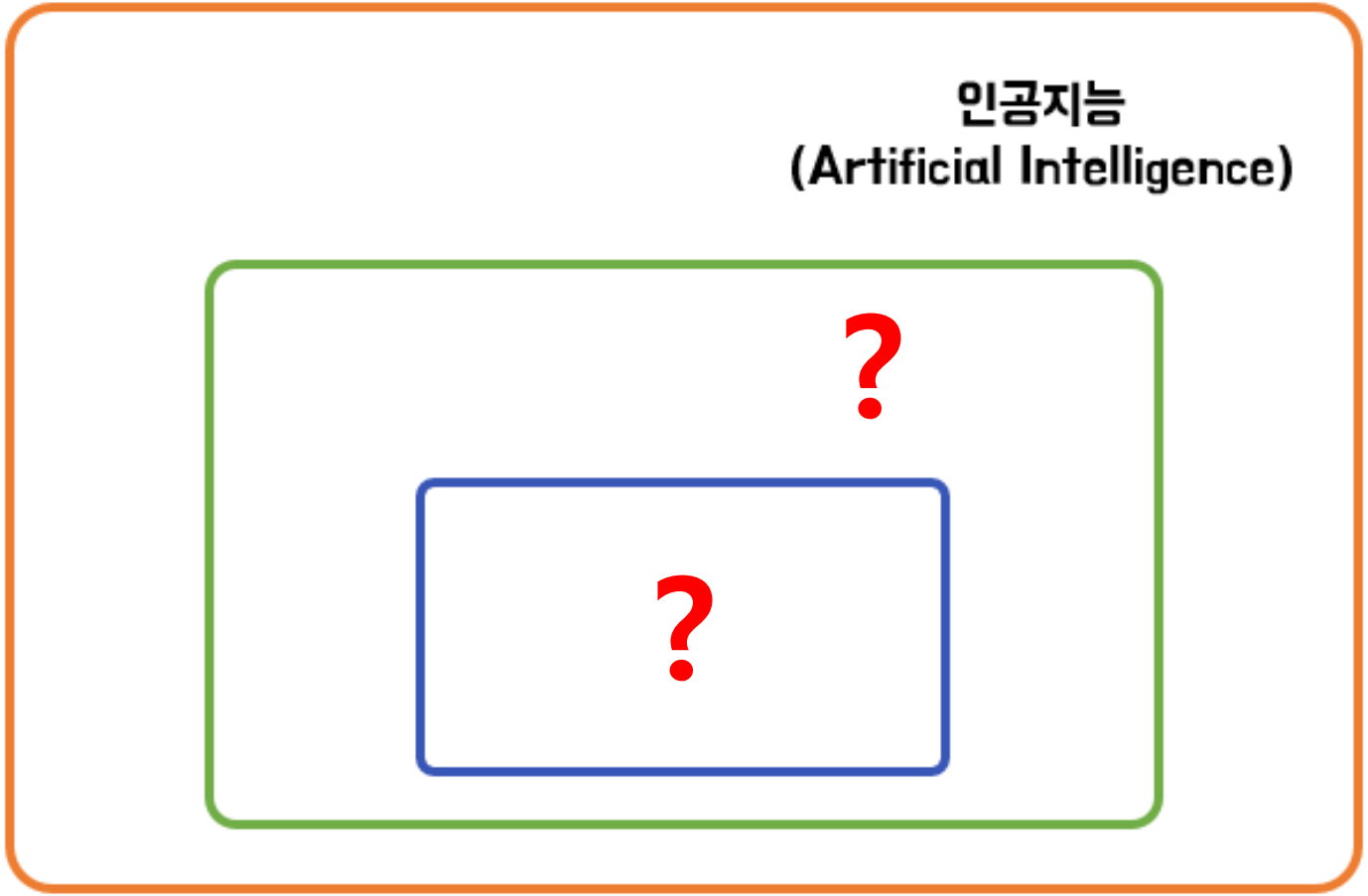

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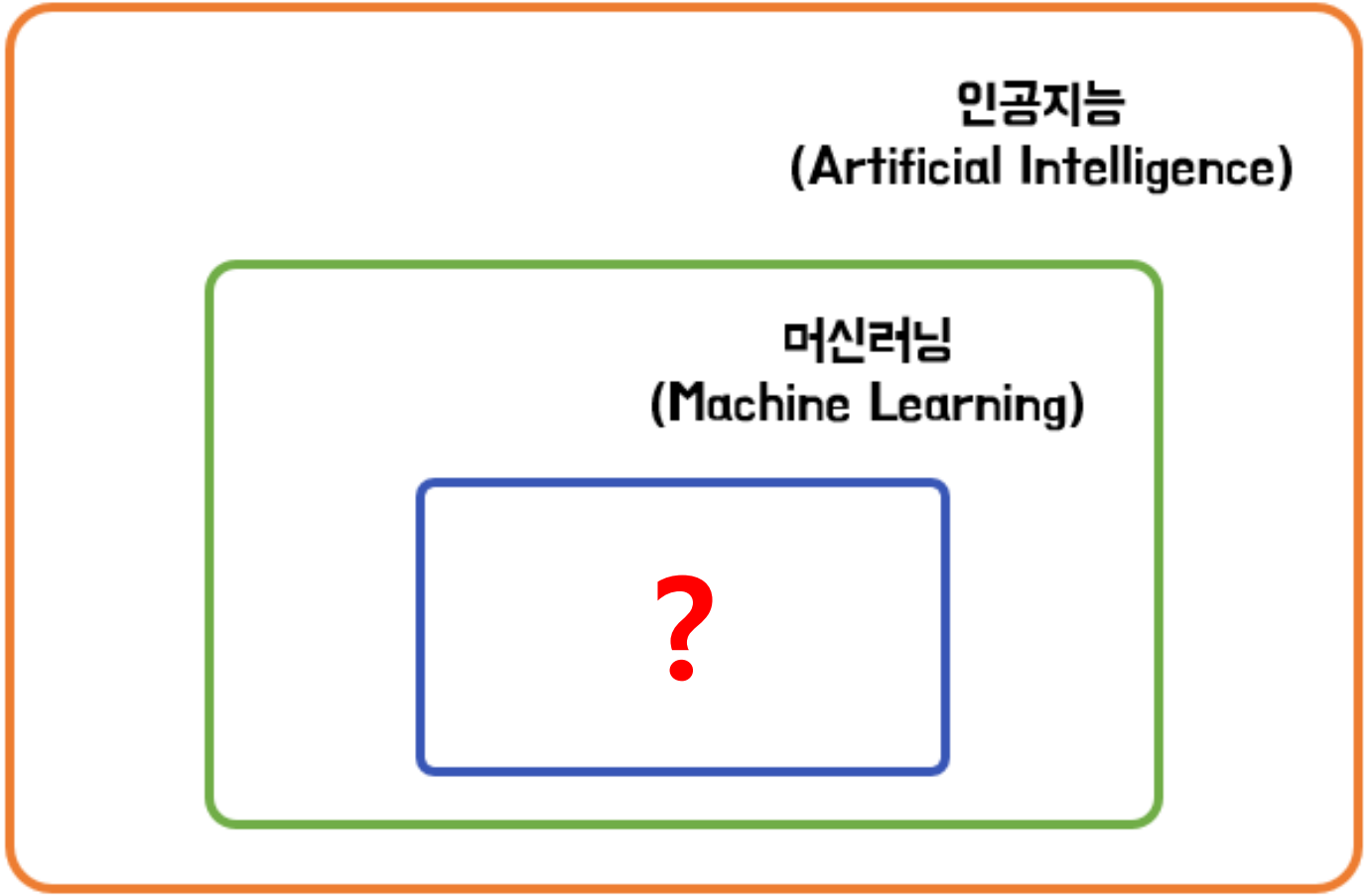

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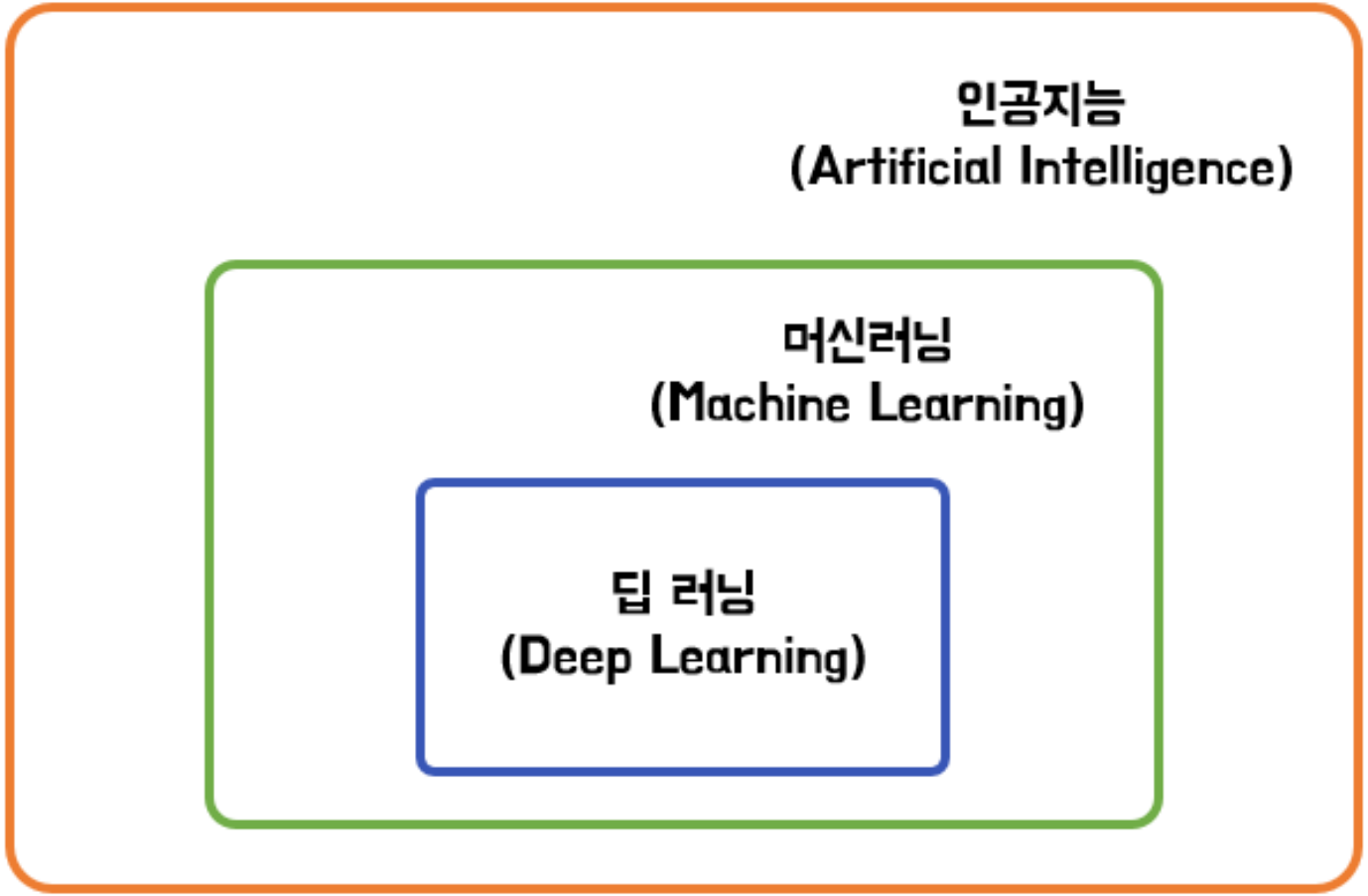
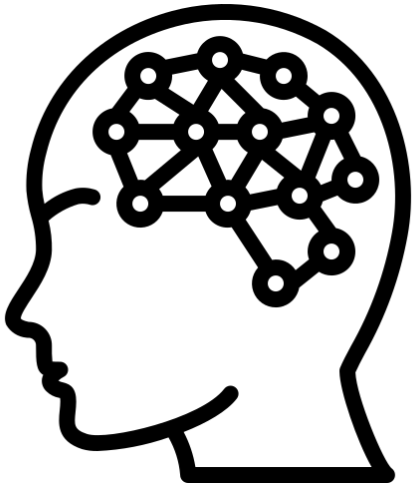


Deep Learning이란?

‘인공지능’이란?

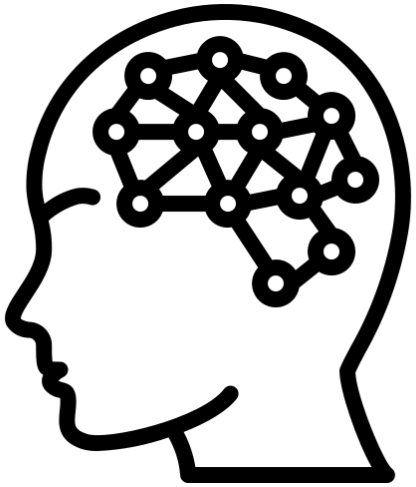
Deep Learning이란?



인공지능

Deep Learning이란?

입력



인공지능

Deep Learning이란?

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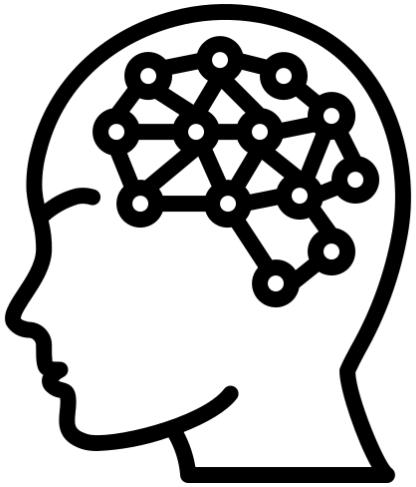
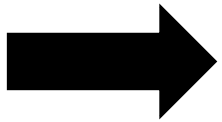
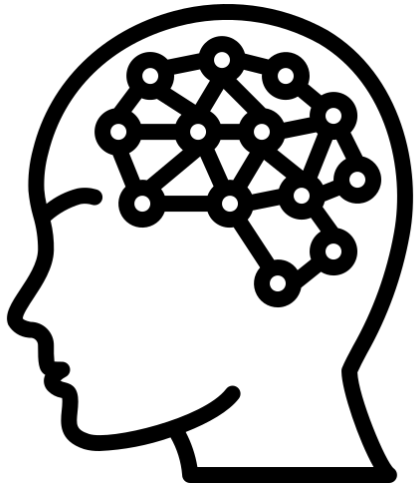


출력

인공지능

Deep Learning이란?





인공지능

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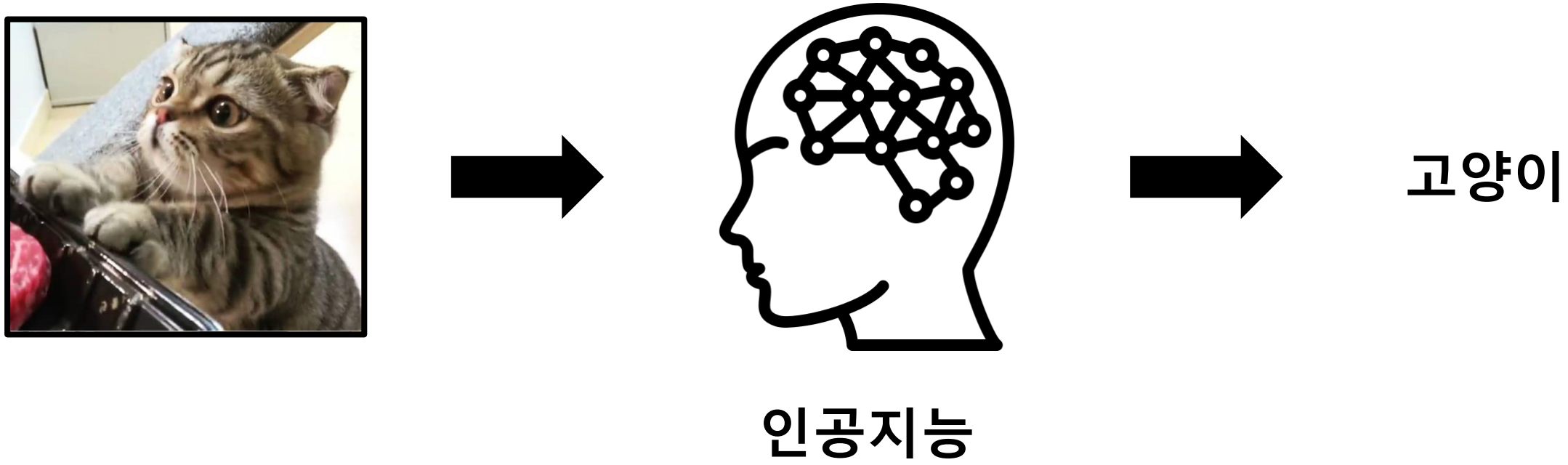
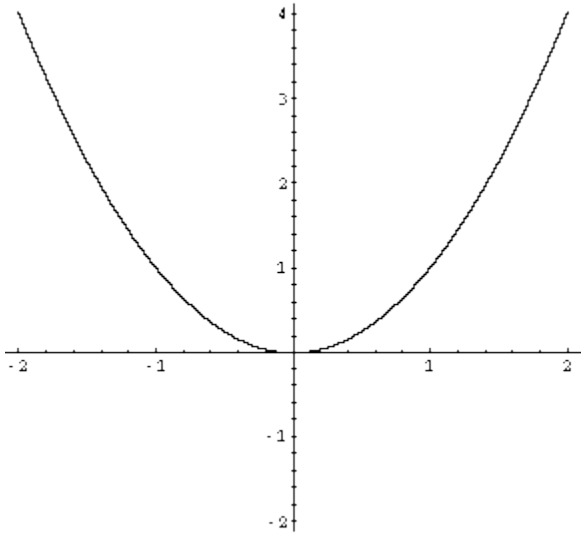


Deep Learning이란?

2

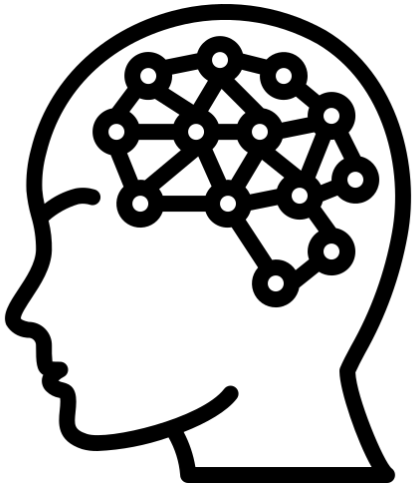


4

$$y = x^2$$

Deep Learning이란?

입력

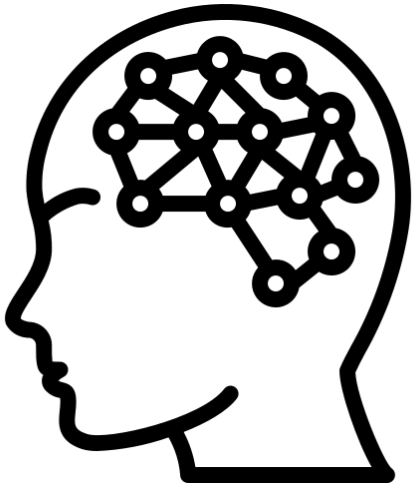


출력

인공지능

Deep Learning이란?

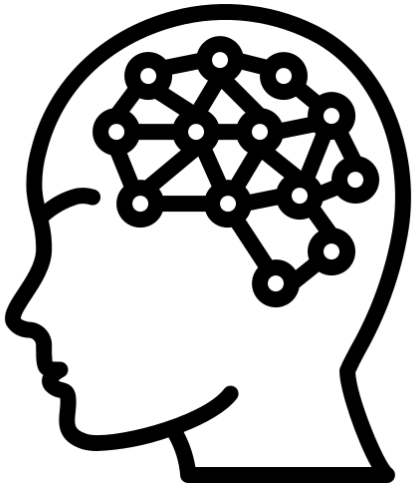
입력



출력

인공지능
= 일종의 함수

Deep Learning이란?

입력 →  → 출력

인공지능
= 일종의 복잡한 함수

Deep Learning이란?

딥러닝 vs 머신러닝

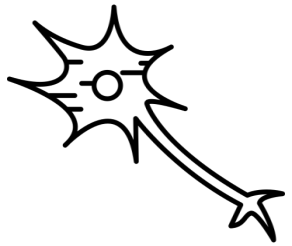
Deep Learning이란?

딥러닝 = 일종의 복잡한 함수

Deep Learning이란?

딥러닝 =  신경망을 본딴 함수

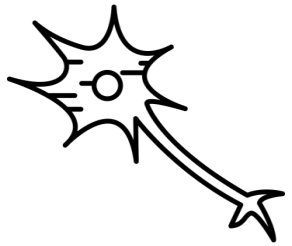
Deep Learning이란?



뉴런 (신경세포)

Deep Learning이란?

자극
(입력)



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Deep Learning이란?

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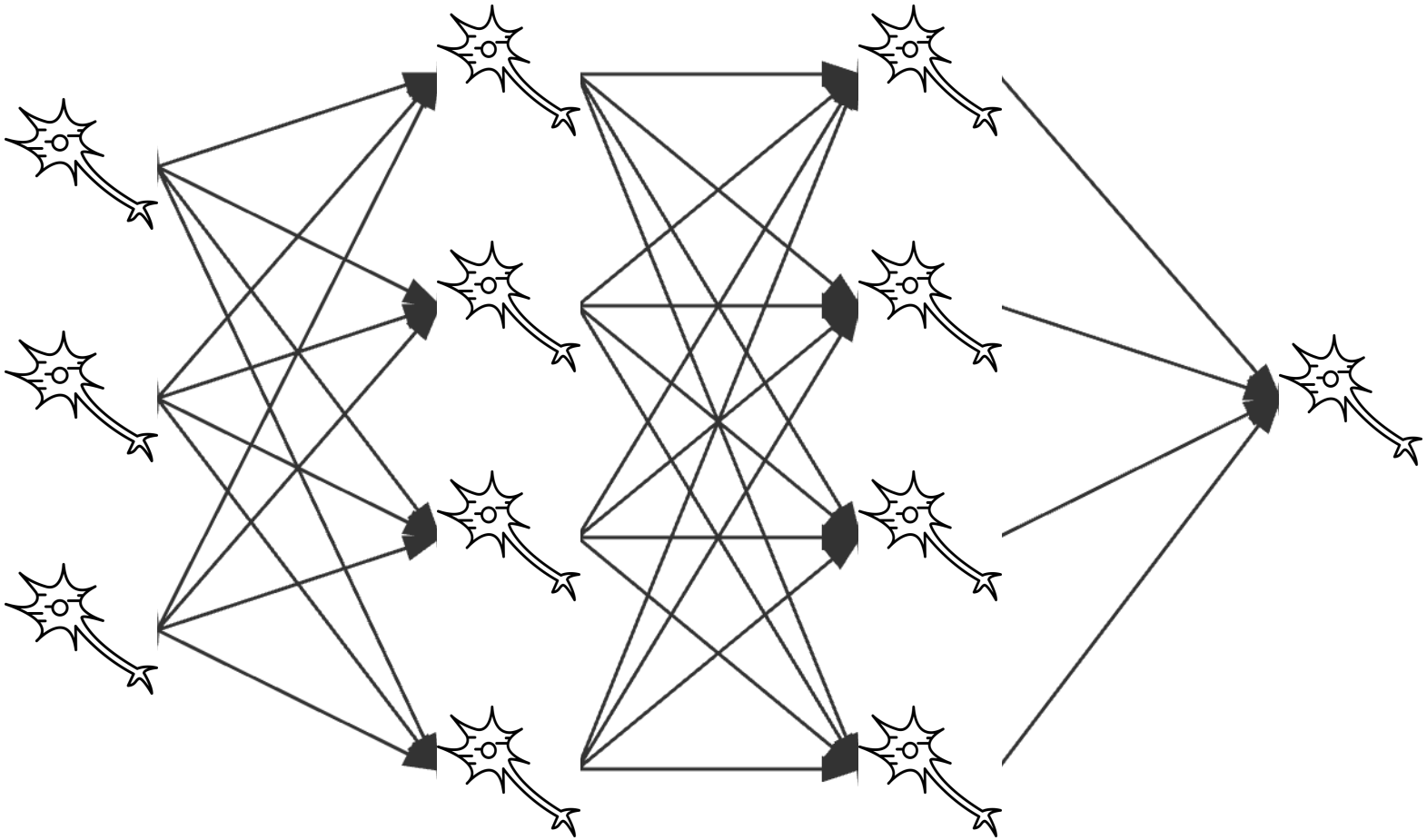

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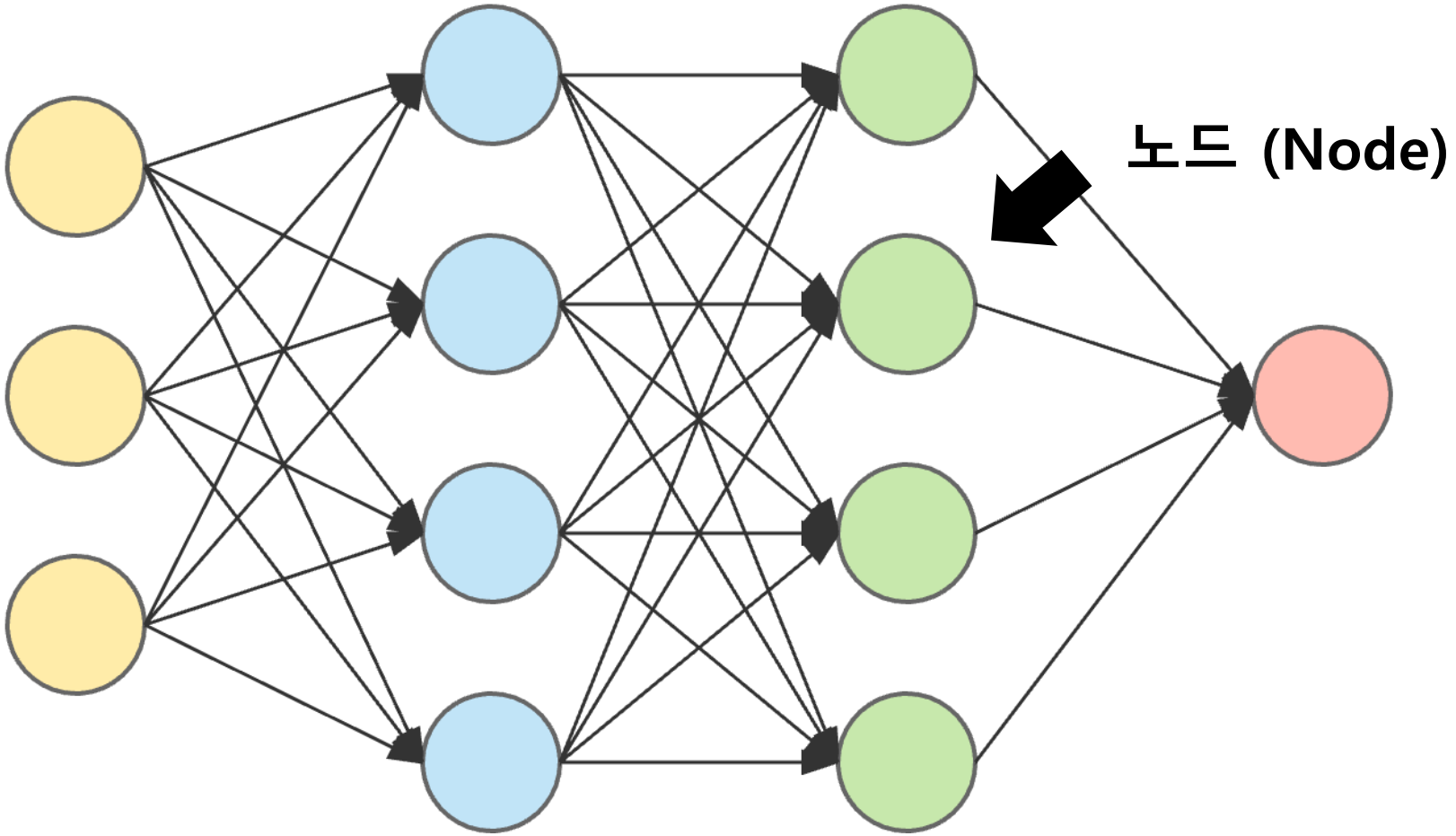
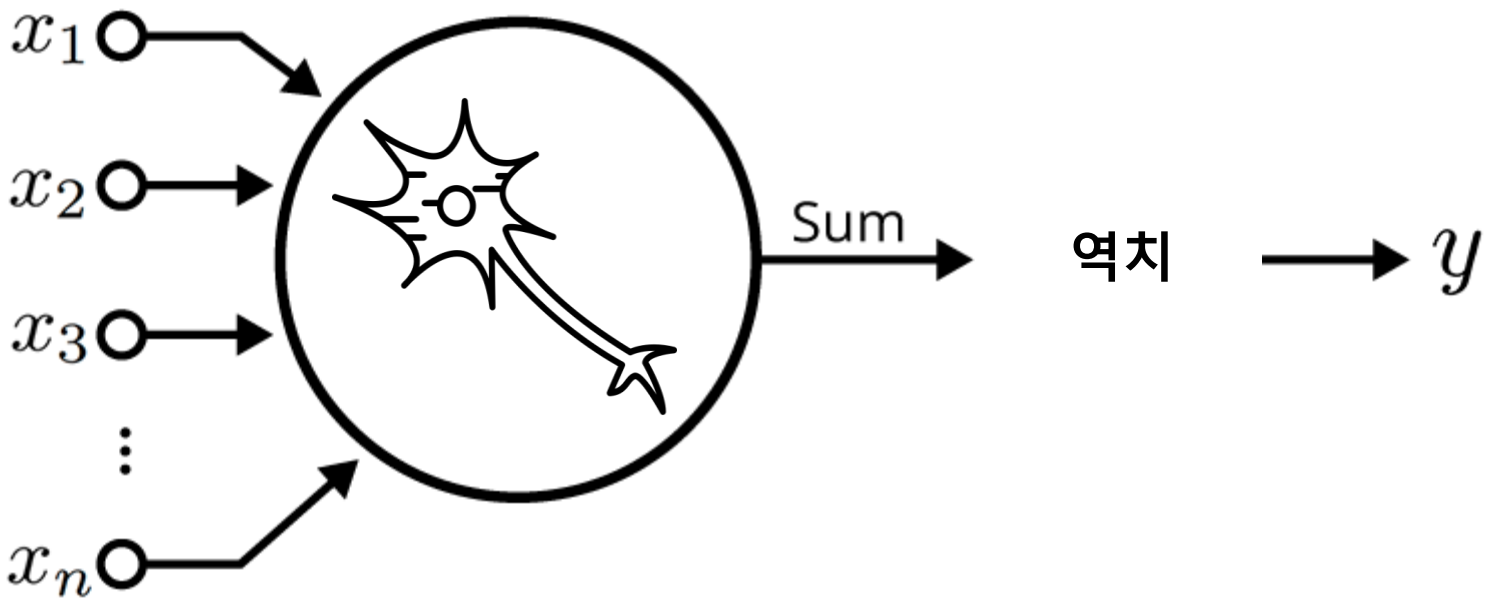


Deep Learning 용어

Deep Learning 용어

1. 가중치 (Weights)



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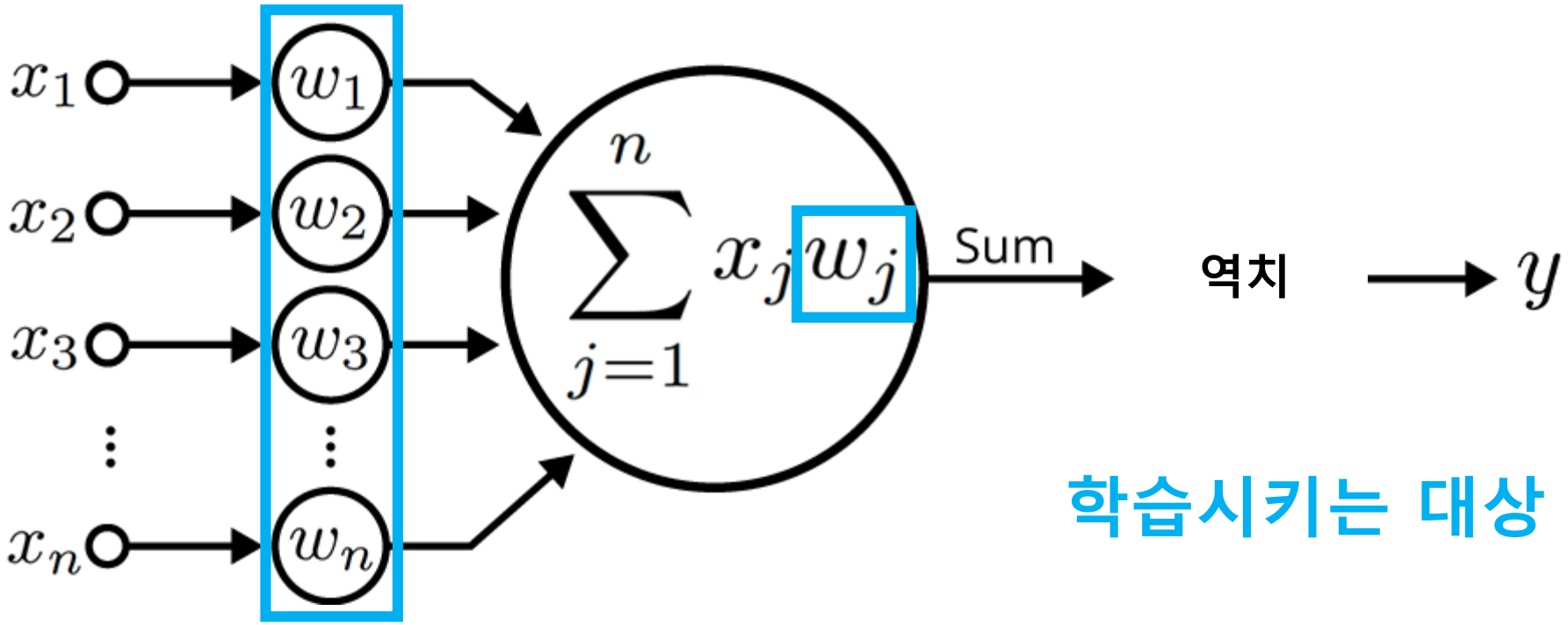
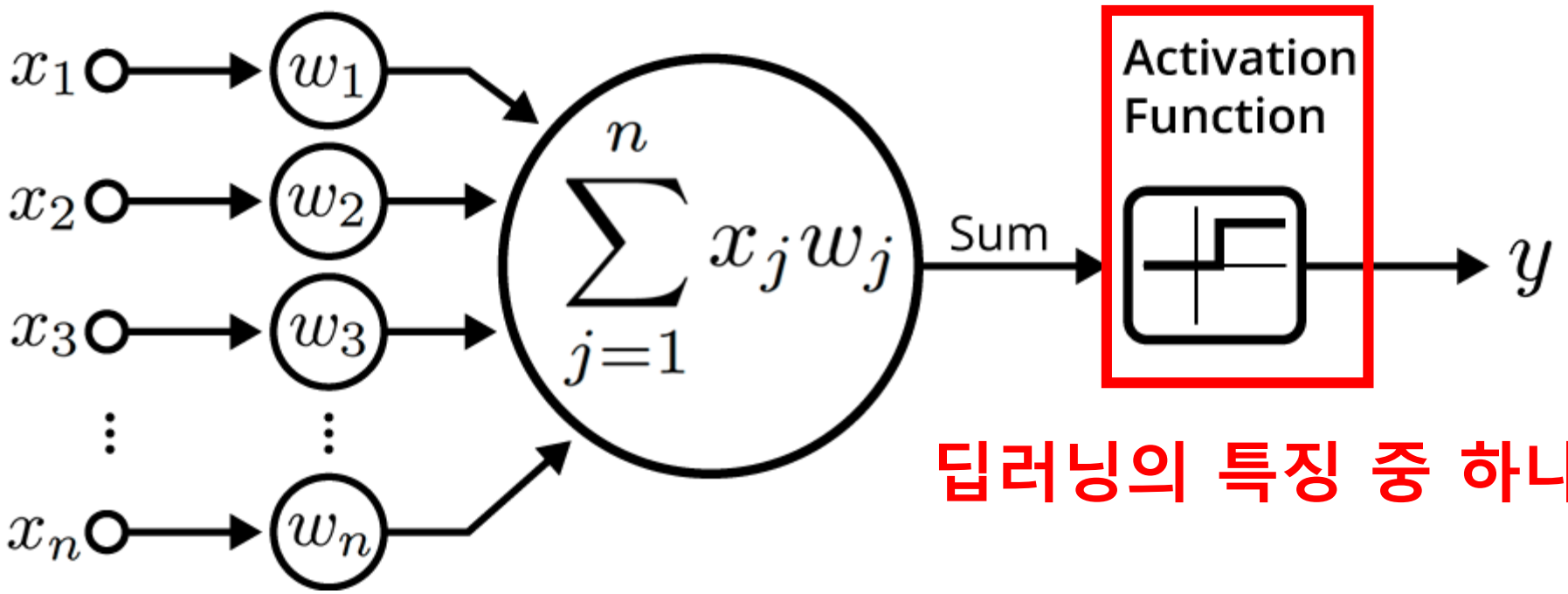


학습시키는 대상

Deep Learning 용어

2. 활성화 함수 (Activation Function)



딥러닝의 특징 중 하나 (비선형 함수)

Deep Learning 용어

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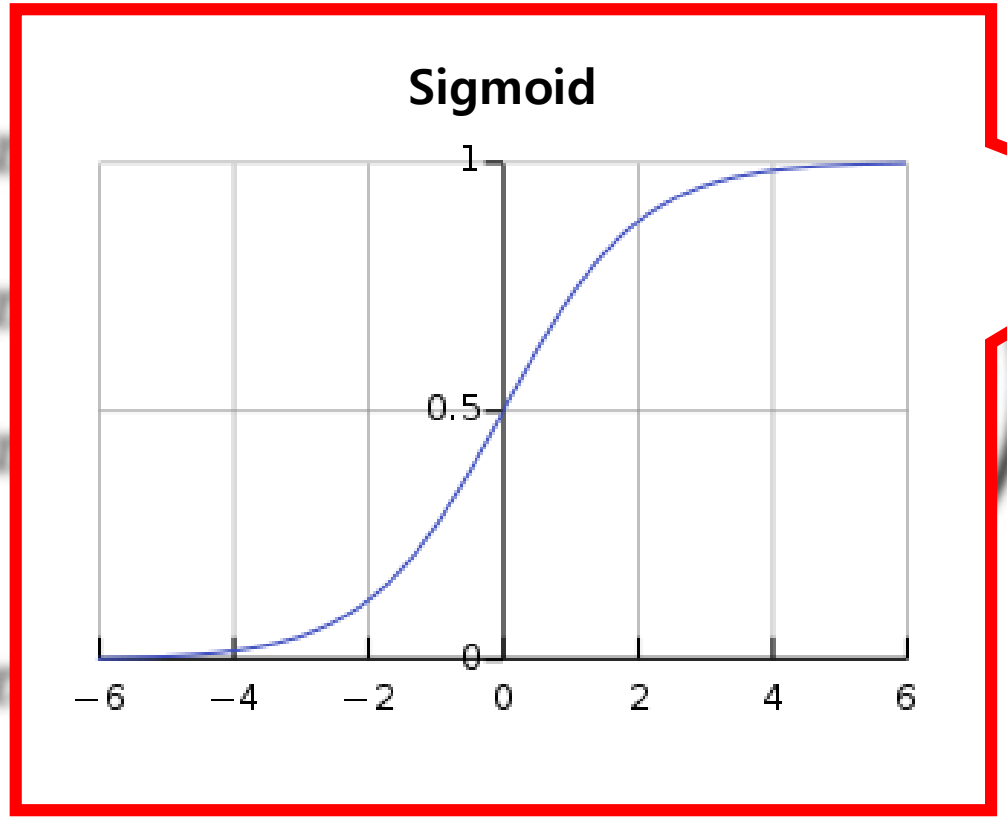

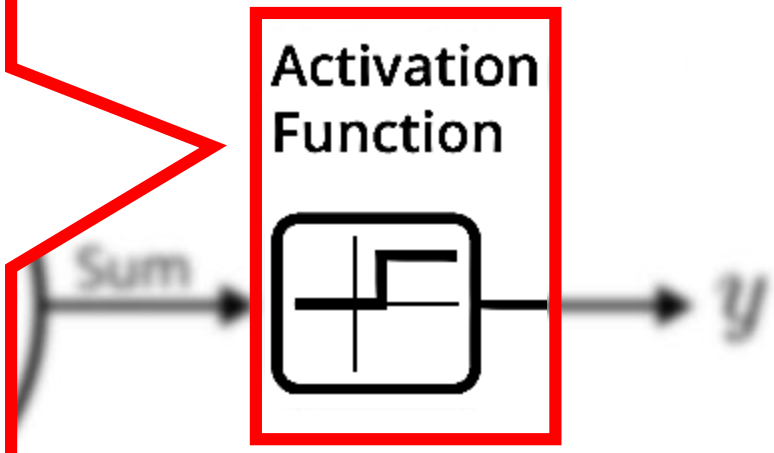

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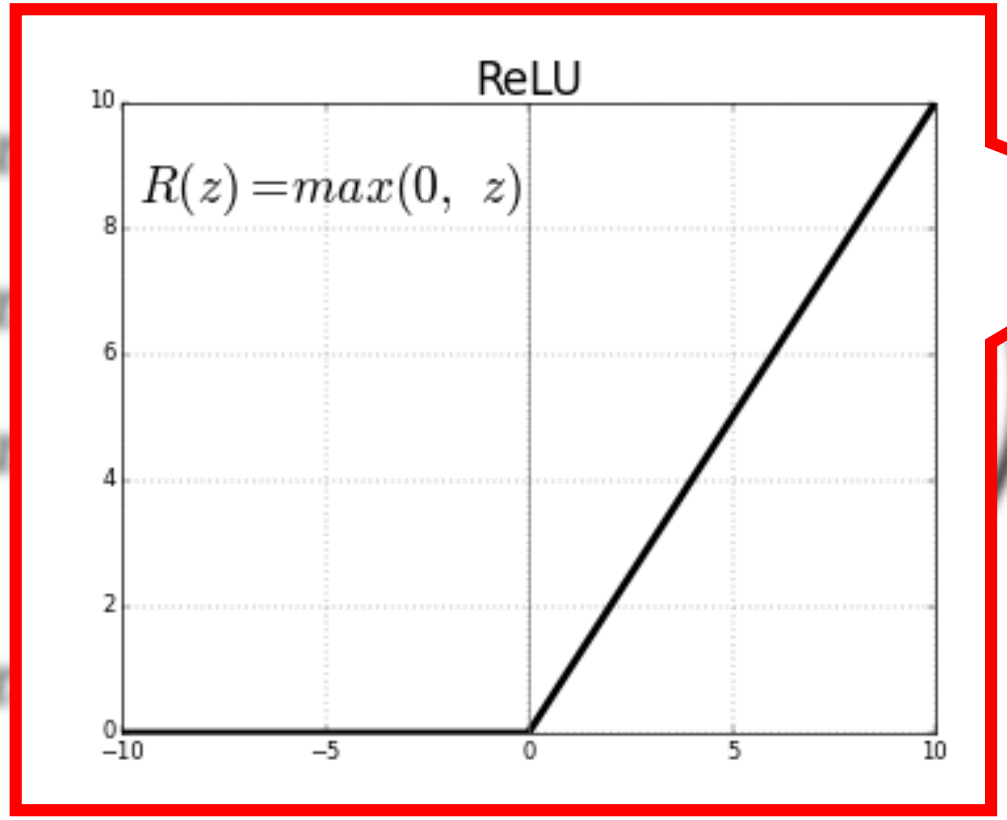
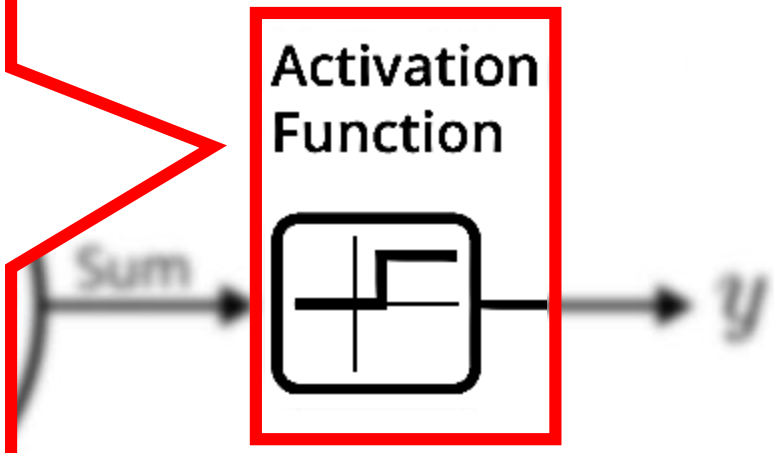
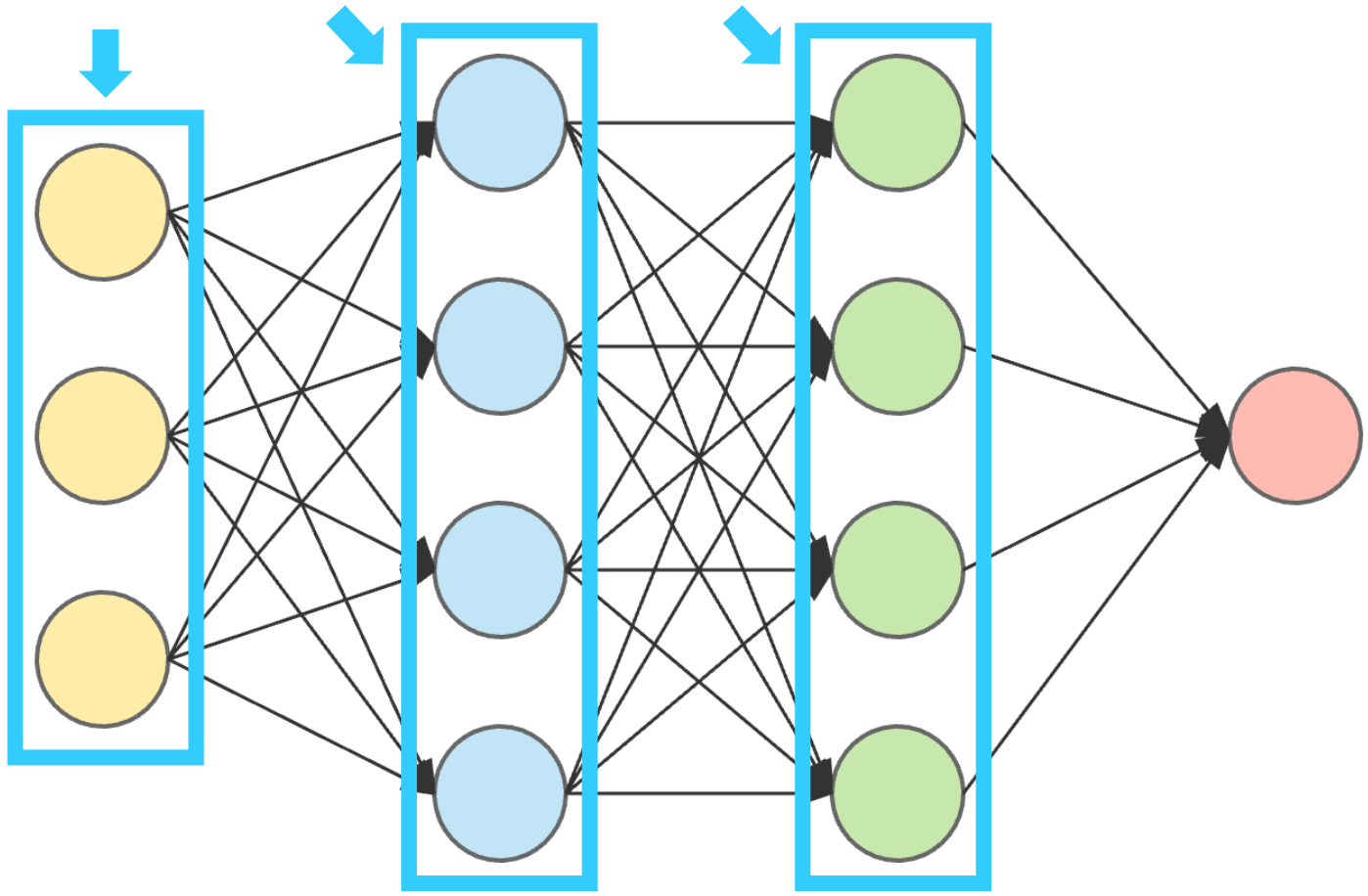




딥러닝의 특징 중 하나 (비선형 함수)

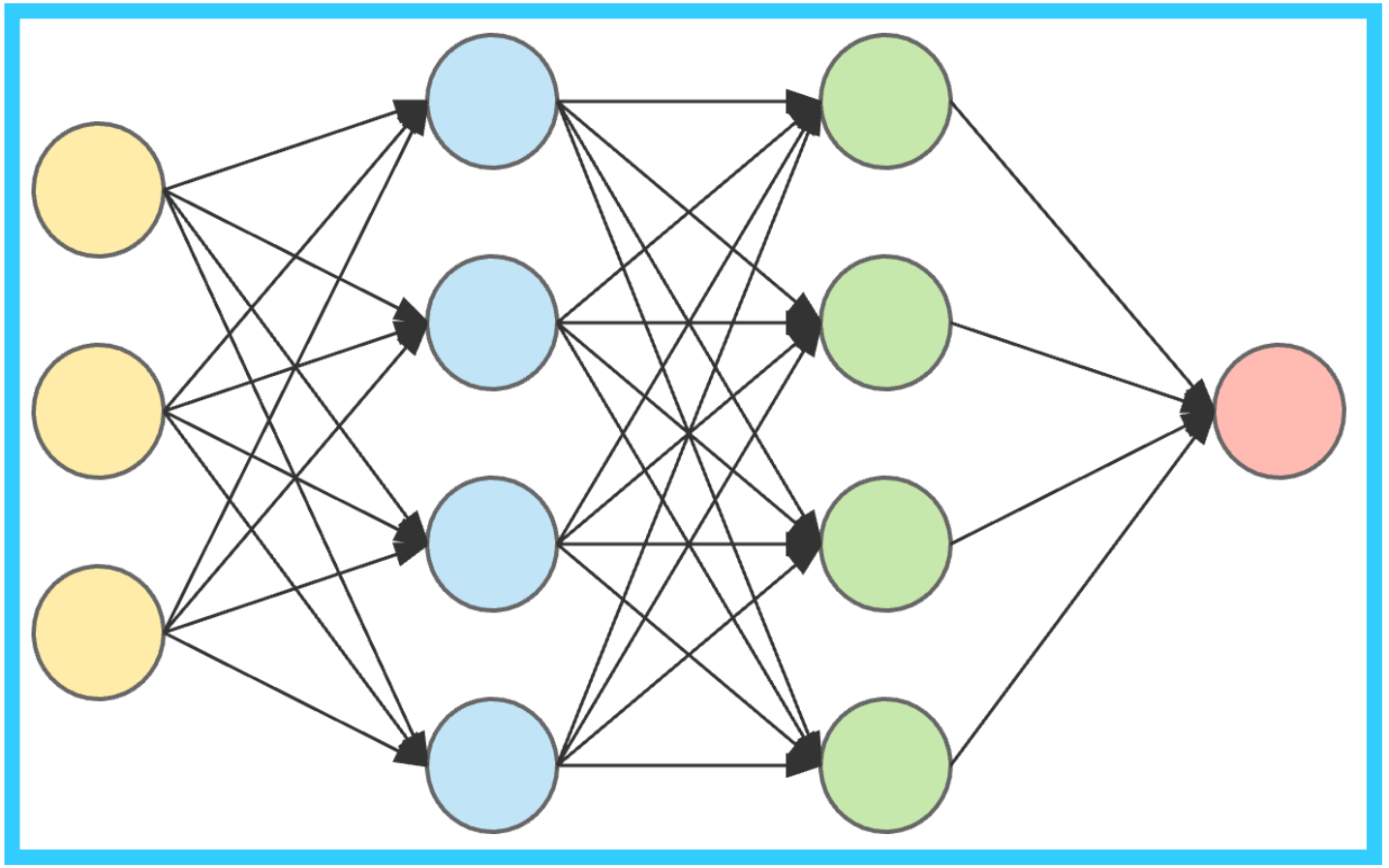
Deep Learning 용어

3. 레이어 (Layer)



Deep Learning 용어

4. 모델 (Model)
   = Architecture
   = Network



Deep Learning 용어

5. 손실 함수 (Loss Function)

Deep Learning 용어

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: 신경망이 학습할 수 있도록 해주는 지표
or 학습 상태를 측정하는 지표

Deep Learning 용어

5. 손실 함수 (Loss Function)

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or 학습 상태를 측정하는 지표

$$\text{MSE} = \frac{1}{n}\sum_{i=1}^{n}(y_i - \tilde{y}_i)^2$$

Mean Squared Error

y_i: True

$\tilde{y}_i$: Prediction

Deep Learning 용어

5. 손실 함수 (Loss Function)

: 신경망이 학습할 수 있도록 해주는 지표
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$$BCE = -\frac{1}{N}\sum_{i=0}^{N} y_i \cdot log(\hat{y}_i) + (1 - y_i) \cdot log(1 - \hat{y}_i)$$

Binary Cross Entropy

Deep Learning 용어

6. 역전파 (Back Propagation)

Deep Learning 용어

6. 역전파 (Back Propagation)

: 출력을 통해 계산한 오차를 앞쪽 레이어로 전달하여
기울기(Gradient)를 계산하는 방법

Deep Learning 용어

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7. Optimizer

Deep Learning 용어

6. 역전파 (Back Propagation)

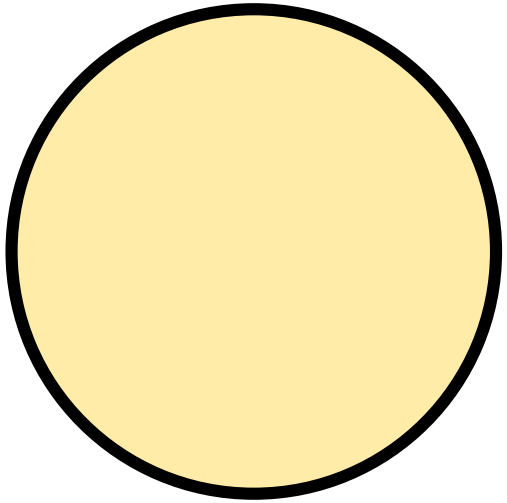
: 출력을 통해 계산한 오차를 앞쪽 레이어로 전달하여
기울기(Gradient)를 계산하는 방법

7. Optimizer

: 기울기(Gradient)를 바탕으로 가중치(Weights)를 최적의 방향으로
업데이트해주는 역할

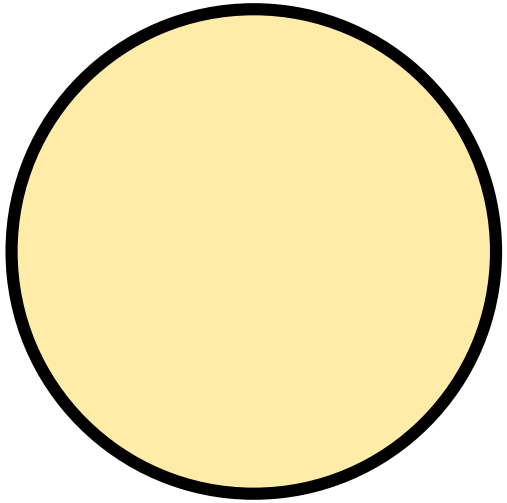
Deep Learning 용어

Review



Deep Learning 용어

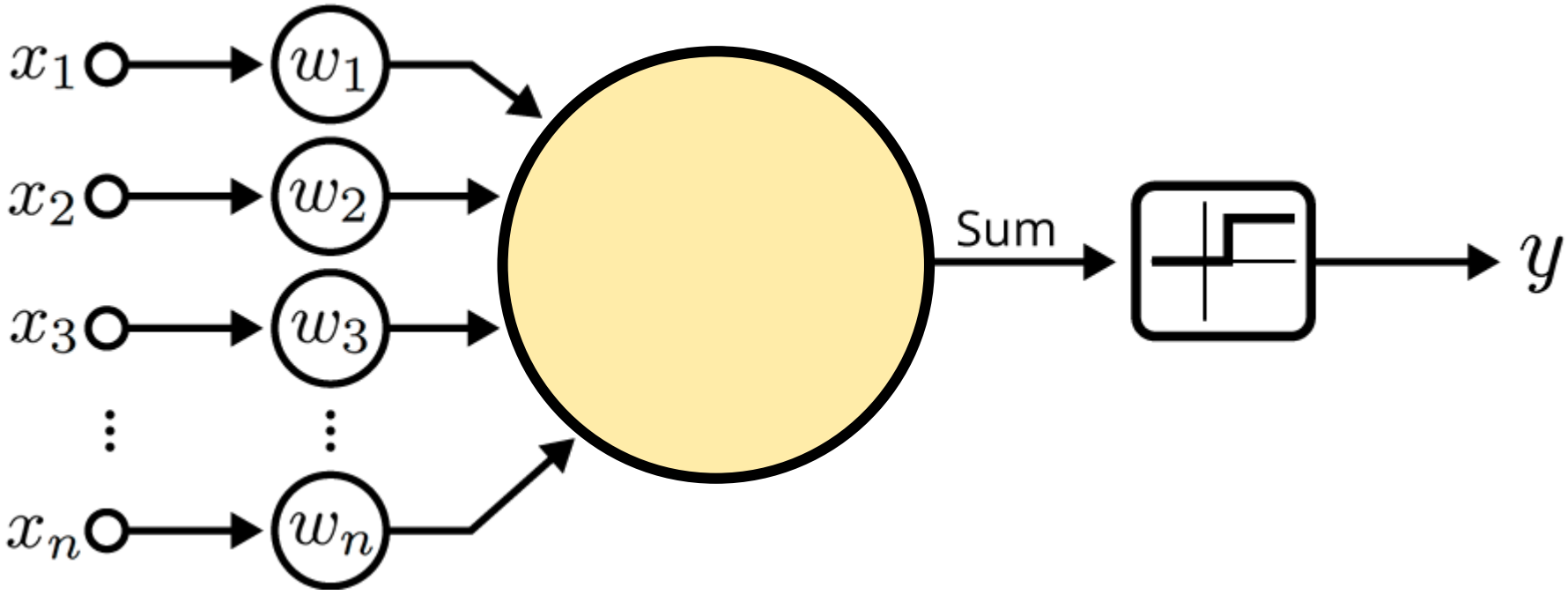
Review



노드 (Node)

Deep Learning 용어

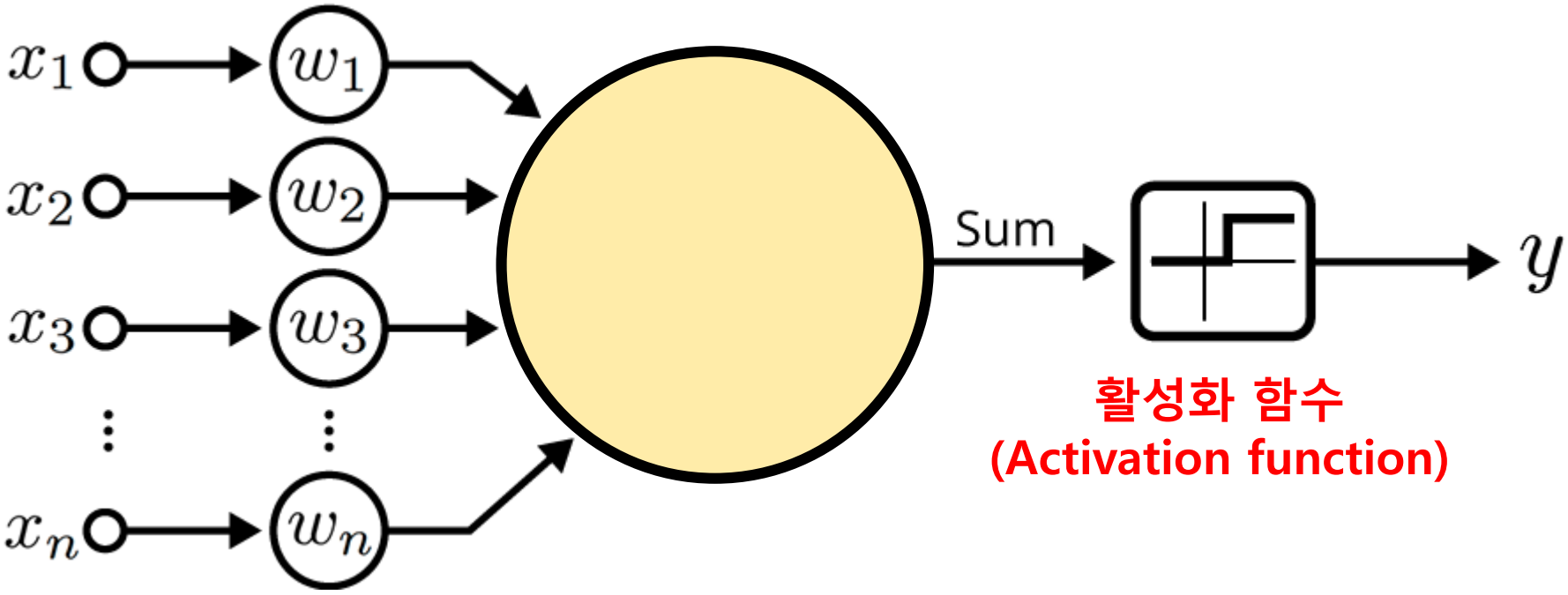
Review



가중치 (Weights)

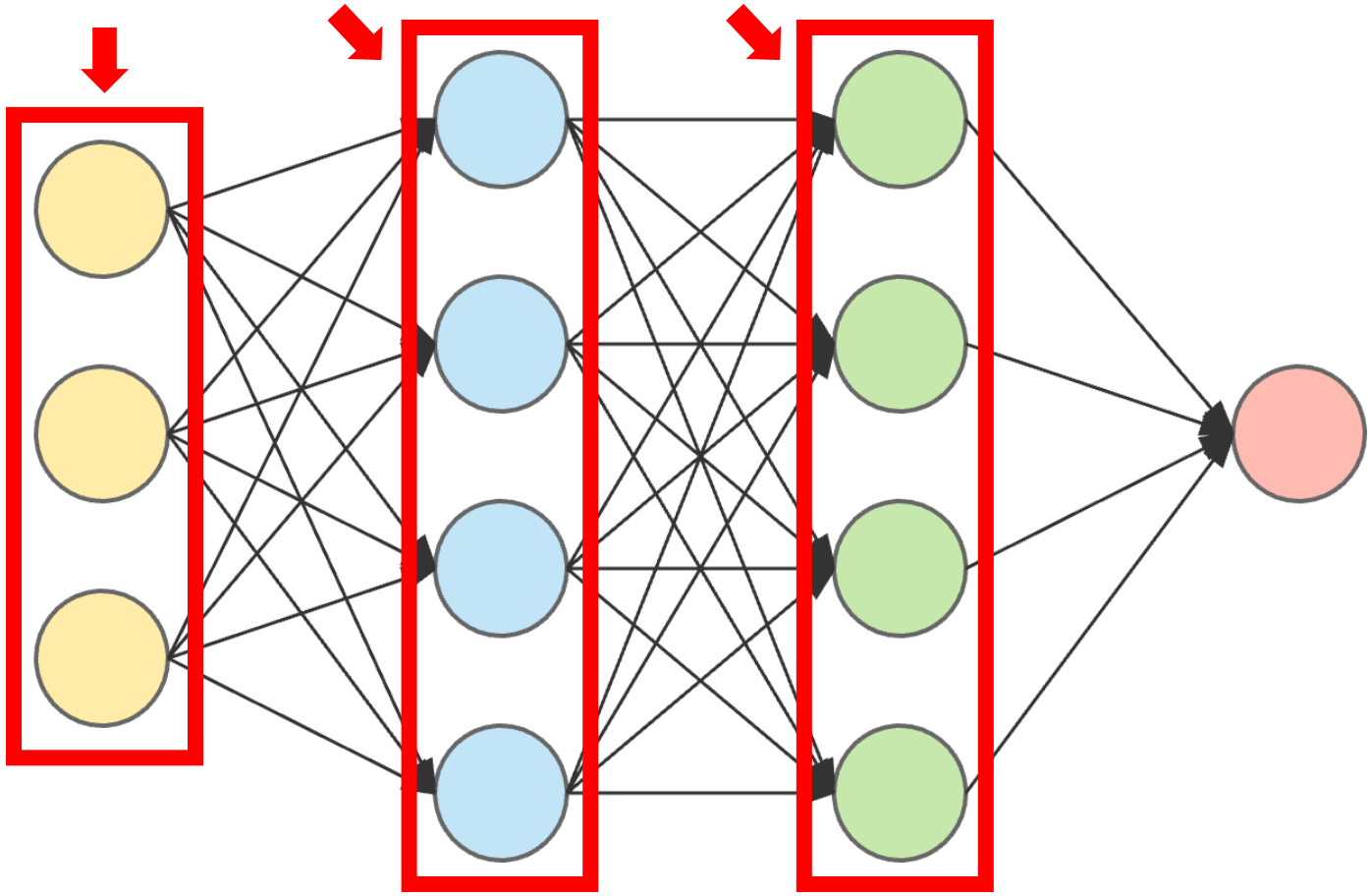
Deep Learning 용어

Review



Deep Learning 용어

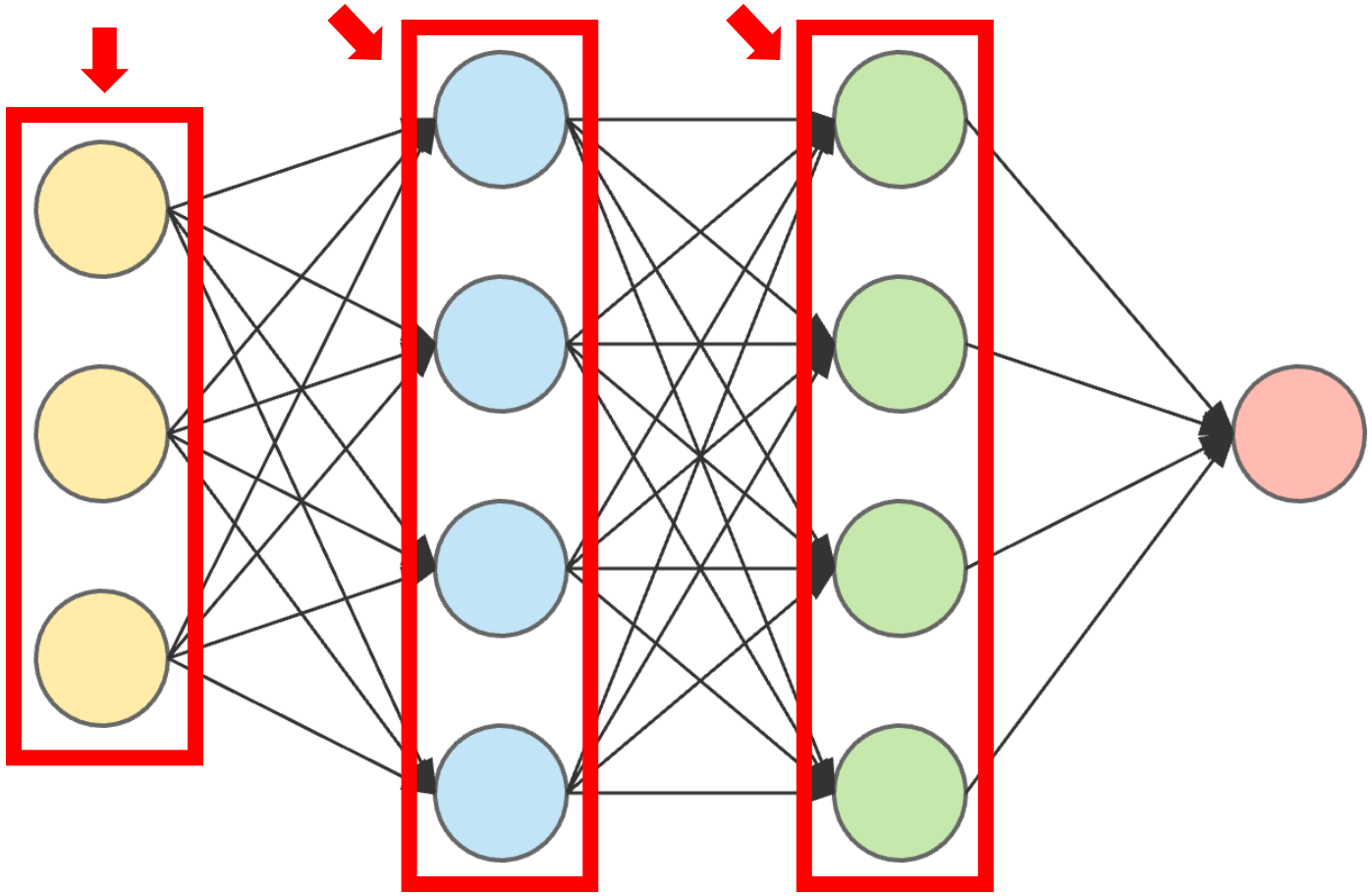
Review



Deep Learning 용어

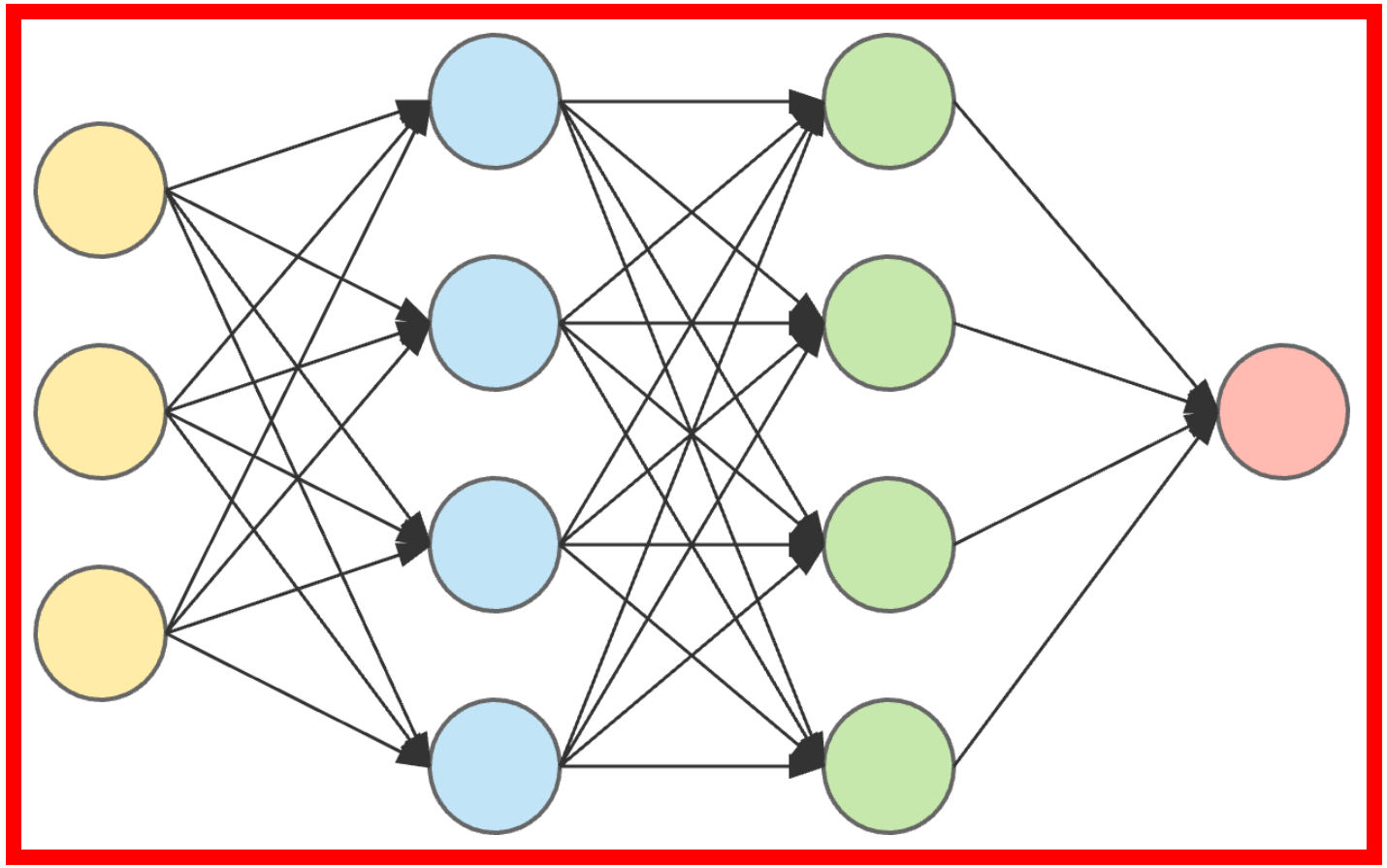
Review

레이어 (Layer)



Deep Learning 용어

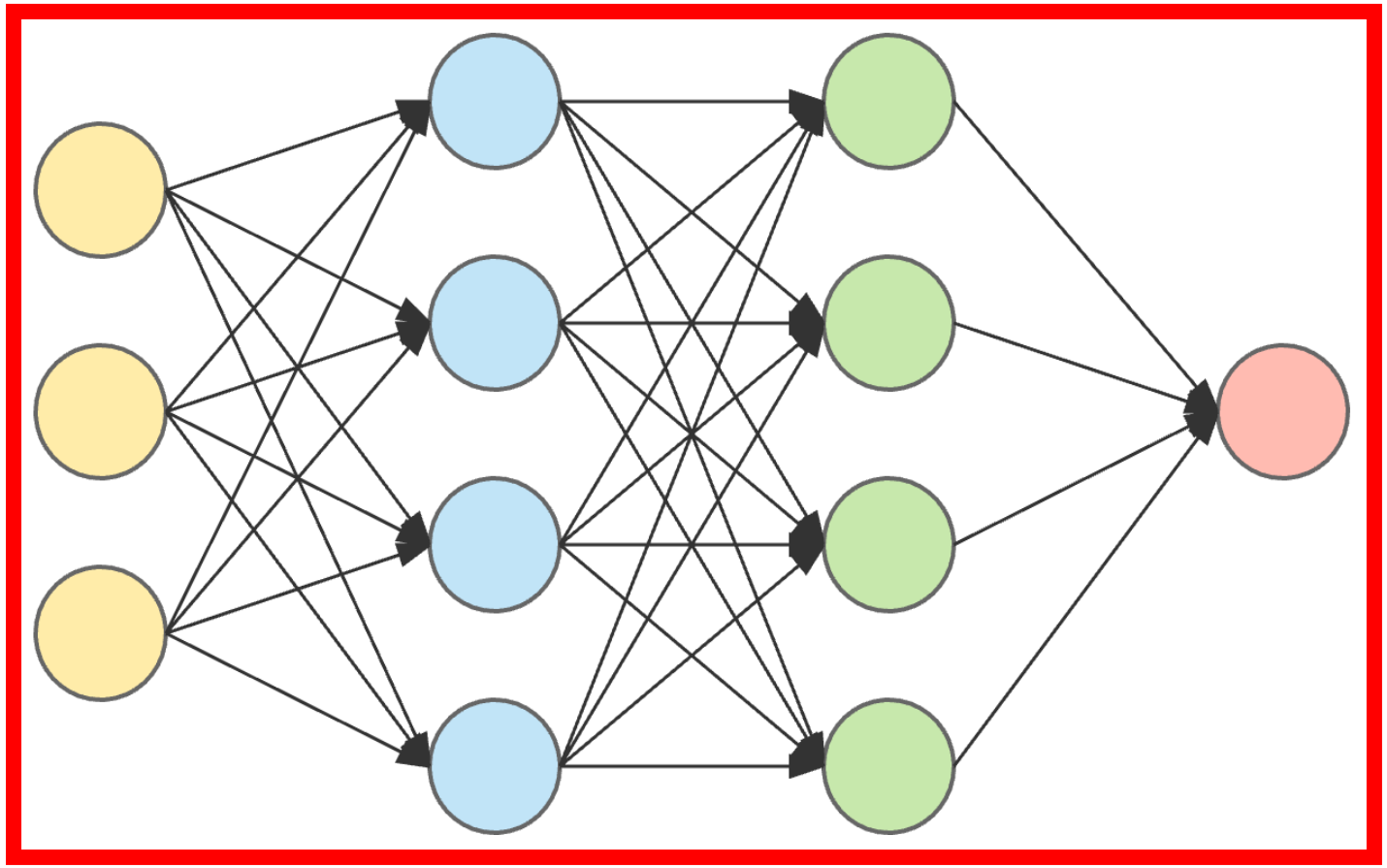
Review



Deep Learning 용어

Review

Model
= Architecture
= Network



Deep Learning 용어

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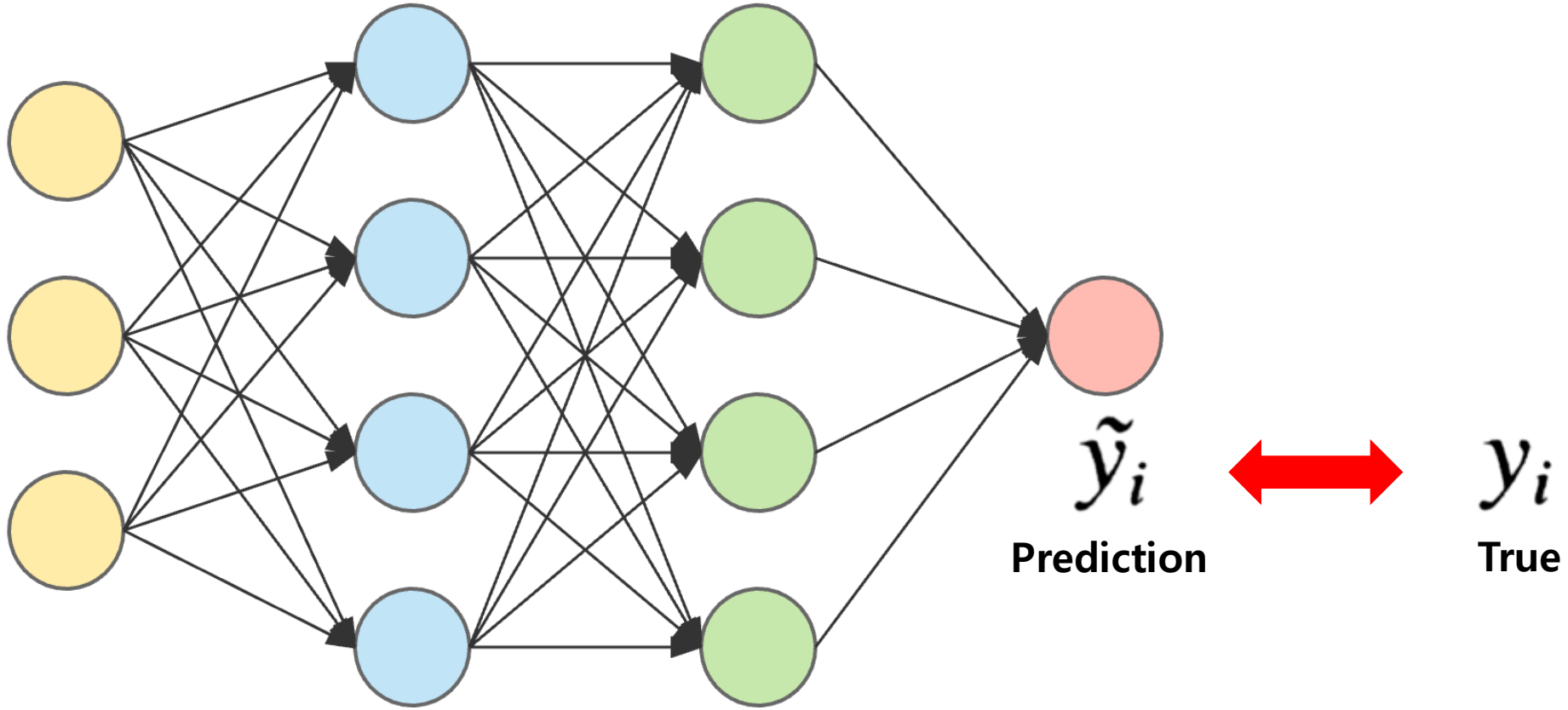

Deep Learning 용어

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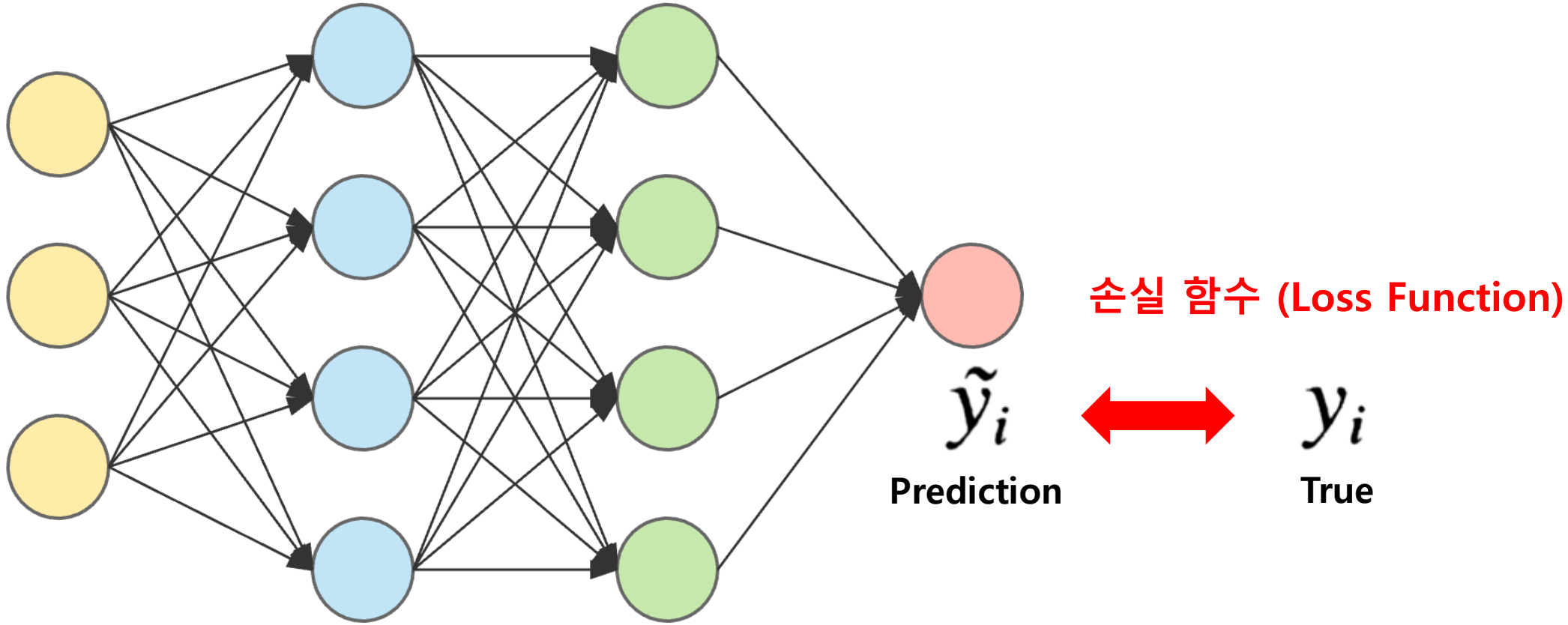
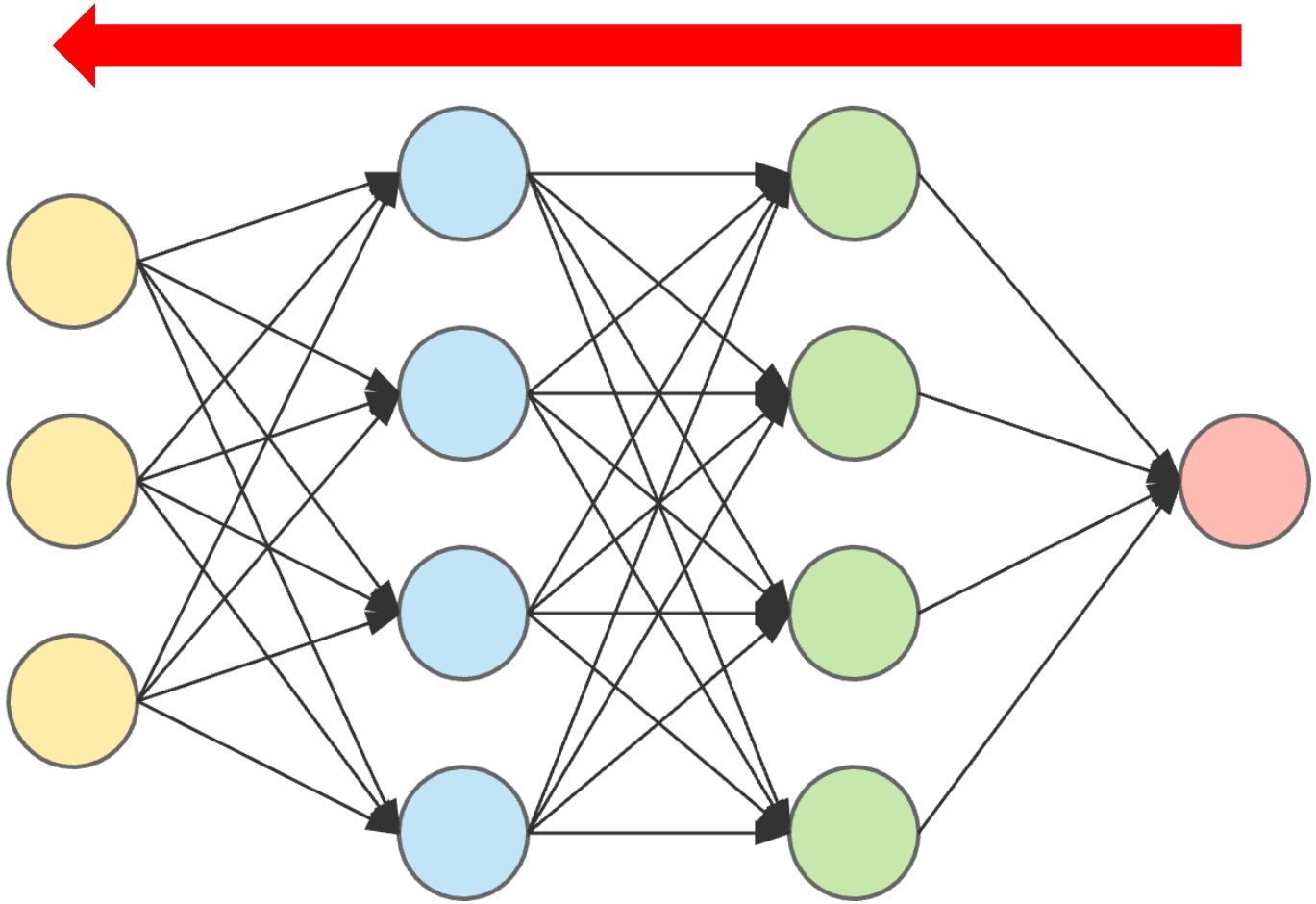


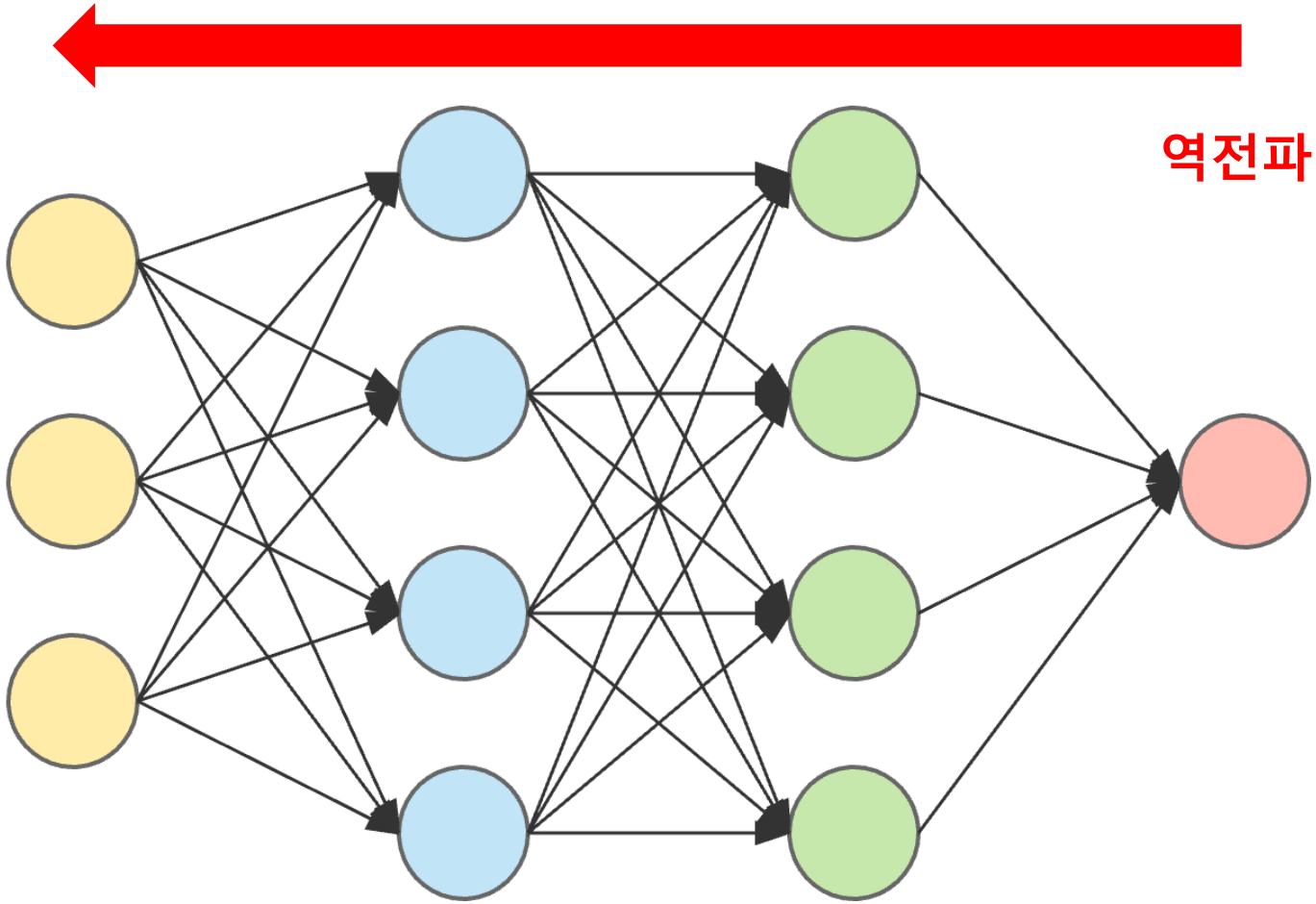
Deep Learning 용어

Review



Deep Learning 용어

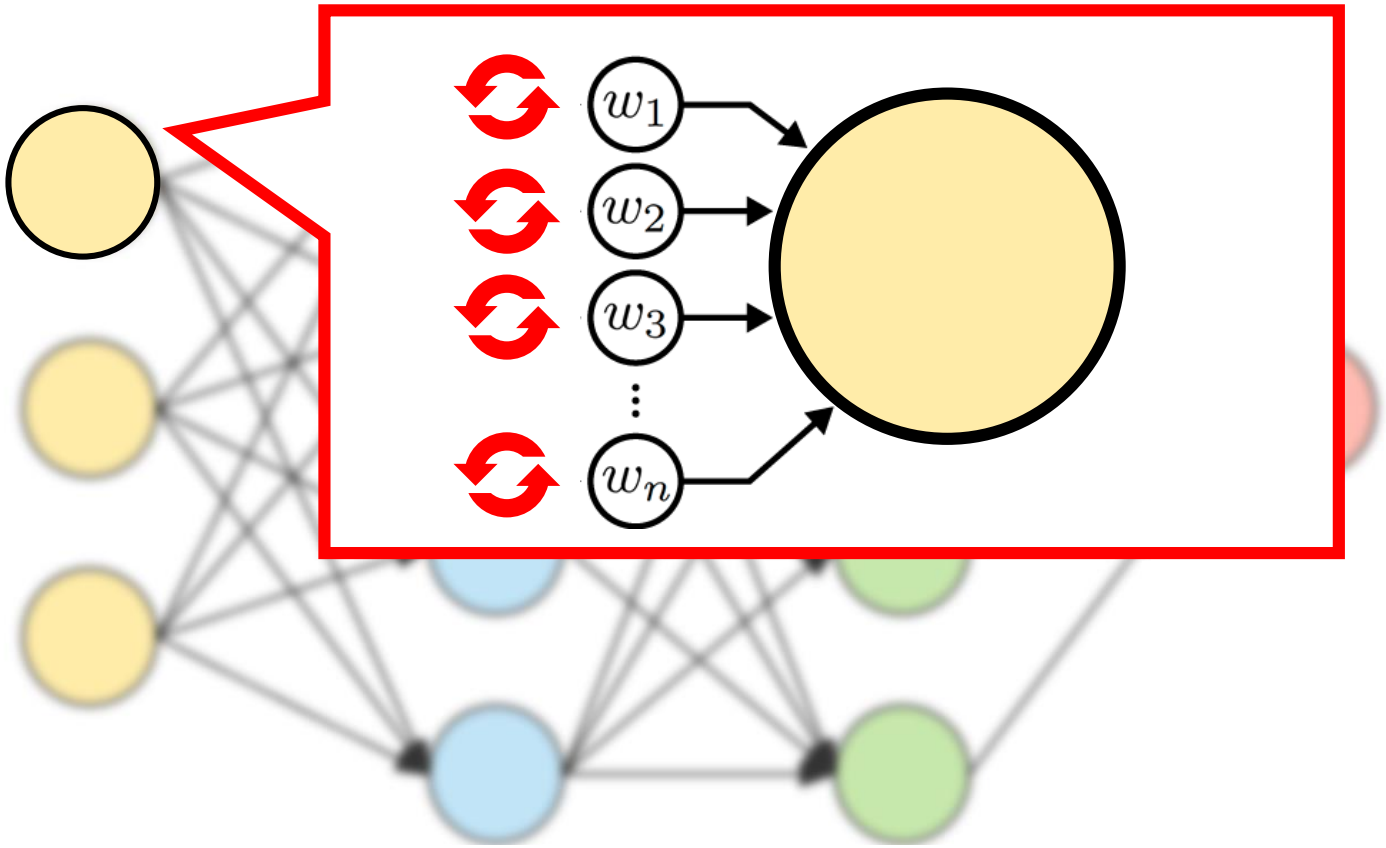
Review



역전파 (Back Propagation)

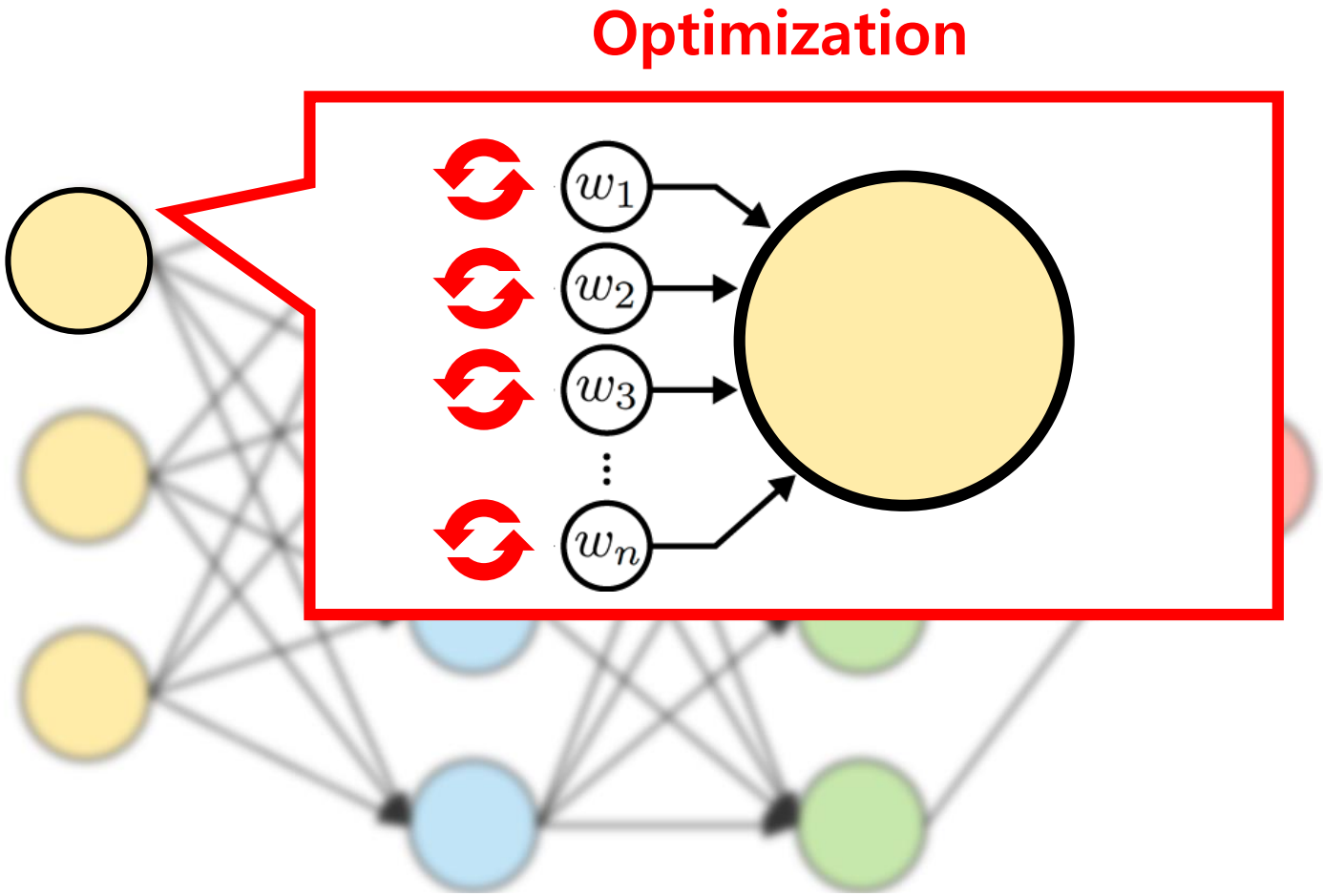
Deep Learning 용어

Review



Deep Learning 용어

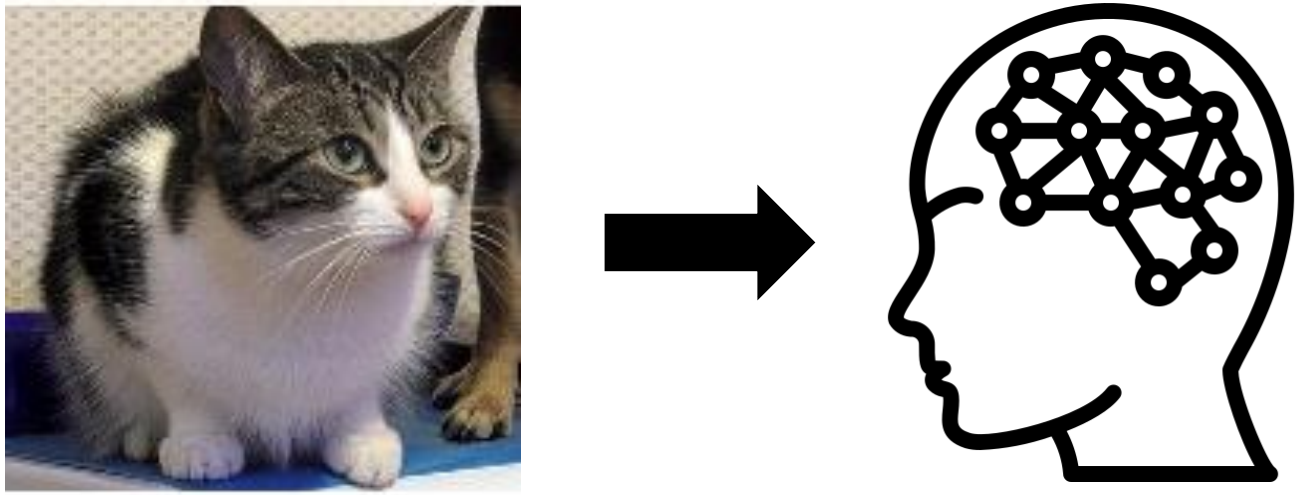
Review



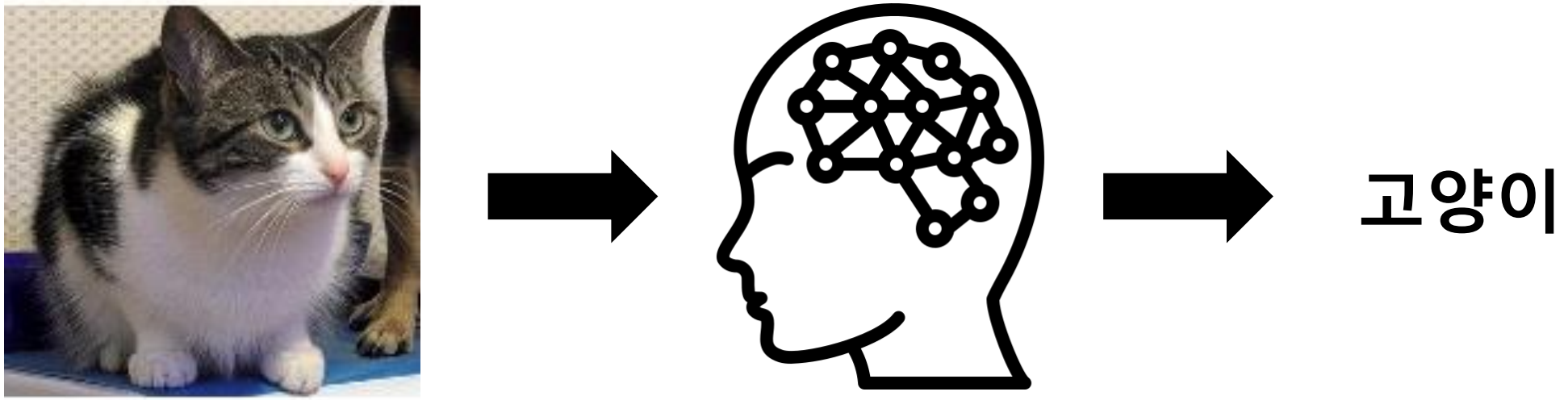
Computer Vision
Deep Learning

Computer Vision Deep Learning 예제

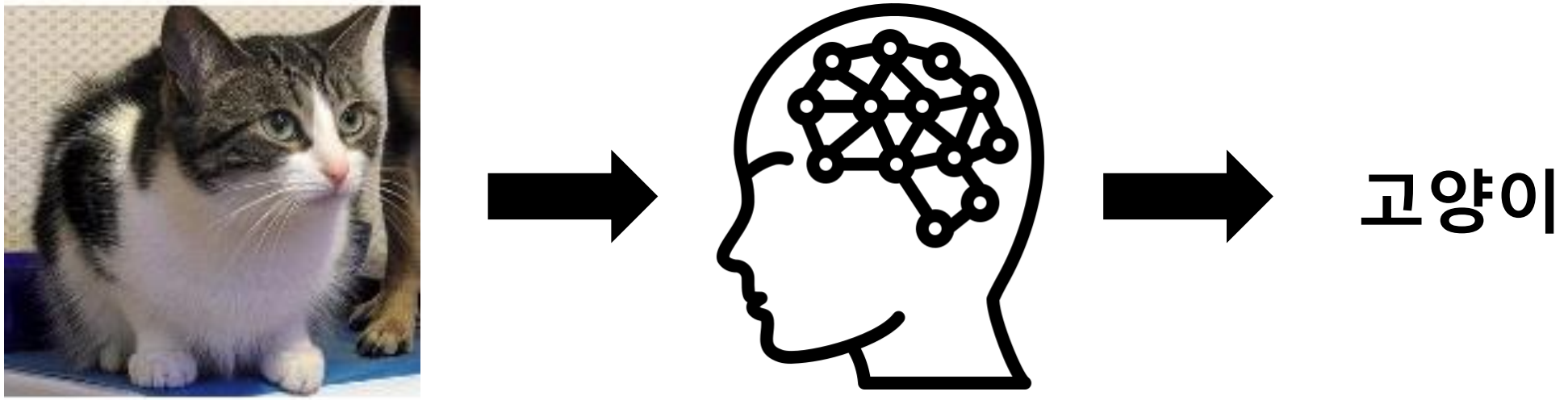
Computer Vision Deep Learning 예제



Computer Vision Deep Learning 예제

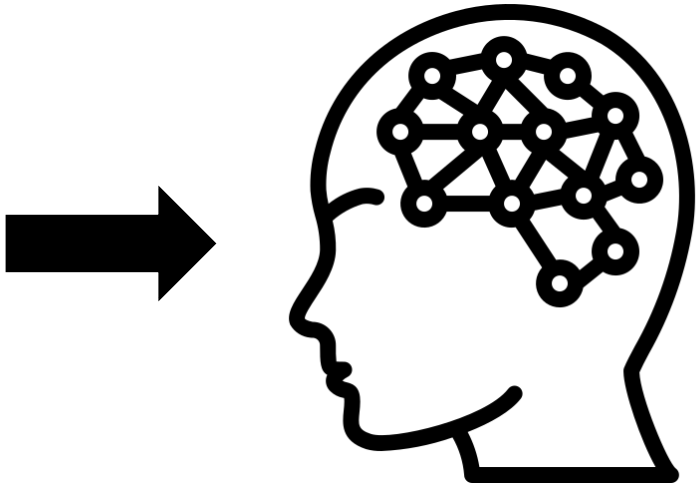


Computer Vision Deep Learning 예제

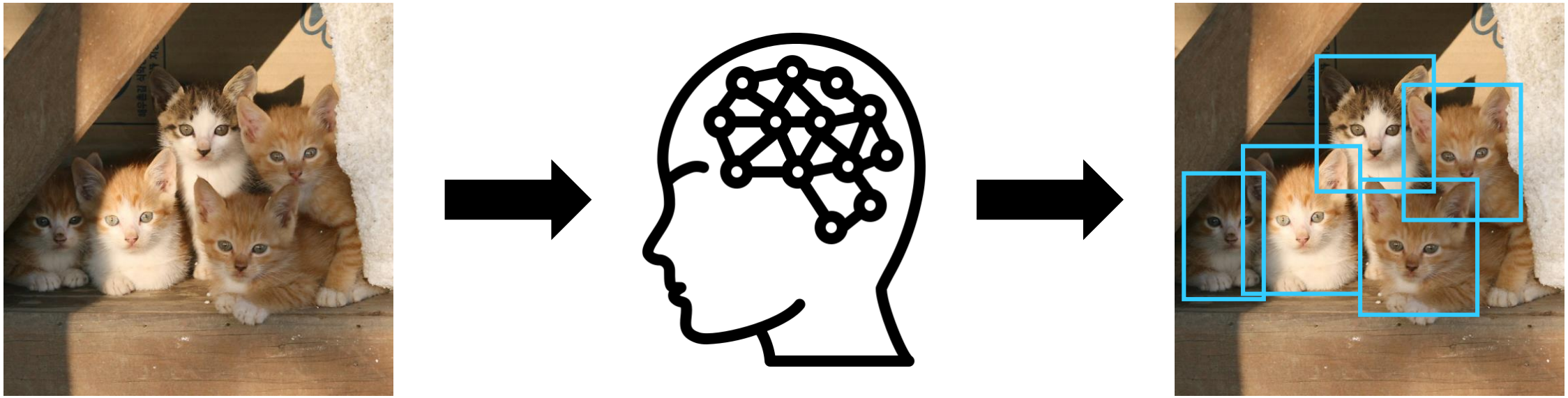


Classification

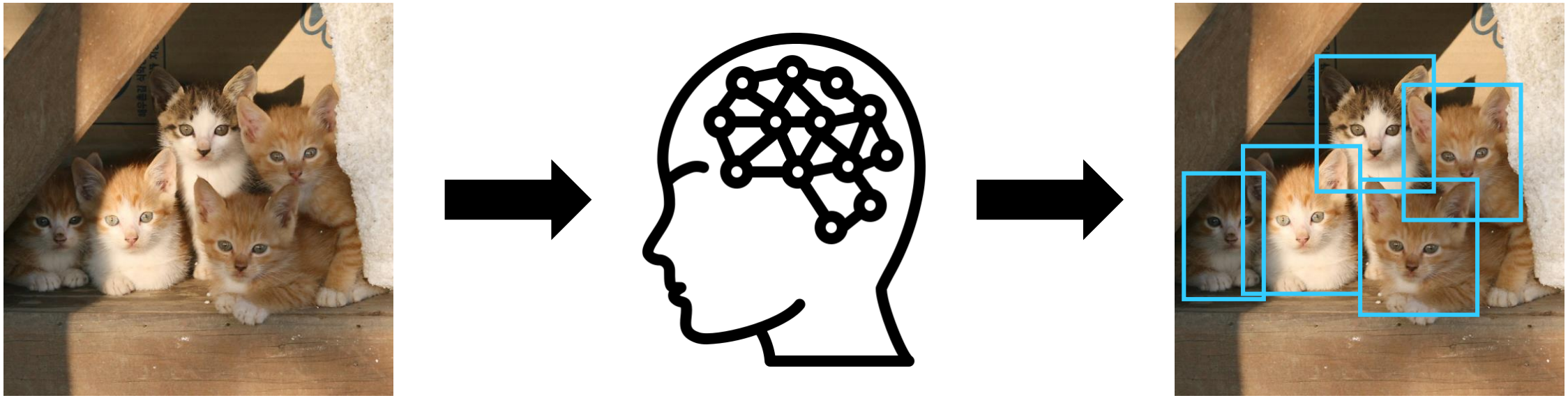
Computer Vision Deep Learning 예제



Computer Vision Deep Learning 예제

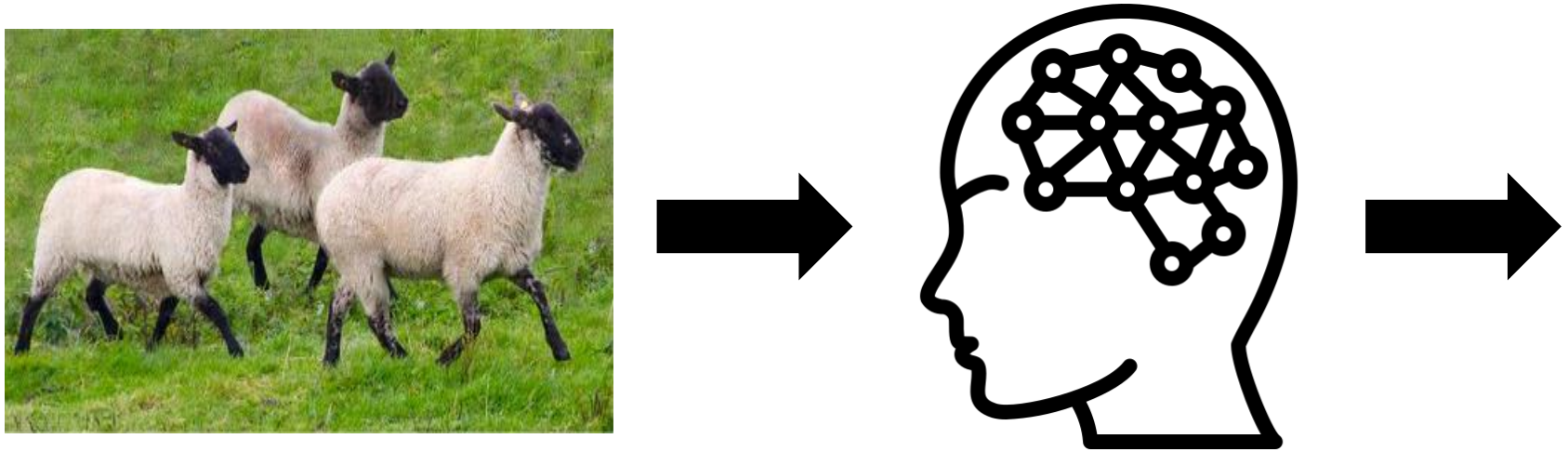


Computer Vision Deep Learning 예제

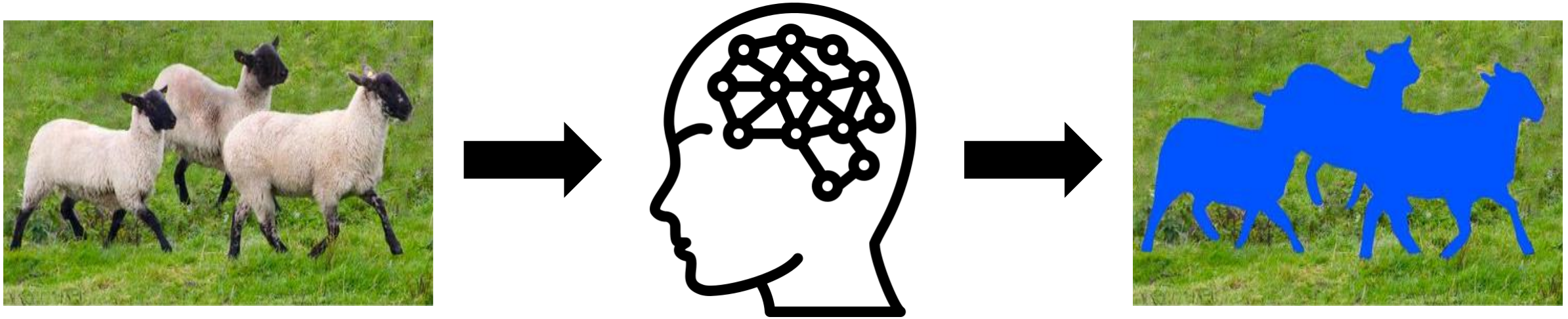


Object Detection

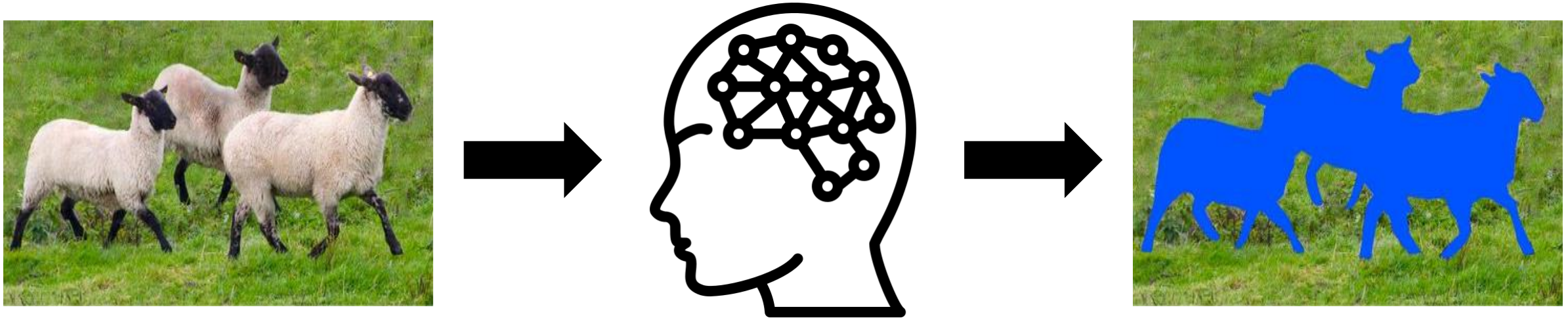
Computer Vision Deep Learning 예제



Computer Vision Deep Learning 예제

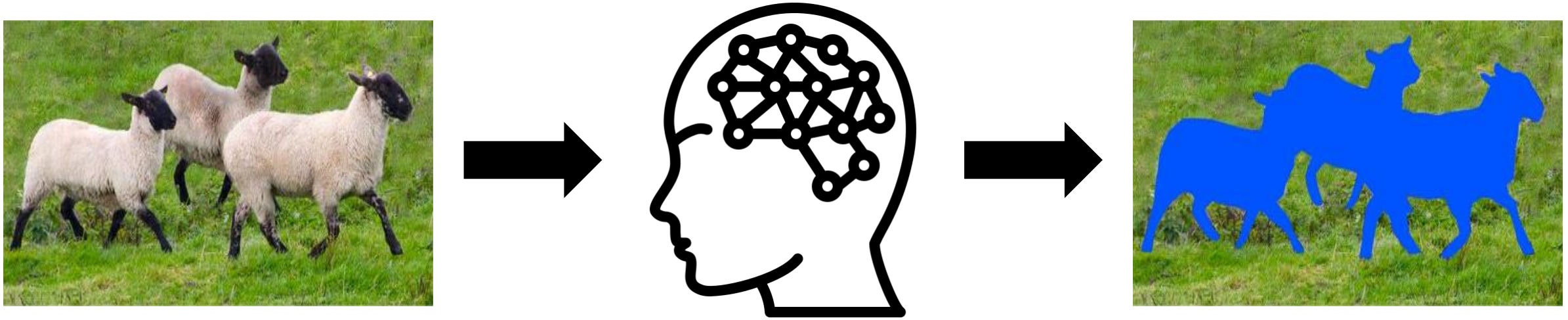


Computer Vision Deep Learning 예제



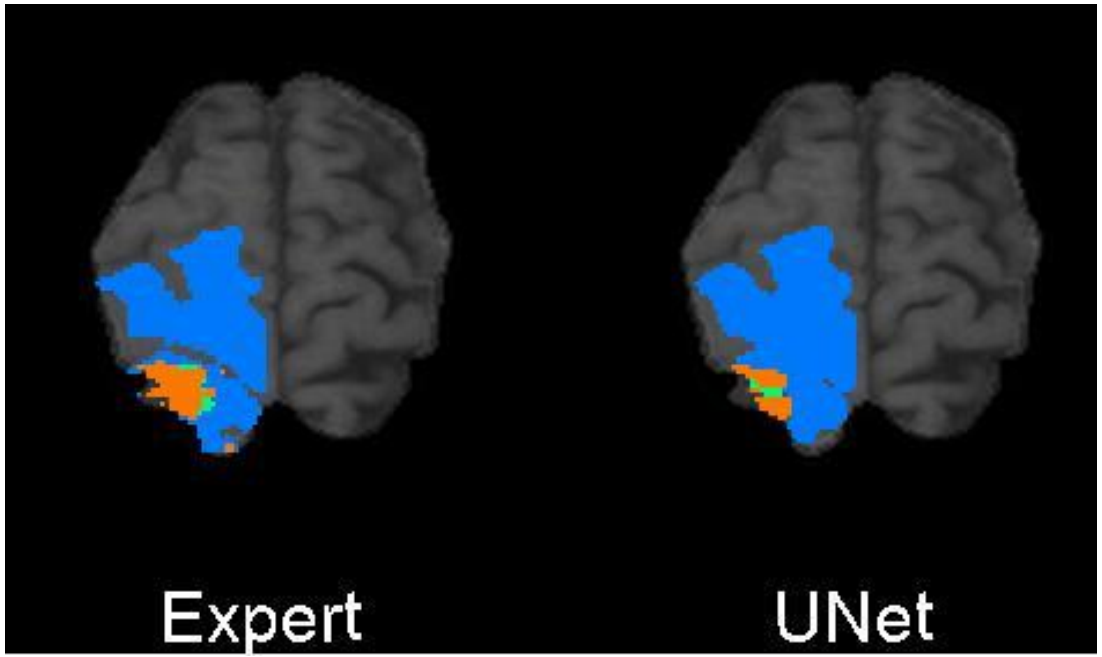
Segmentation

Computer Vision Deep Learning 예제



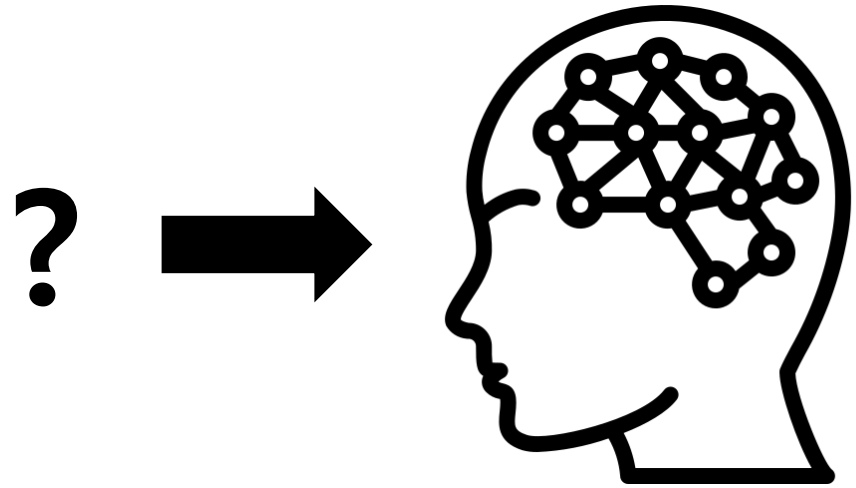
Segmentation

Computer Vision Deep Learning 예제

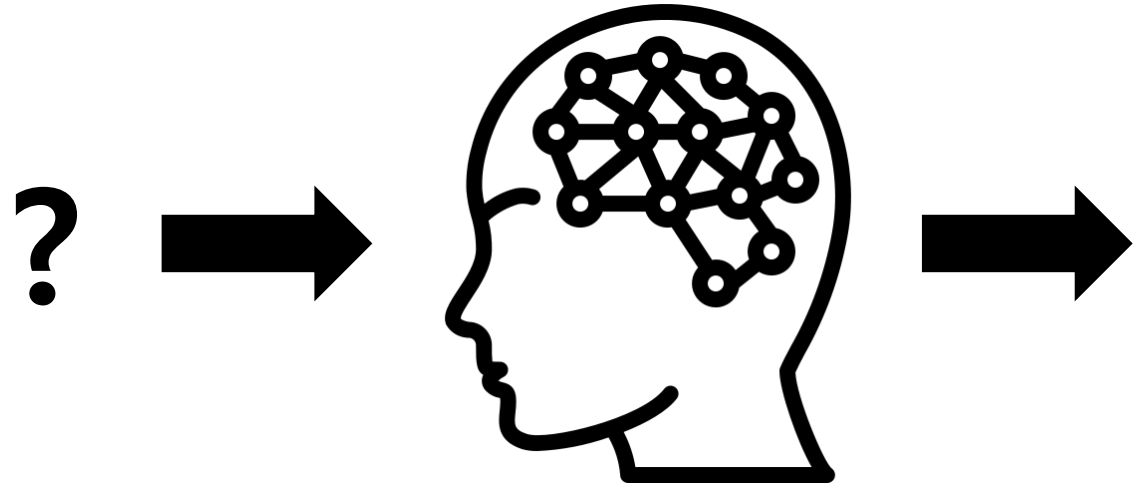


Brain Tumor Segmentation

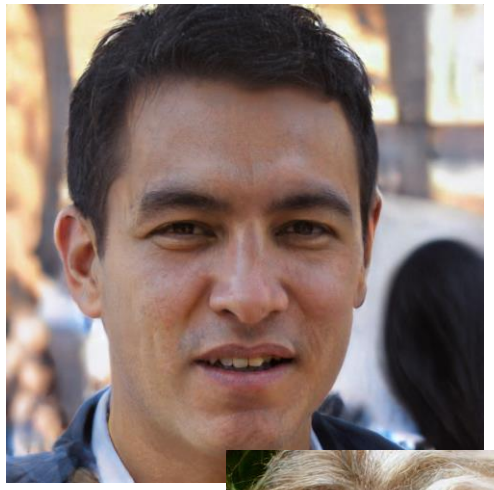
Computer Vision Deep Learning 예제



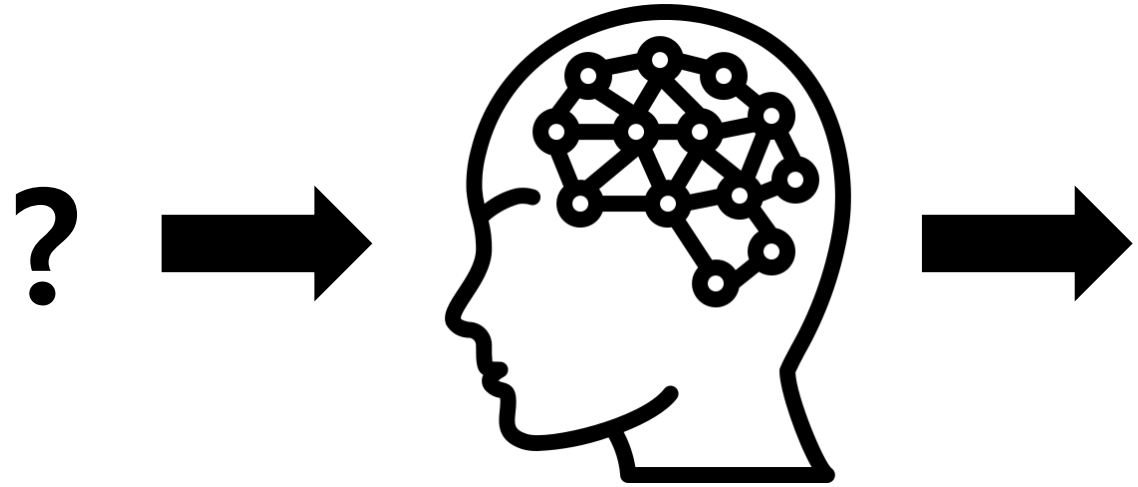
Computer Vision Deep Learning 예제



https://thispersondoesnotexist.com/

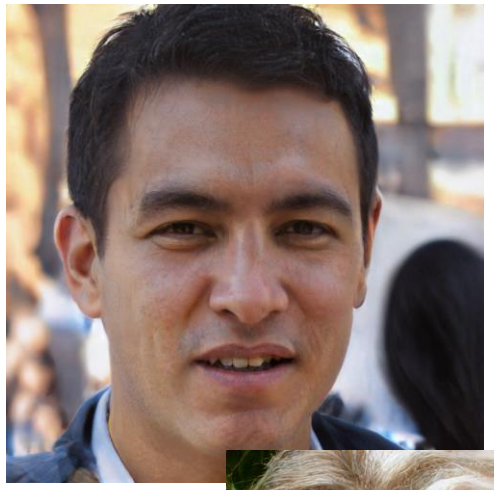


Computer Vision Deep Learning 예제

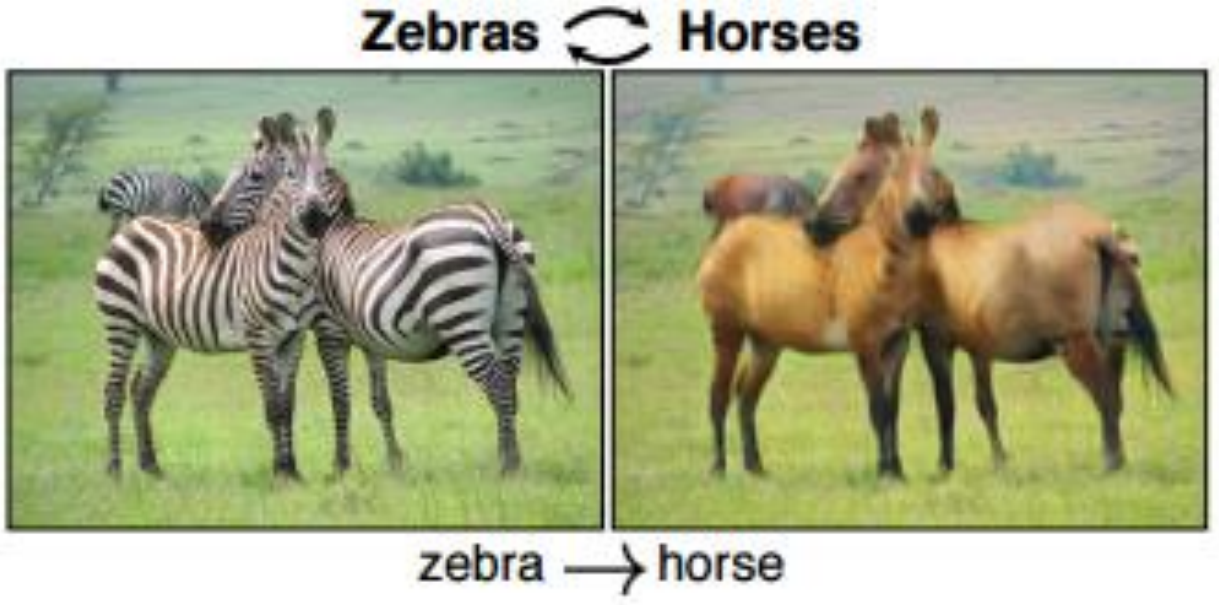


Generation

https://thispersondoesnotexist.com/



Computer Vision Deep Learning 예제



CycleGAN

Computer Vision Deep Learning 예제

(b) Handbag images (input) & **Generated** shoe images (output)

DiscoGAN

Computer Vision Deep Learning 예제

앞선 모든 예시에서 사용된 모델

Computer Vision Deep Learning 예제

앞선 모든 예시에서 사용된 모델

CNN (Convolutional Neural Network)

CNN

CNN (Convolutional Neural Network)

Convolutional Neural Network

CNN (Convolutional Neural Network)

Convolutional Neural Network

신경망

CNN (Convolutional Neural Network)

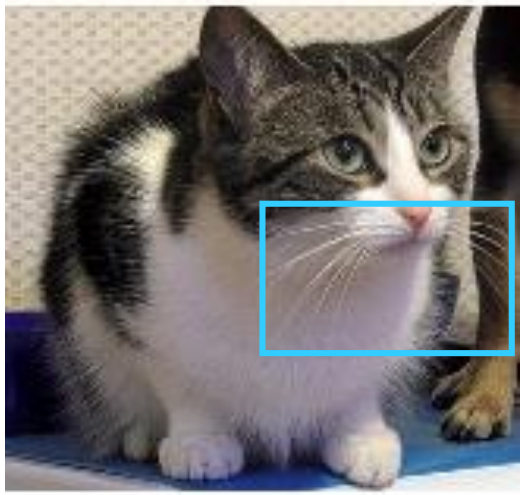
Convolutional Neural Network

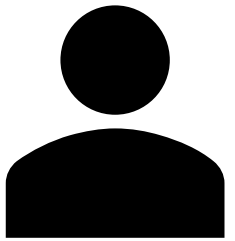
합성곱 신경망

CNN (Convolutional Neural Network)

고양이 vs 강아지

CNN (Convolutional Neural Network)

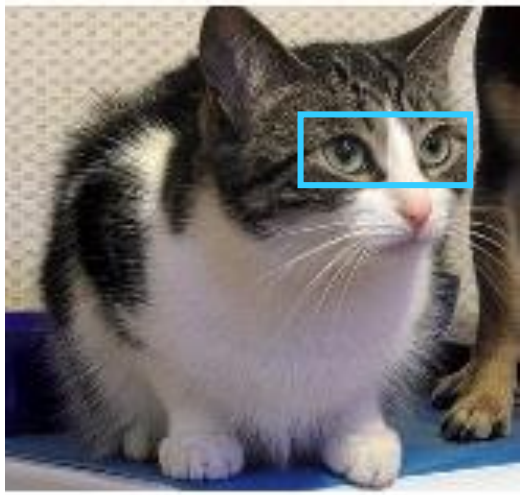




사람

고양이 vs 강아지

CNN (Convolutional Neural Network)



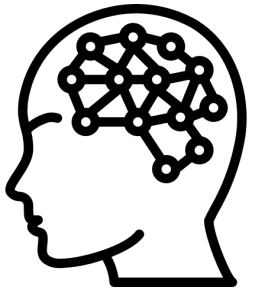
고양이 vs 강아지

CNN (Convolutional Neural Network)

사람

고양이 vs 강아지

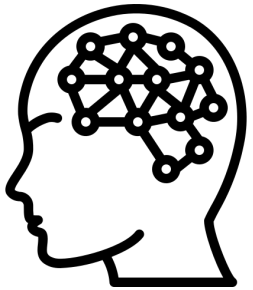
CNN (Convolutional Neural Network)



딥러닝 모델

고양이 vs 강아지

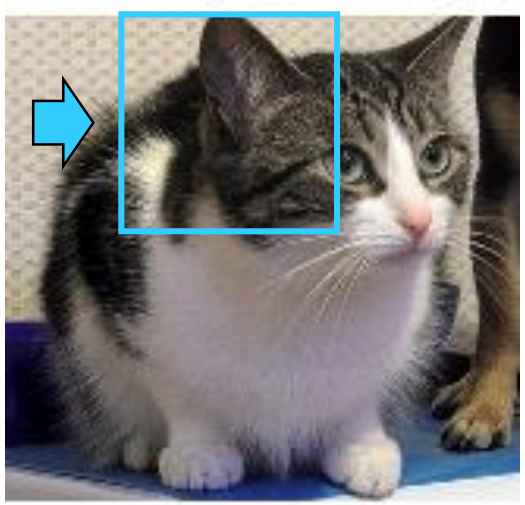
CNN (Convolutional Neural Network)

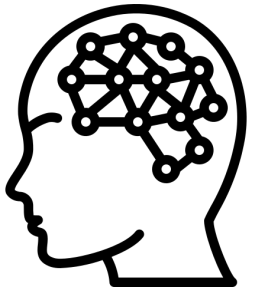


딥러닝 모델

고양이 vs 강아지

CNN (Convolutional Neural Network)

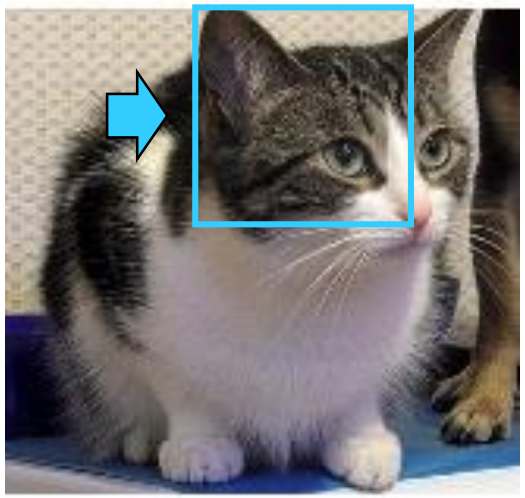


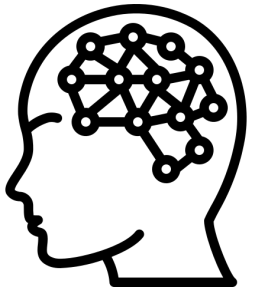


딥러닝 모델

고양이 vs 강아지

CNN (Convolutional Neural Network)

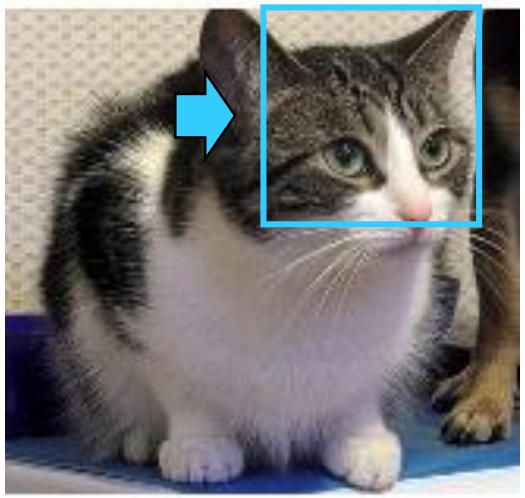


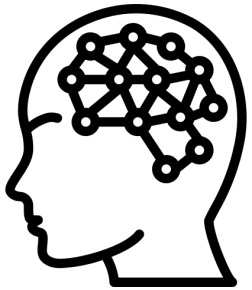


딥러닝 모델

고양이 vs 강아지

CNN (Convolutional Neural Network)

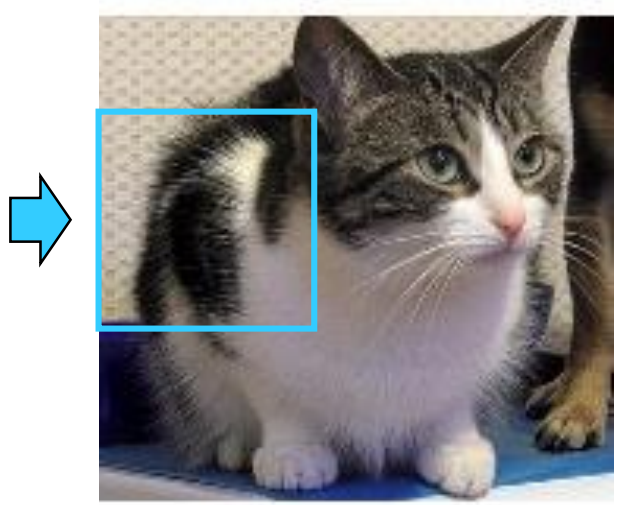


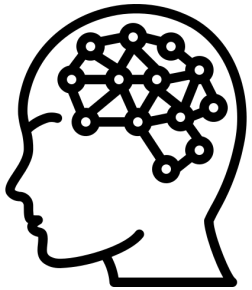


딥러닝 모델

고양이 vs 강아지

CNN (Convolutional Neural Network)

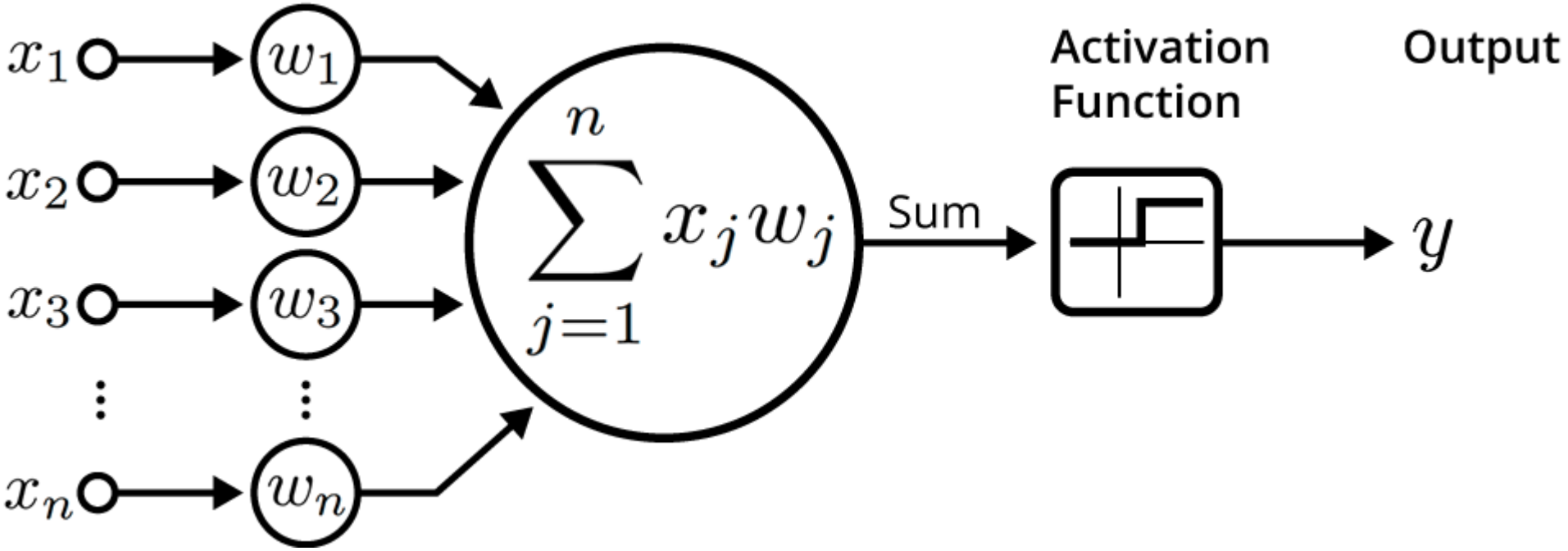




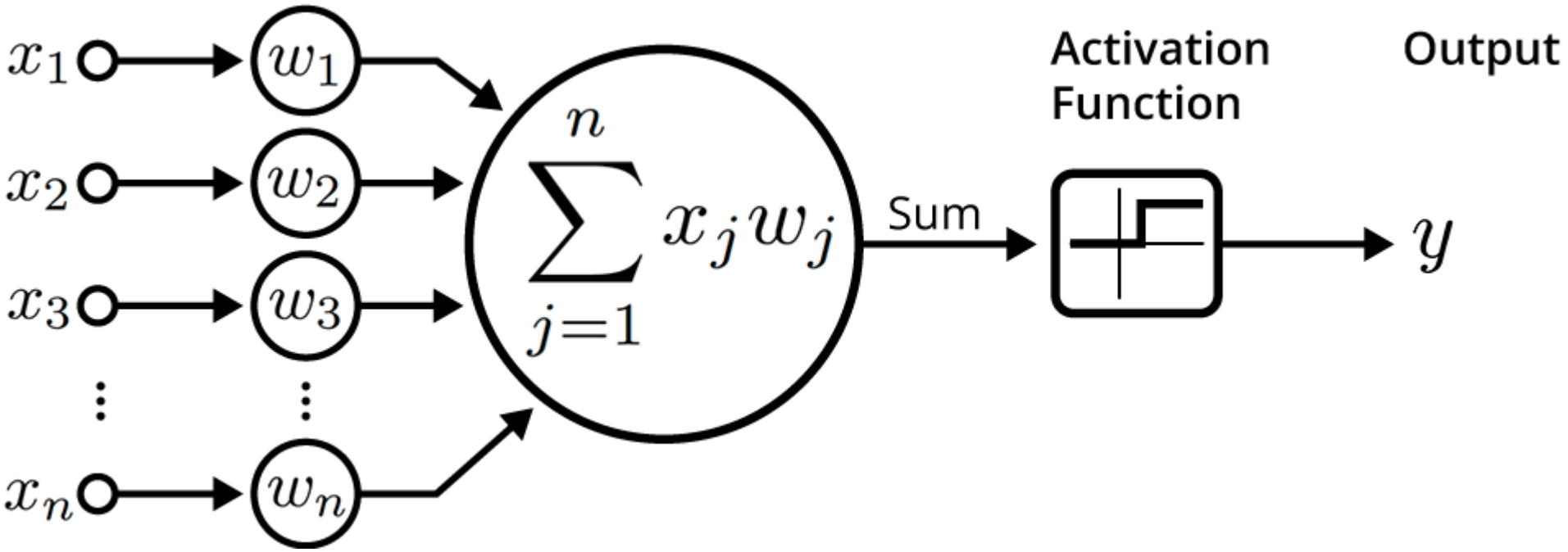
딥러닝 모델

고양이 vs 강아지

CNN (Convolutional Neural Network)

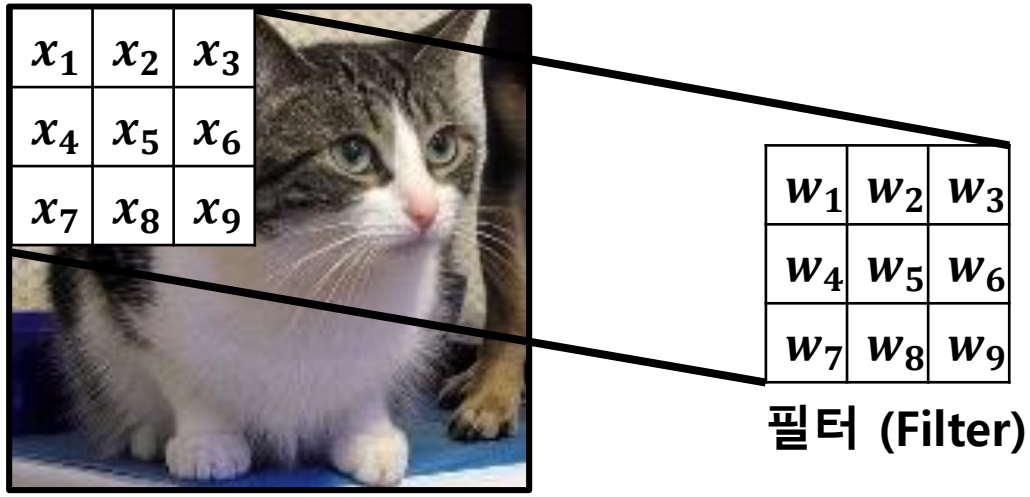


CNN (Convolutional Neural Network)



$$x_1 \cdot w_1 + x_2 \cdot w_2 + x_3 \cdot w_3 + \cdots + x_n \cdot w_n$$

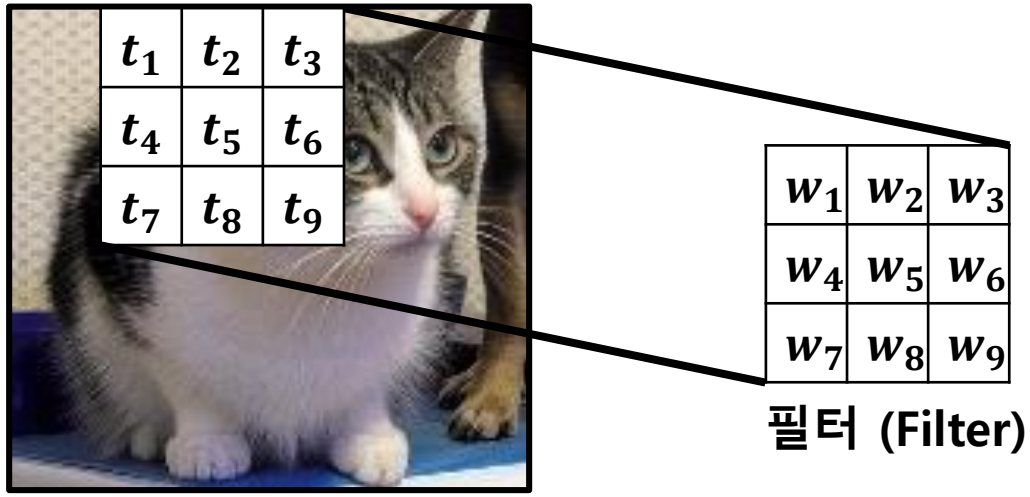
CNN (Convolutional Neural Network)



$$= x_1 \cdot w_1 + x_2 \cdot w_2 + x_3 \cdot w_3 + \cdots + x_9 \cdot w_9$$

$$= a_1$$

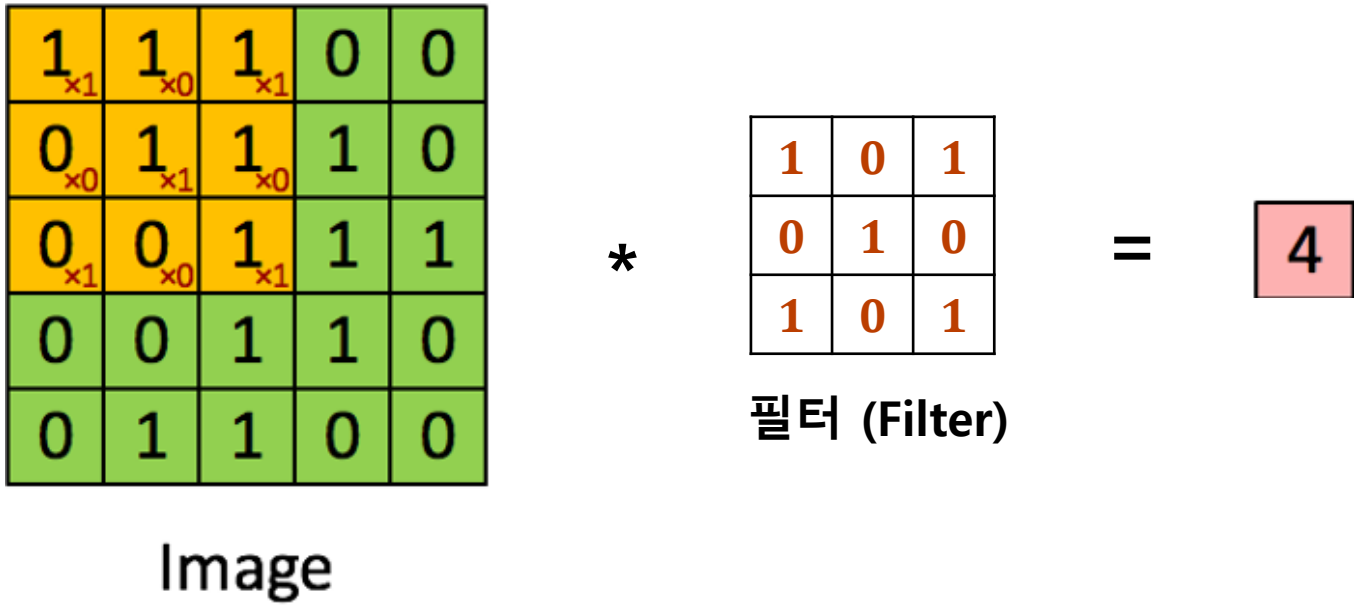
CNN (Convolutional Neural Network)



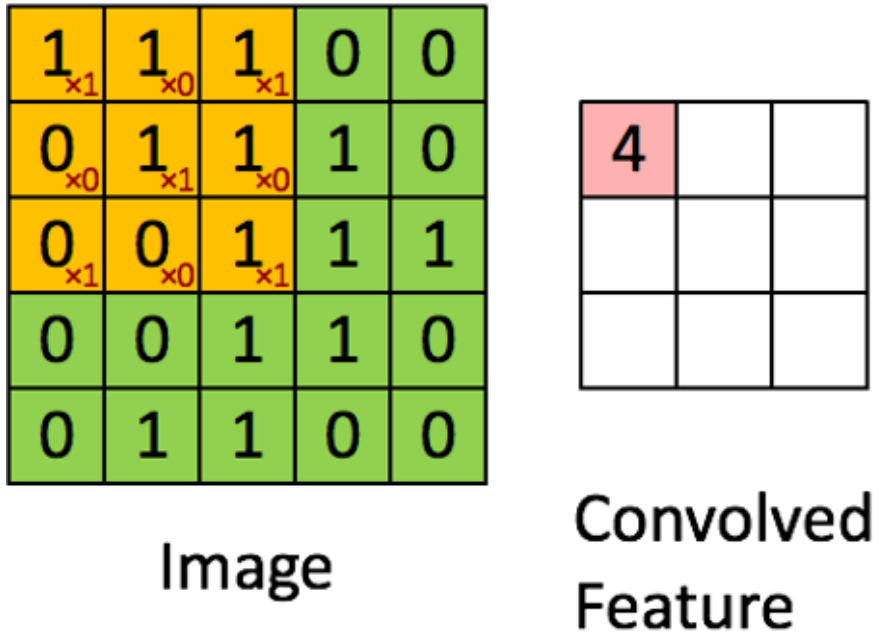
$$= t_1 \cdot w_1 + t_2 \cdot w_2 + t_3 \cdot w_3 + \cdots + t_9 \cdot w_9$$

$$= a_2$$

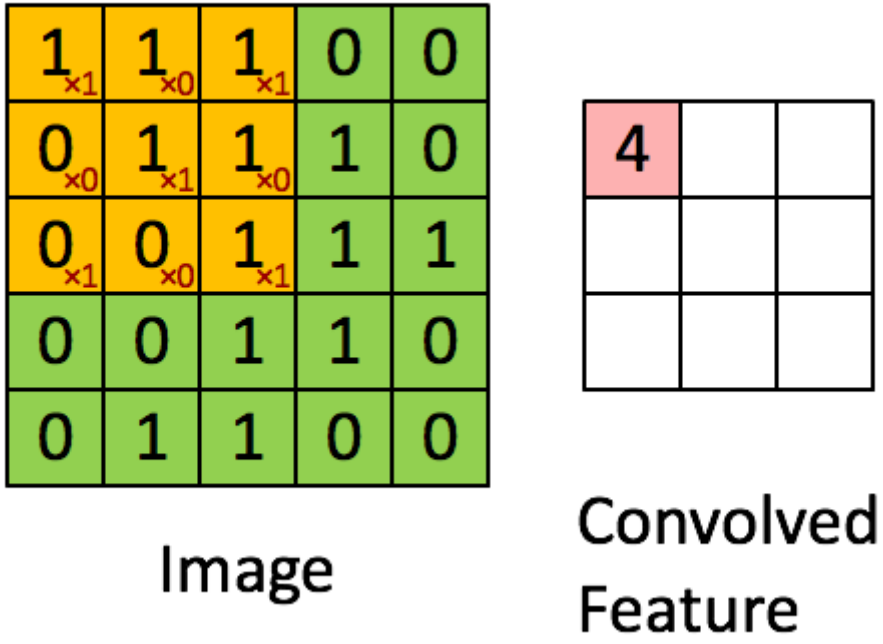
CNN (Convolutional Neural Network)



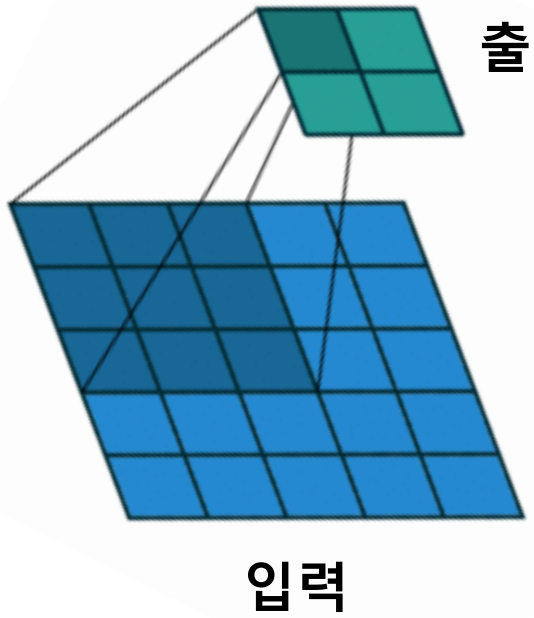
CNN (Convolutional Neural Network)



CNN (Convolutional Neural Network)



CNN (Convolutional Neural Network)



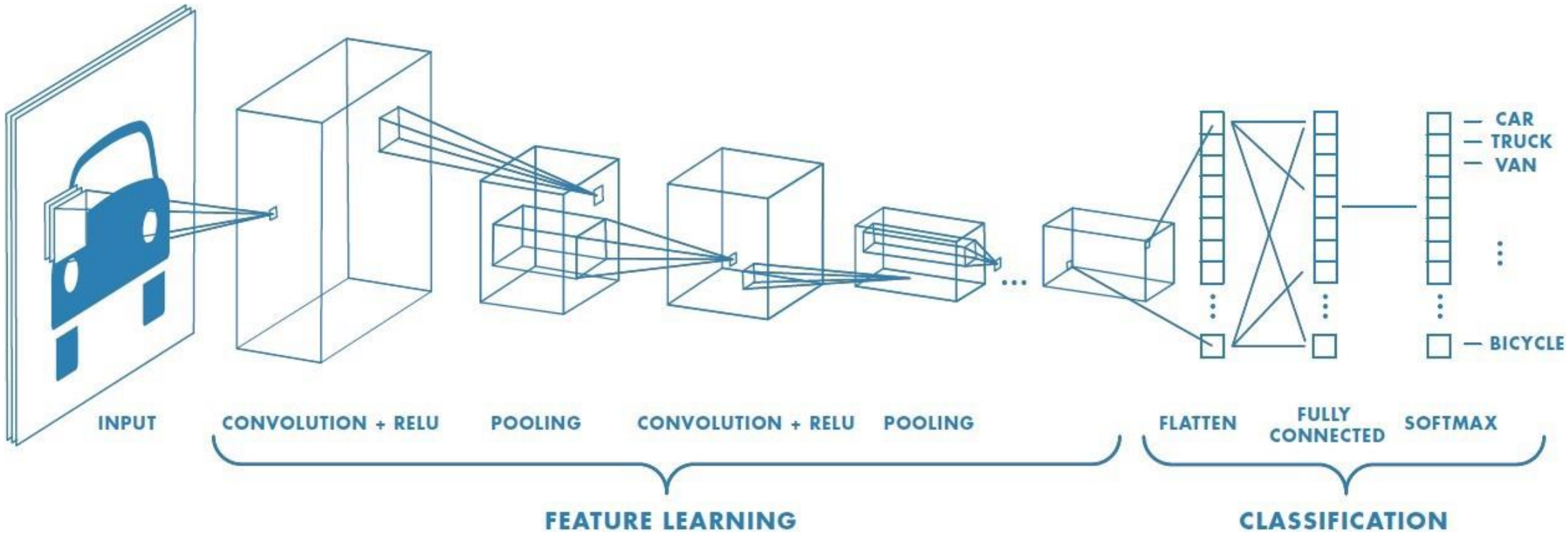
CNN (Convolutional Neural Network)

입력과 출력이 이미지(벡터)

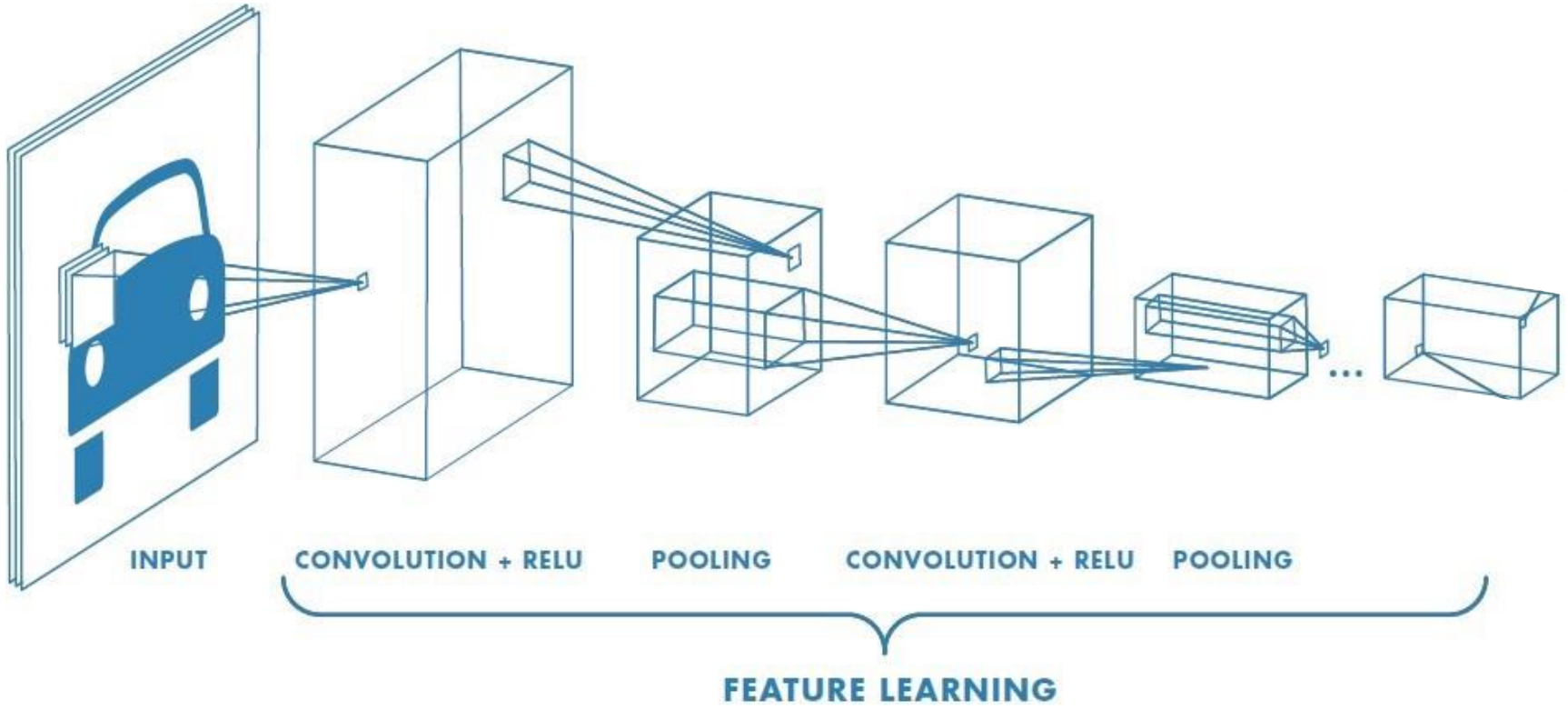
CNN (Convolutional Neural Network)

입력과 출력이 이미지(벡터)
가중치로 구성된 필터를 이용

CNN (Convolutional Neural Network)

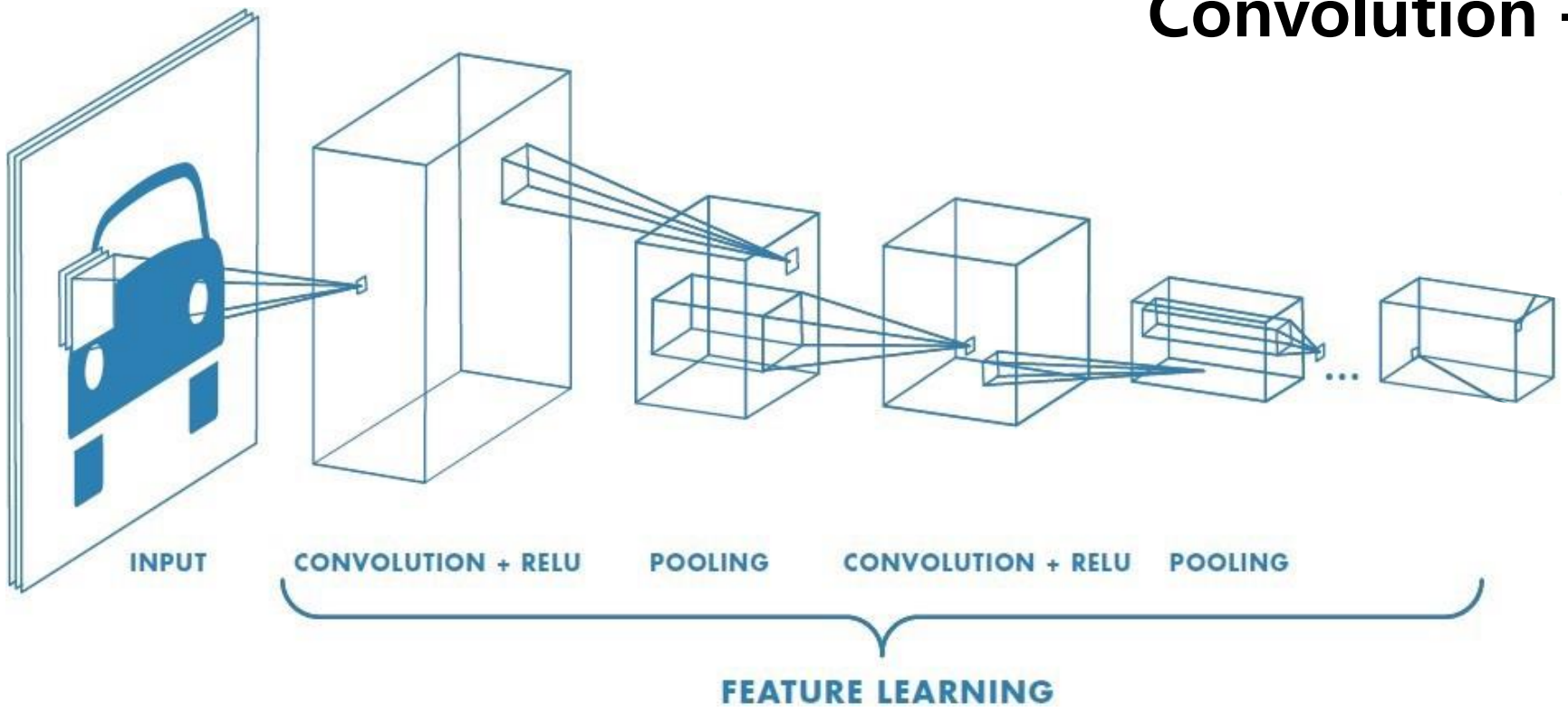


CNN (Convolutional Neural Network)



CNN (Convolutional Neural Network)

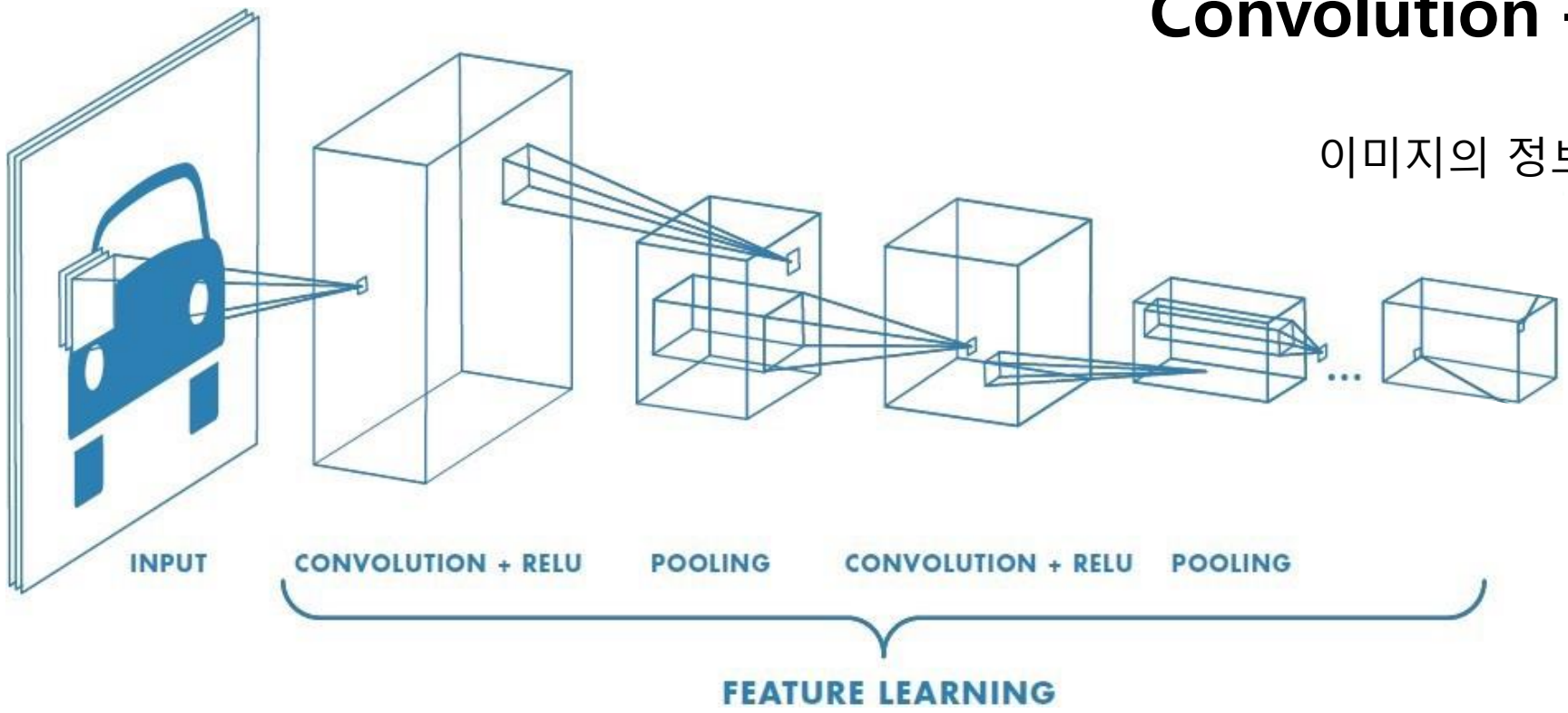
Convolution – Pooling Layers



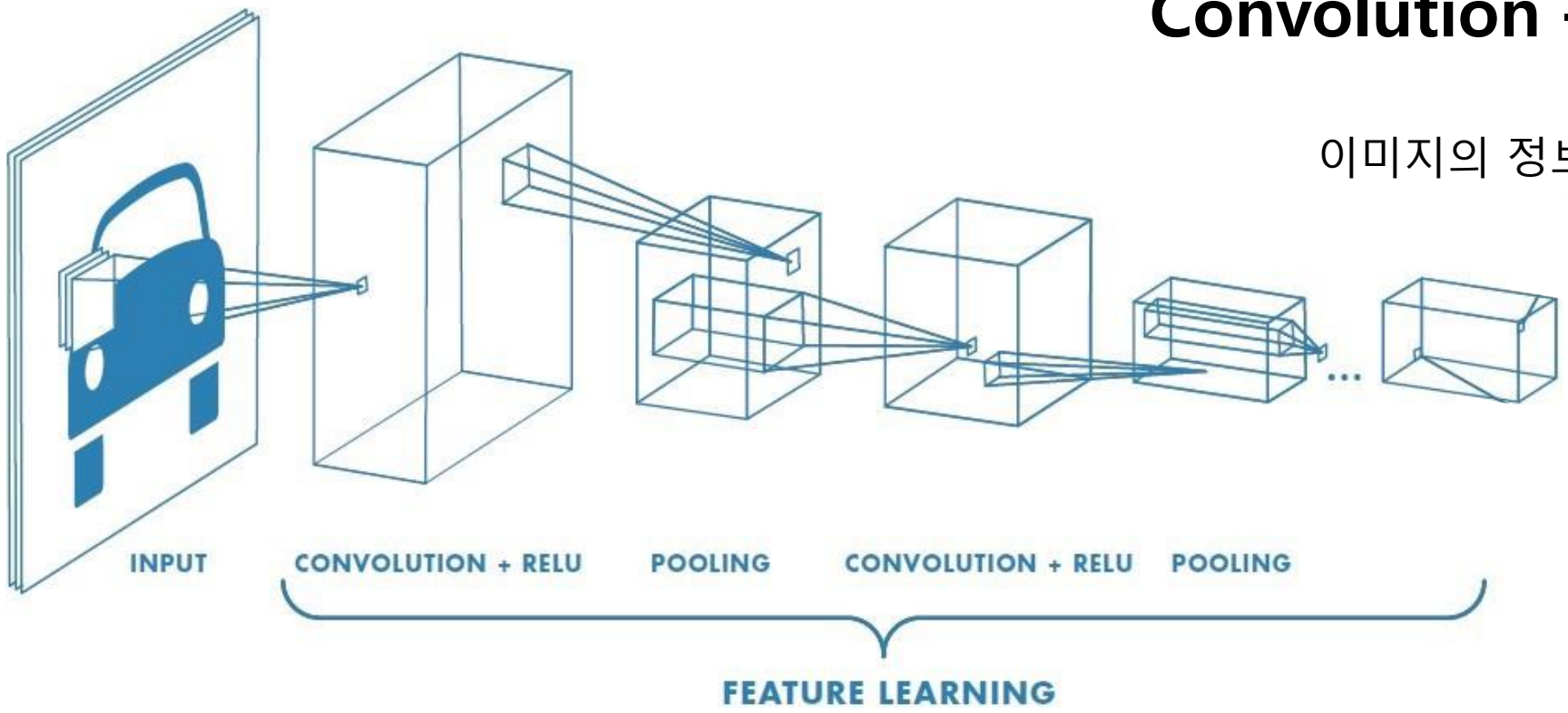
CNN (Convolutional Neural Network)

Convolution – Pooling Layers

이미지의 정보(feature)를 얻어내는 과정



CNN (Convolutional Neural Network)

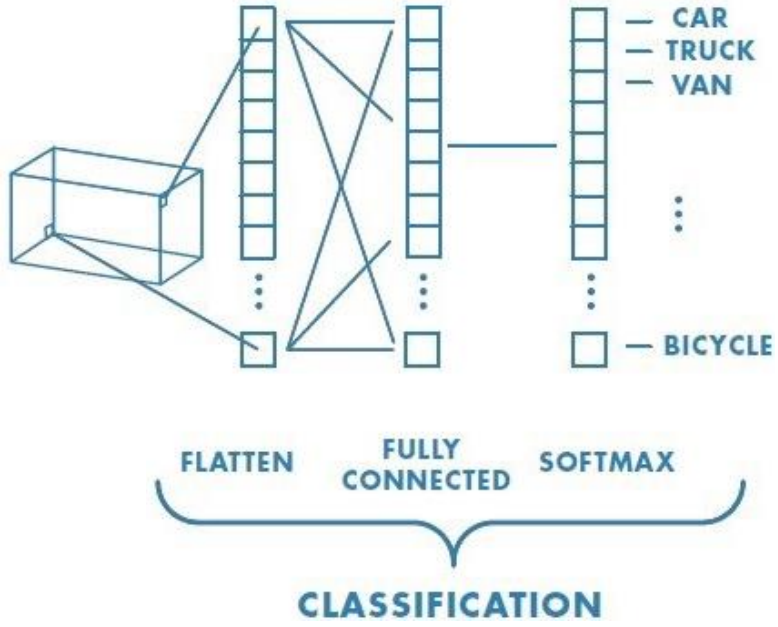


Convolution – Pooling Layers

이미지의 정보(feature)를 얻어내는 과정

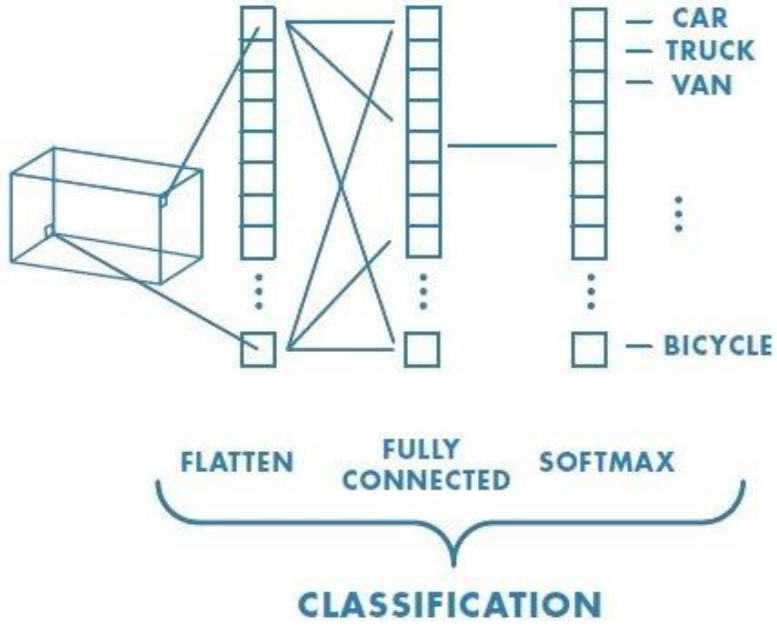
= 인코더 (Encoder) 부분

CNN (Convolutional Neural Network)



CNN (Convolutional Neural Network)

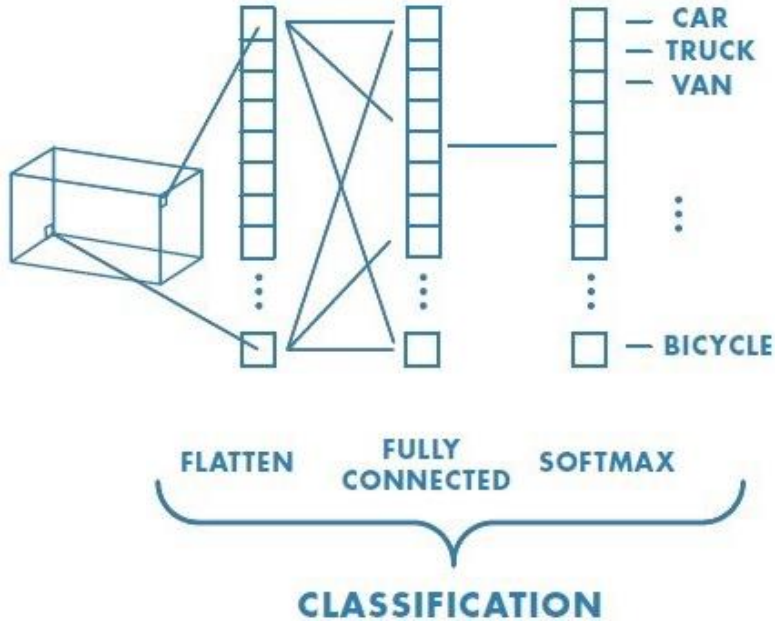
Fully-Connected Layer



CNN (Convolutional Neural Network)

Fully-Connected Layer

Encoder에서 얻어낸 값들을 통해 최종 결과를 도출하는 과정

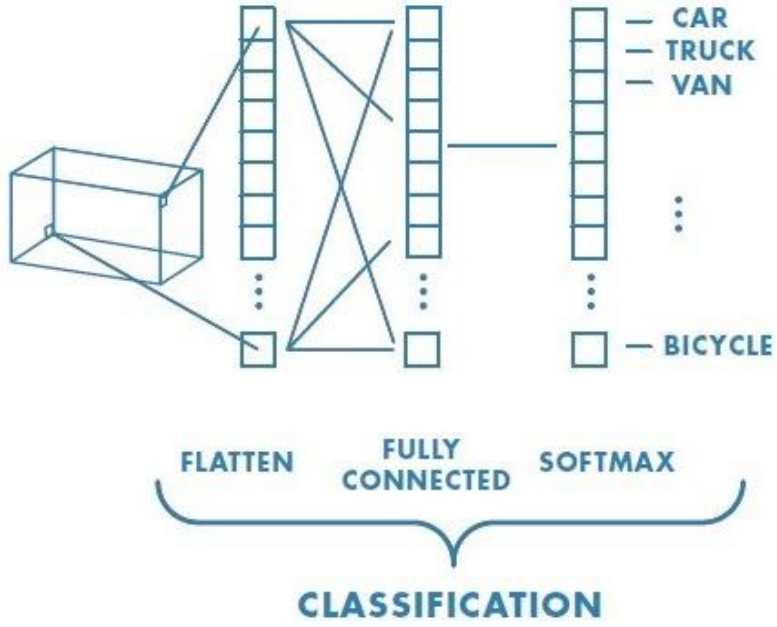


CNN (Convolutional Neural Network)

Fully-Connected Layer

Encoder에서 얻어낸 값들을 통해 최종 결과를 도출하는 과정

= 단순히 선형 레이어를 쌓은 형태



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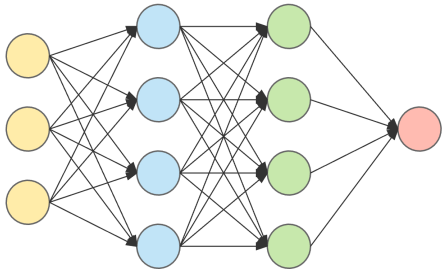
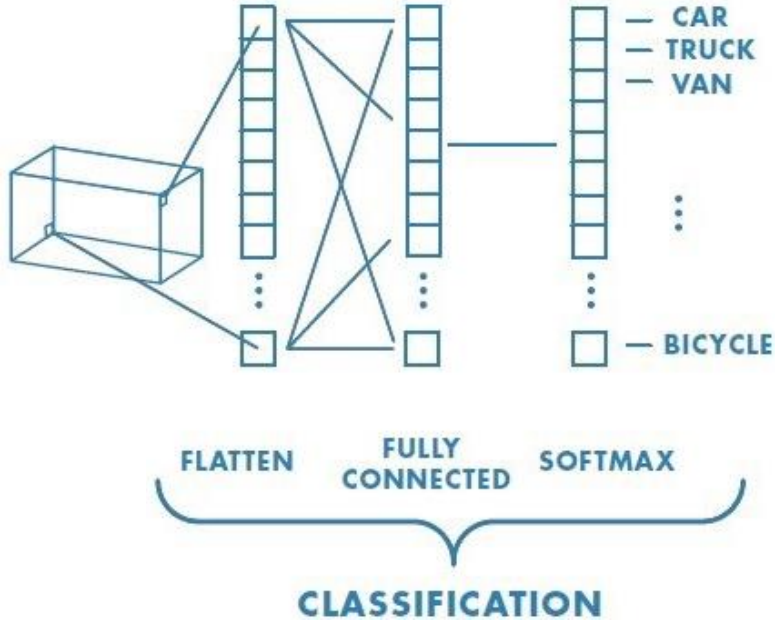
Encoder에서 얻어낸 값들을 통해 최종 결과를 도출하는 과정

= 단순히 선형 레이어를 쌓은 형태

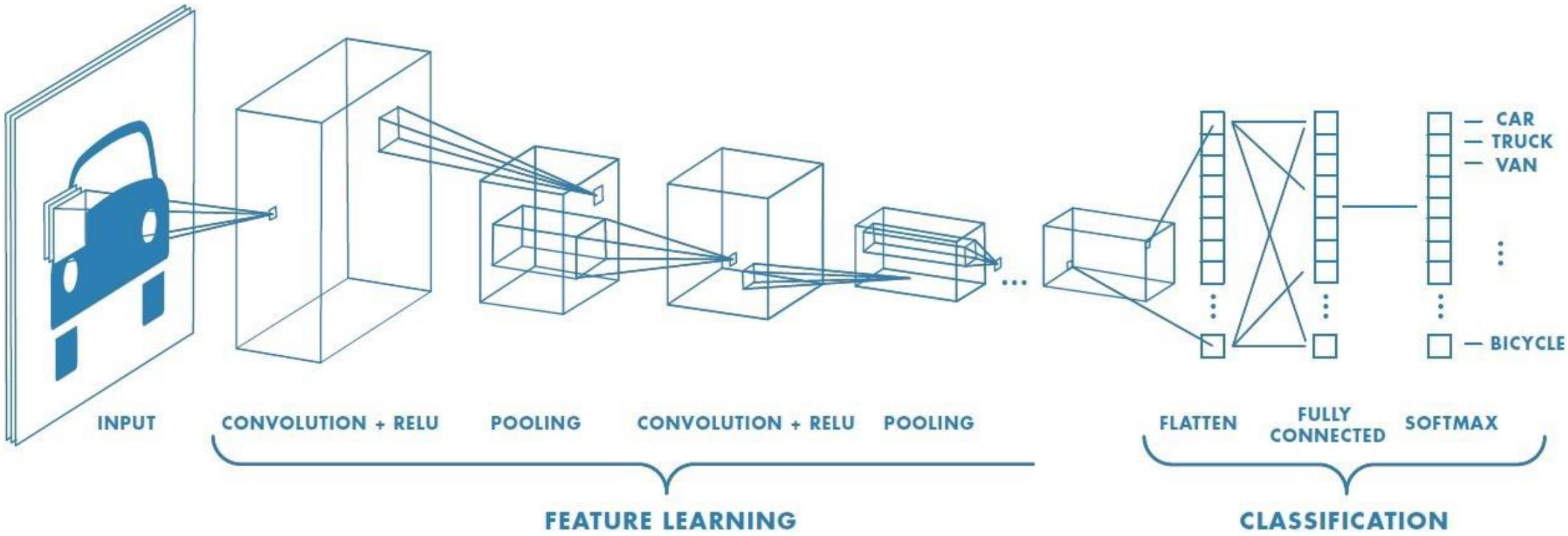
= MLP (Multi Layer Perceptron)



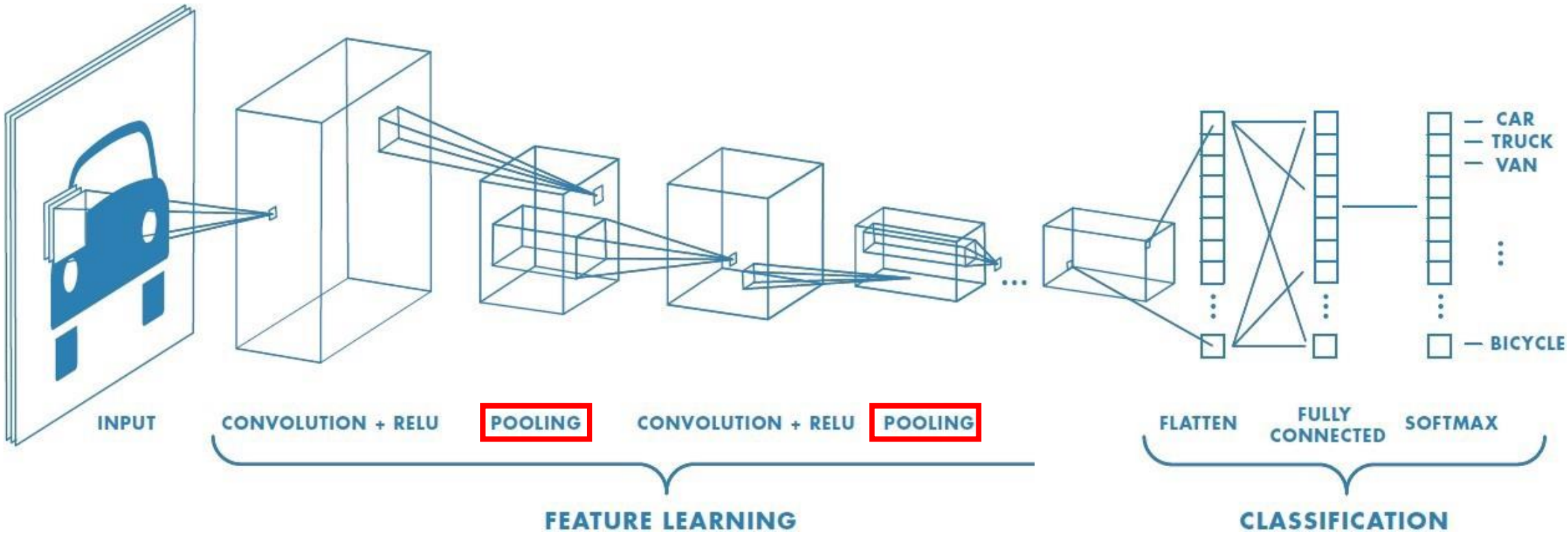


CNN 용어

CNN 용어


CAR
TRUCK
VAN
BICYCLE
INPUT
CONVOLUTION + RELU
POOLING
CONVOLUTION + RELU
POOLING
FLATTEN
FULLY CONNECTED
SOFTMAX
FEATURE LEARNING
CLASSIFICATION

CNN 용어


CAR
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CONVOLUTION + RELU
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FEATURE LEARNING
CLASSIFICATION

CNN 용어

1. Pooling

CNN 용어

1. Pooling

추출된 특징들 중 필요한 정보만 남도록 서브 샘플링(Sub-sampling)하는 과정

CNN 용어

1. Pooling

추출된 특징들 중 필요한 정보만 남도록 서브 샘플링(Sub-sampling)하는 과정

Ex) Max-pooling, Average-pooling …

CNN 용어

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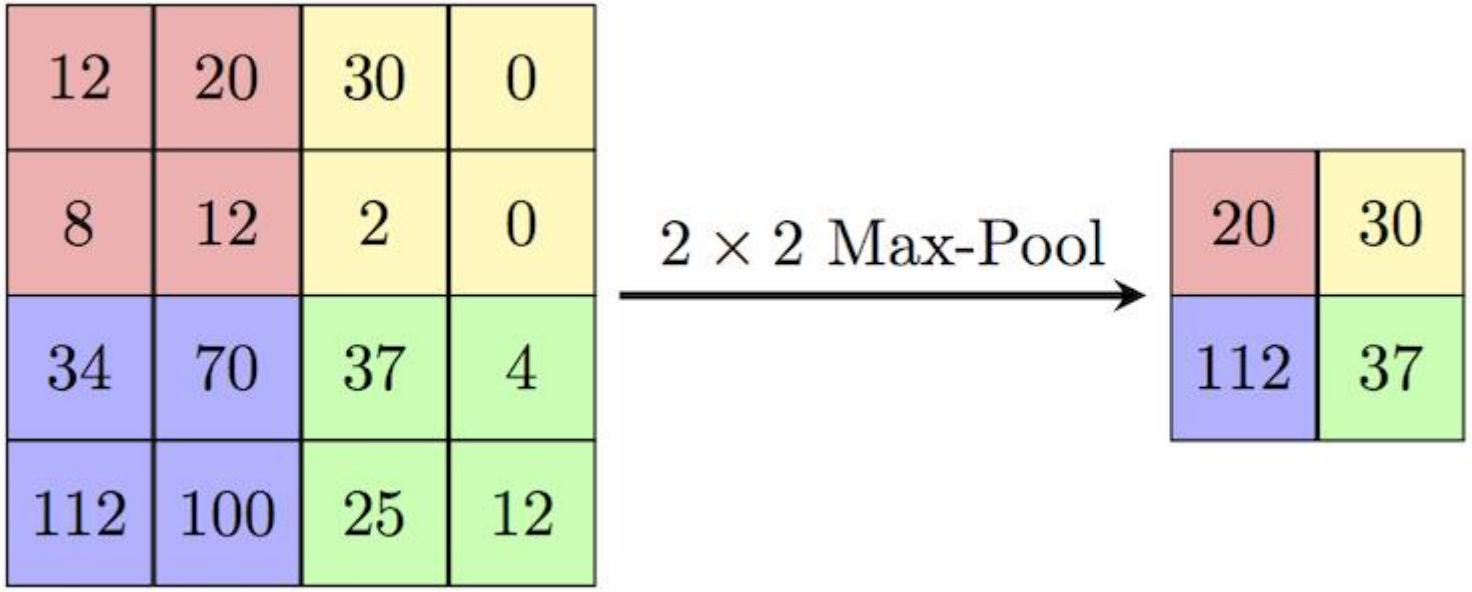
Ex) **Max-pooling**, Average-pooling …



CNN 용어

2. Stride

CNN 용어

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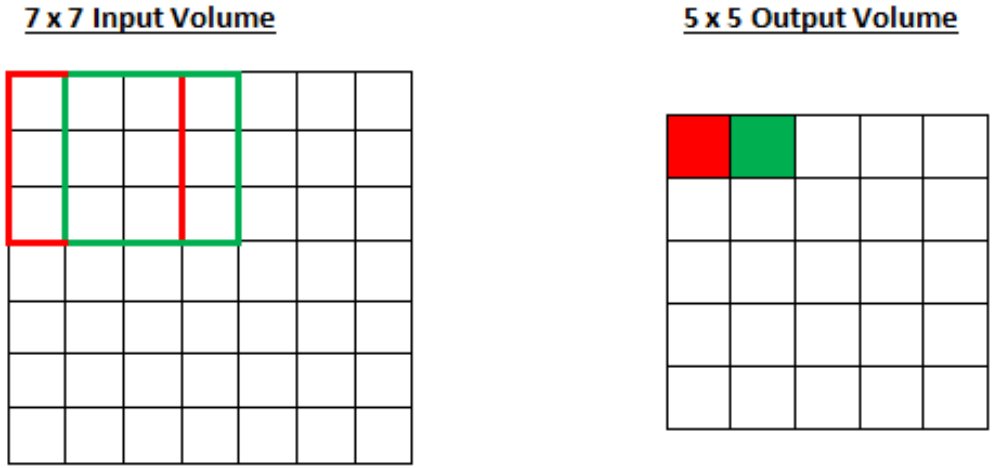
필터가 한번에 이동하는 pixel의 수

CNN 용어

2. Stride

필터가 한번에 이동하는 pixel의 수

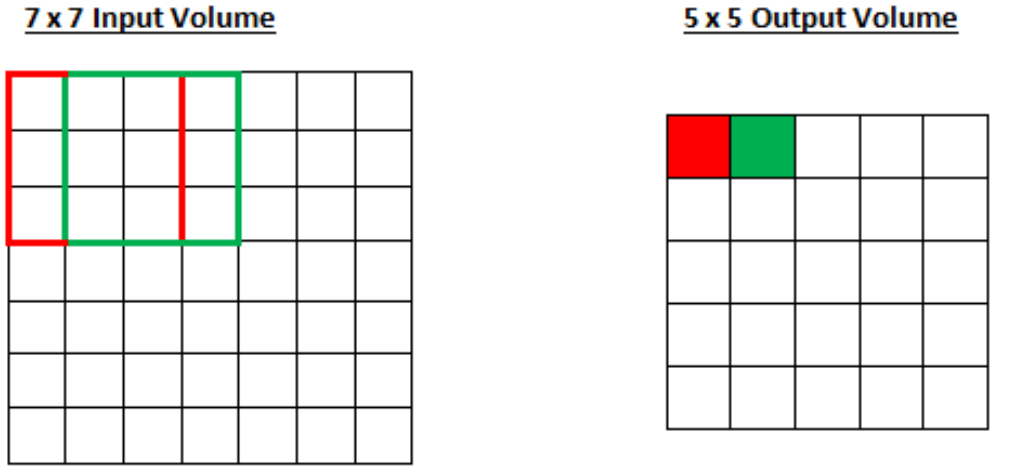


Stride = 1

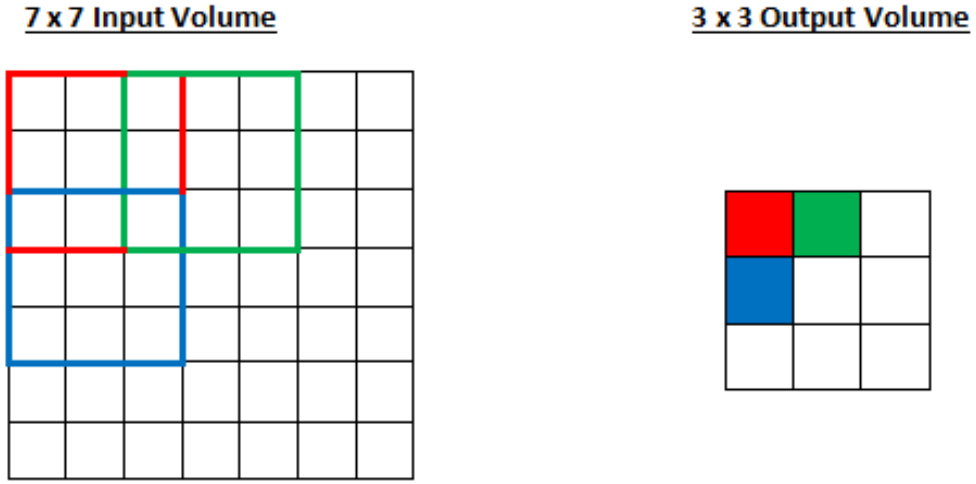
CNN 용어

2. Stride

필터가 한번에 이동하는 pixel의 수



Stride = 1

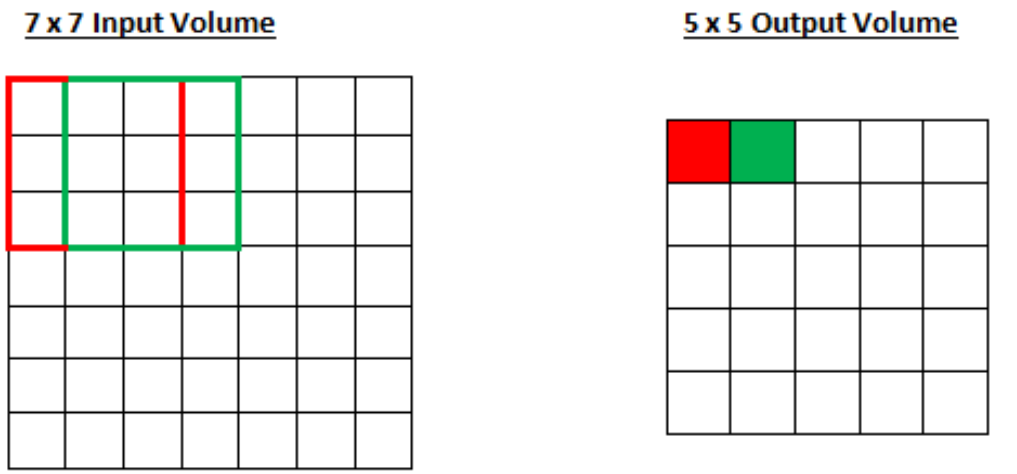


Stride = 2

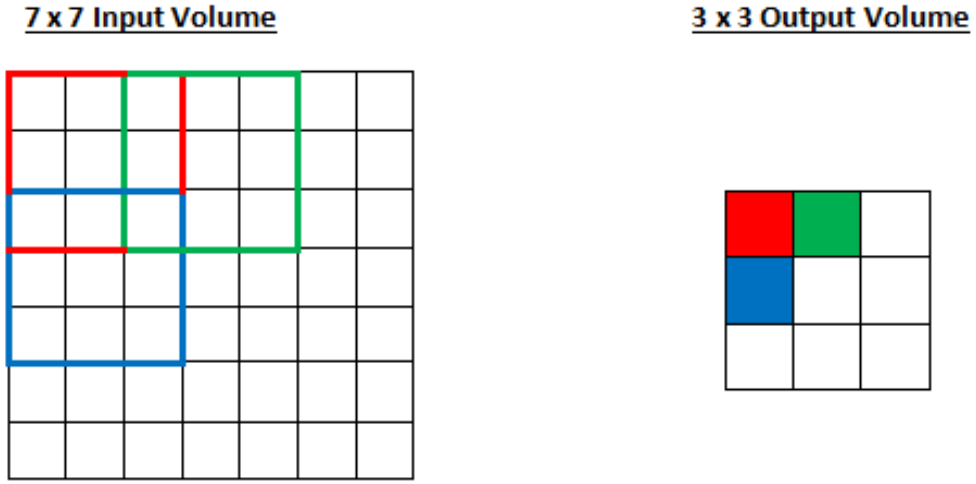
CNN 용어

2. Stride

필터가 한번에 이동하는 pixel의 수 = 출력 이미지의 크기를 결정하는 요소 중 하나



Stride = 1



Stride = 2

CNN 용어

3. Padding

CNN 용어

3. Padding

출력 이미지의 크기를 크게 해주려는 목적

CNN 용어

3. Padding

출력 이미지의 크기를 크게 해주려는 목적

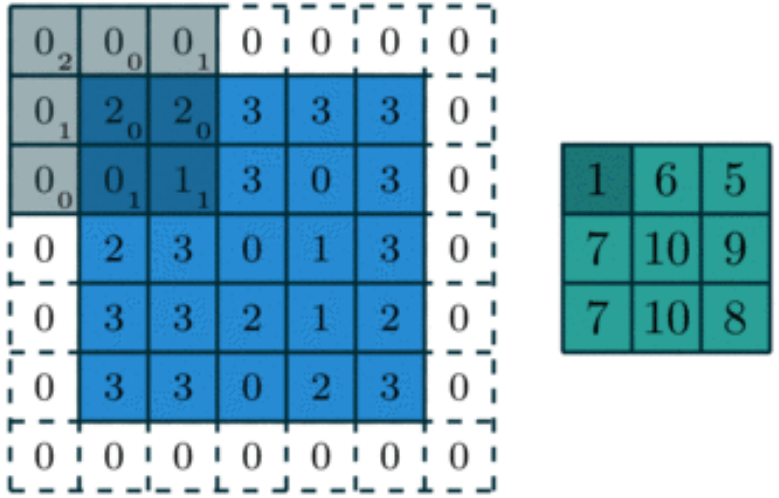
Ex) Zero-padding, Replication-padding, Reflection-padding

CNN 용어

3. Padding

출력 이미지의 크기를 크게 해주려는 목적

Ex) **Zero-padding**, Replication-padding, Reflection-padding



Zero-padding (Filter size = 3, Stride = 2)

GAN
(Generative Adversarial Network)

GAN이란?

Generative Adversarial Network

GAN이란?

Generative Adversarial Network

생성

GAN이란?

Generative Adversarial Network

생성 적대하는

GAN이란?

Generative Adversarial Network

생성 적대하는 네트워크

GAN이란?

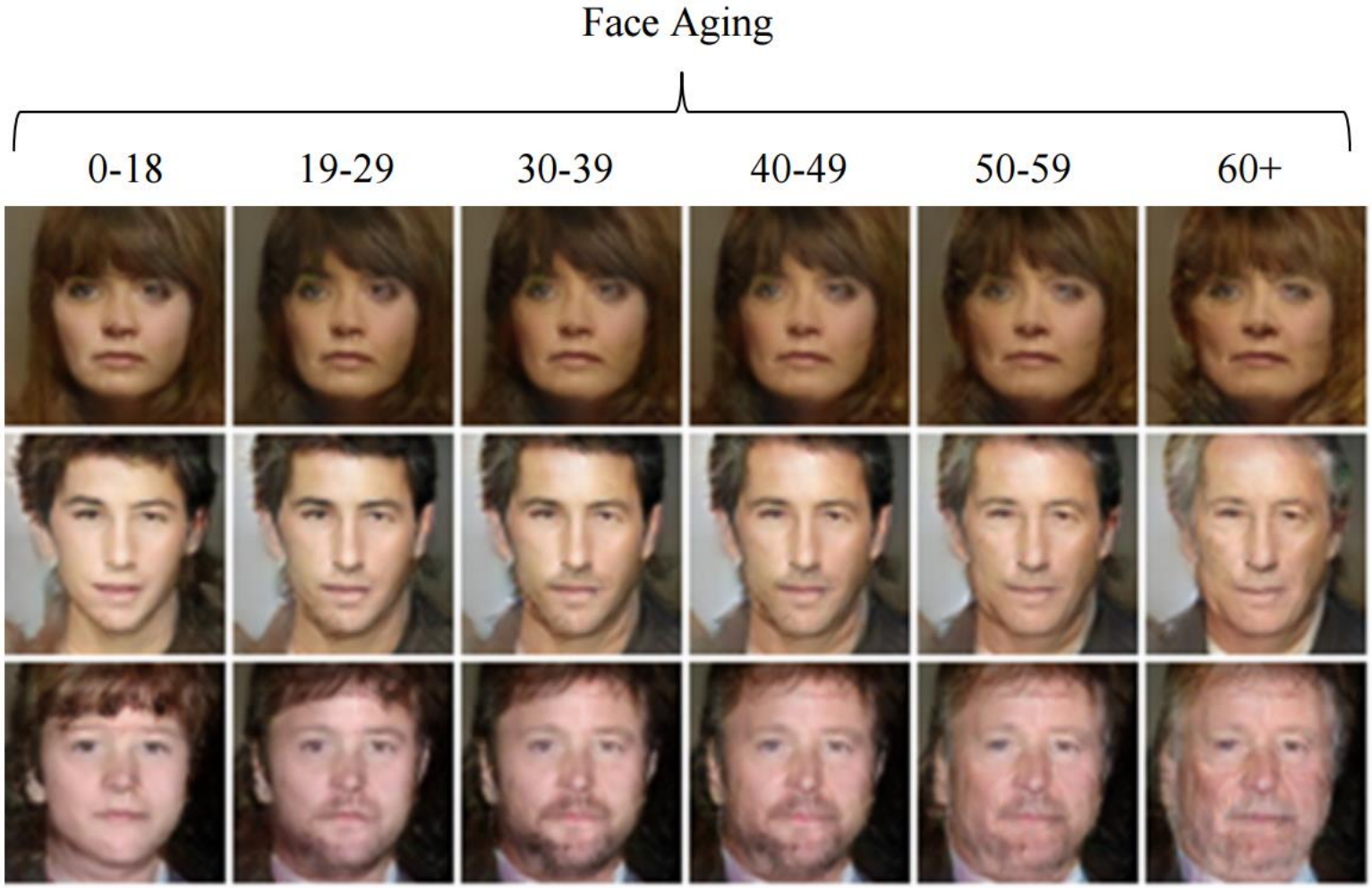
Generative Adversarial Network

생성 적대하는 네트워크

GAN이란? – Generative

Generated Faces

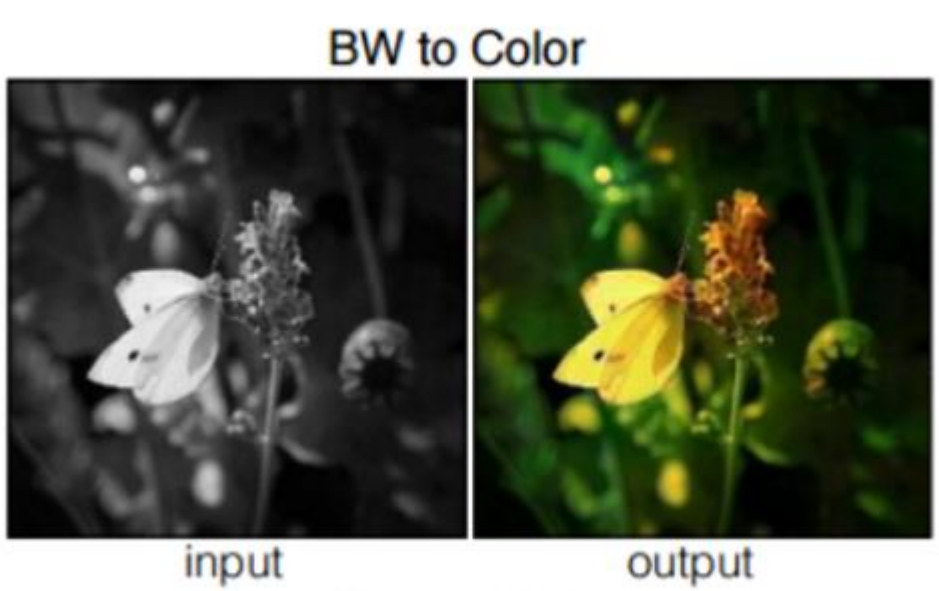
GAN이란? – Generative

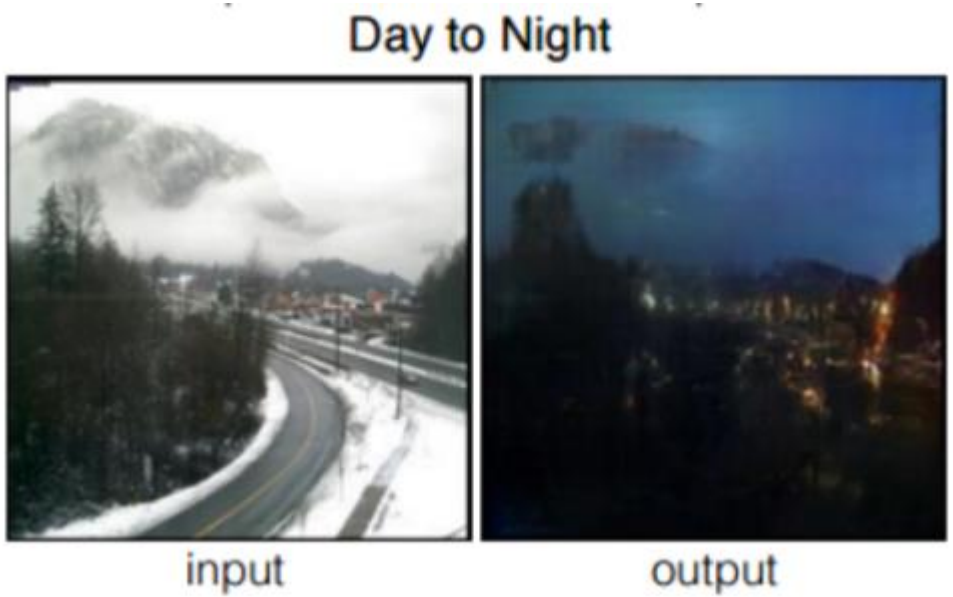


GAN이란? – Generative

Super Resolution (SRGAN)

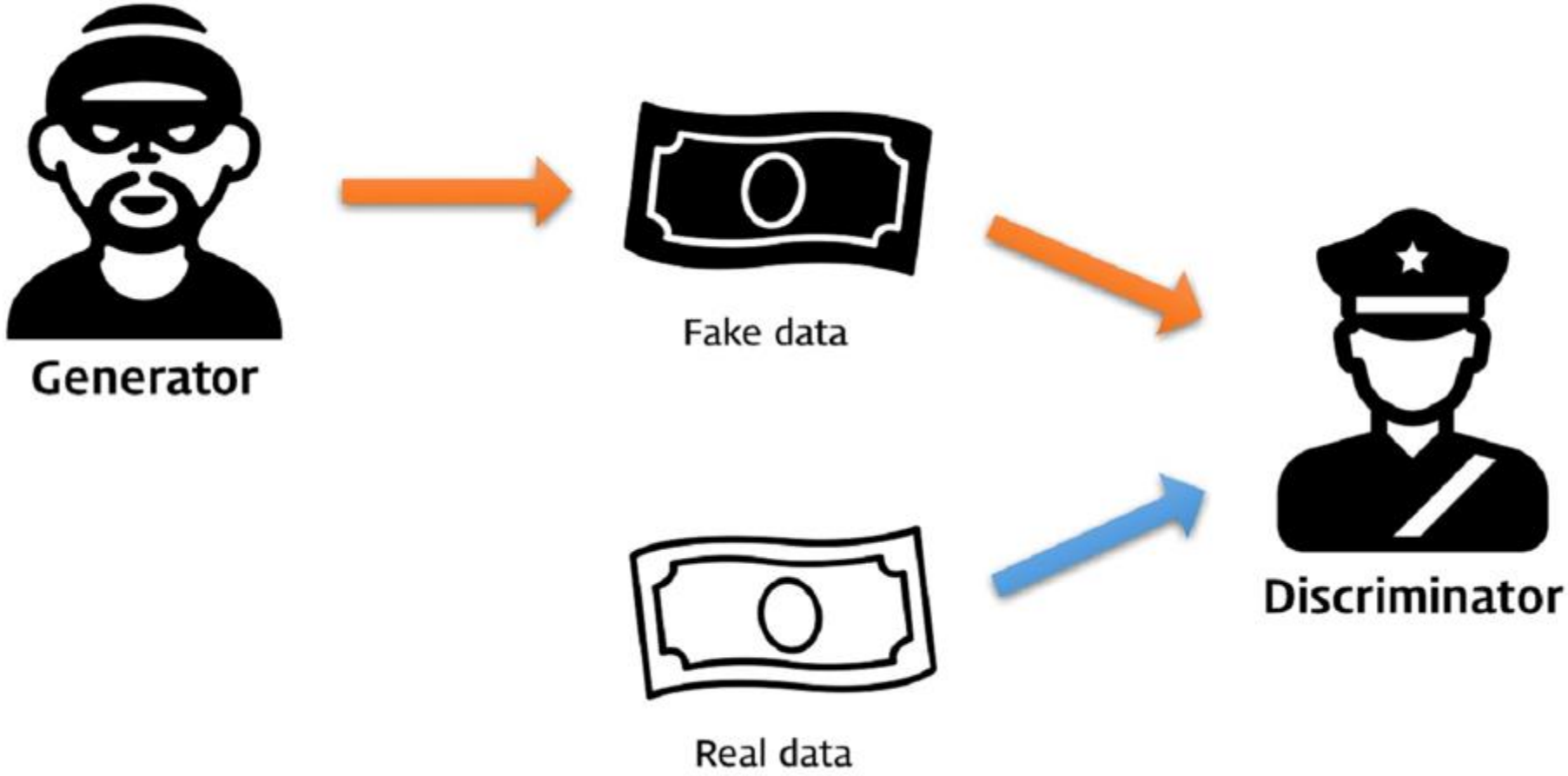
GAN이란? – Generative



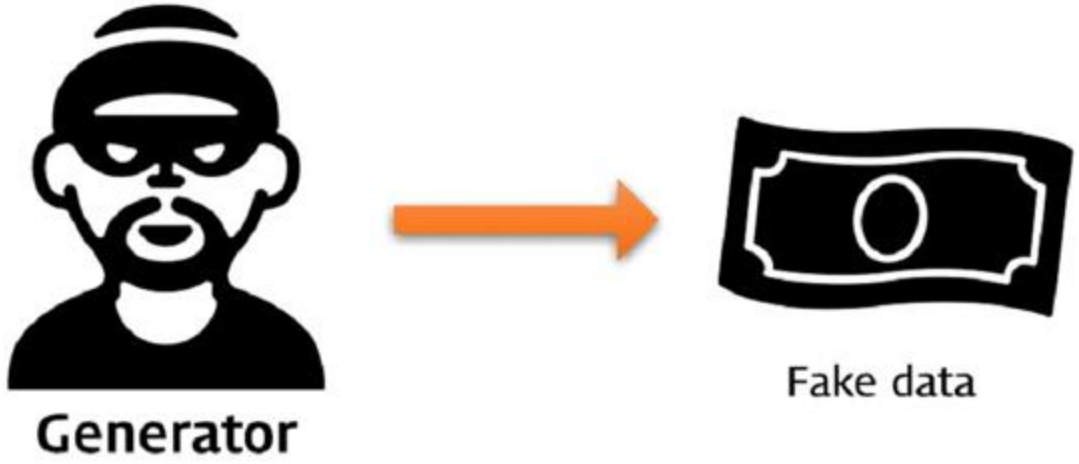


GAN의 직관적 이해

GAN의 직관적 이해



GAN의 직관적 이해



Generative

GAN의 직관적 이해

Adversarial

더 자세한 내용은 사이언스팀에서 !!

https://www.facebook.com/ybigtascience/

Q&A

Thank You