

퍼셉트론

목차

퍼셉트론



경사하강법

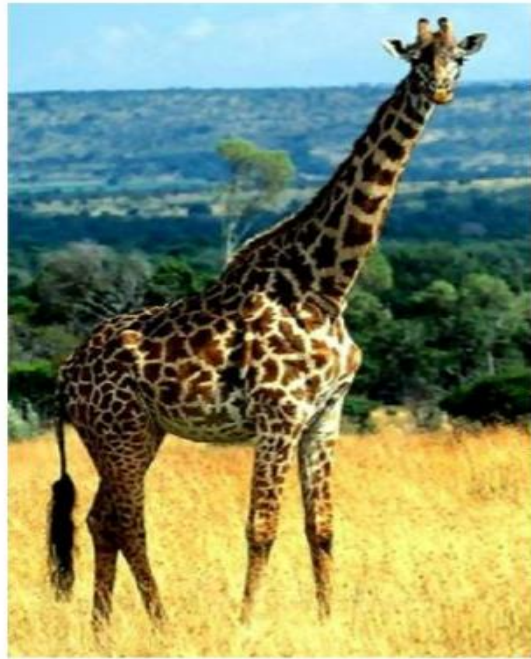


Q&A

퍼셉트론

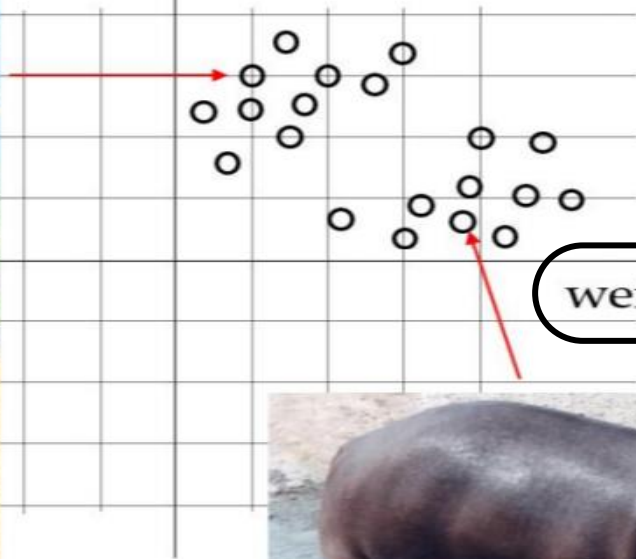
- 첫 번째 인공 신경망
- 신경망을 모델링하면서 이를 학습하기 위한 알고리즘도 제시
- 이 학습 알고리즘은 최근 주목 받고 있는 딥러닝 학습의 근간이 됨.

퍼셉트론



object

height↑



Feature – 객체를 표현하기 위한 것

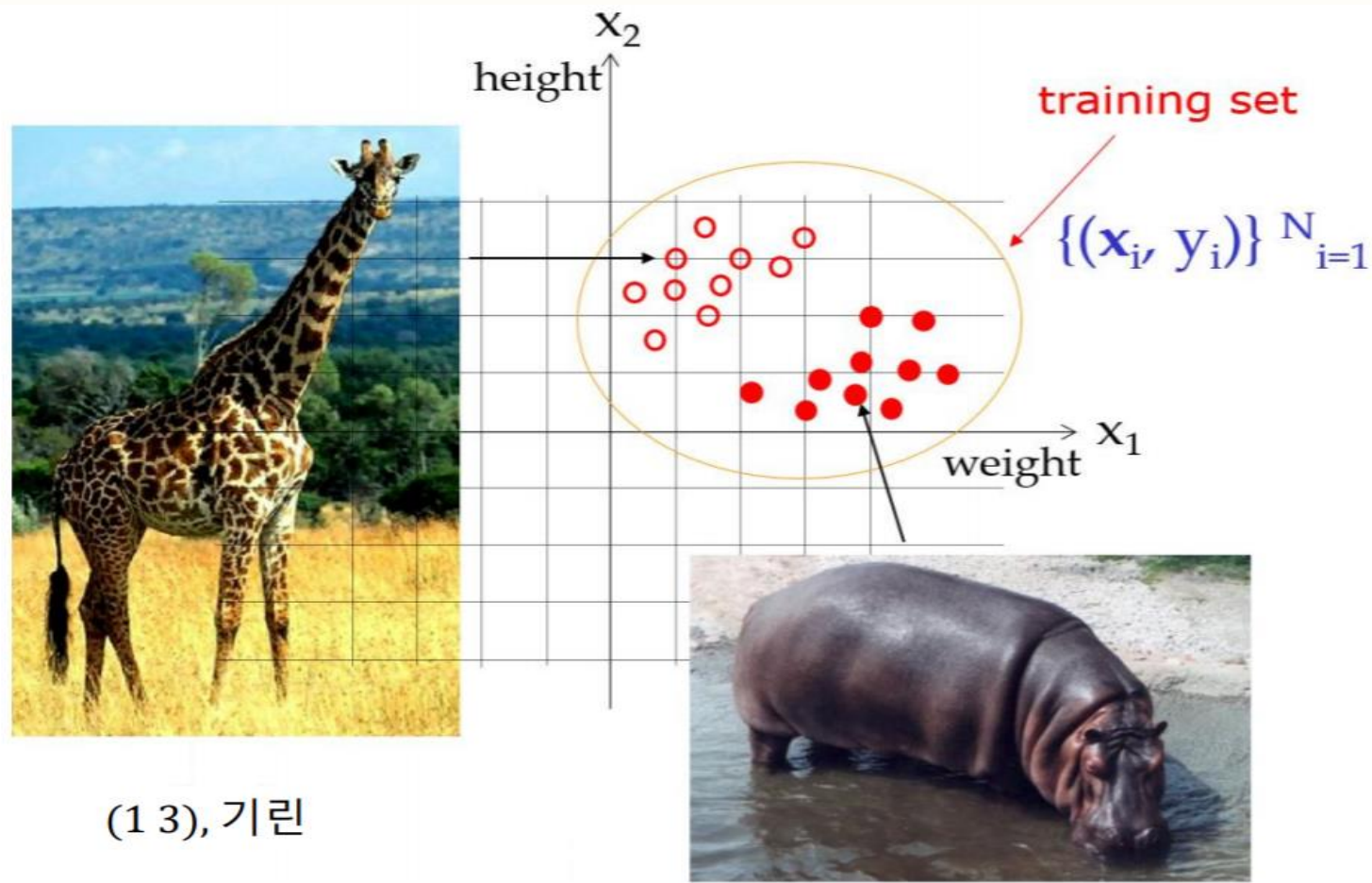
두개 구분

키, 몸무게

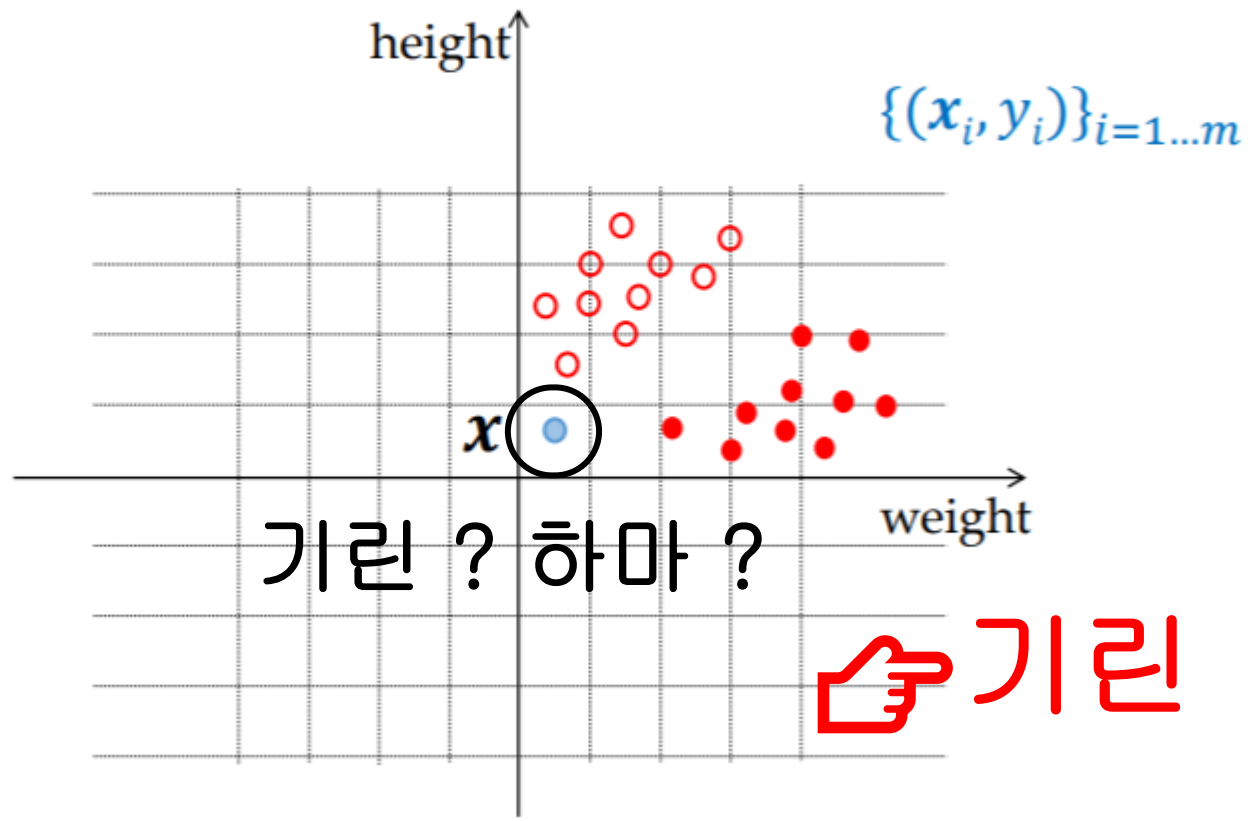


Feature vector
 $x = (x_1, x_2)$

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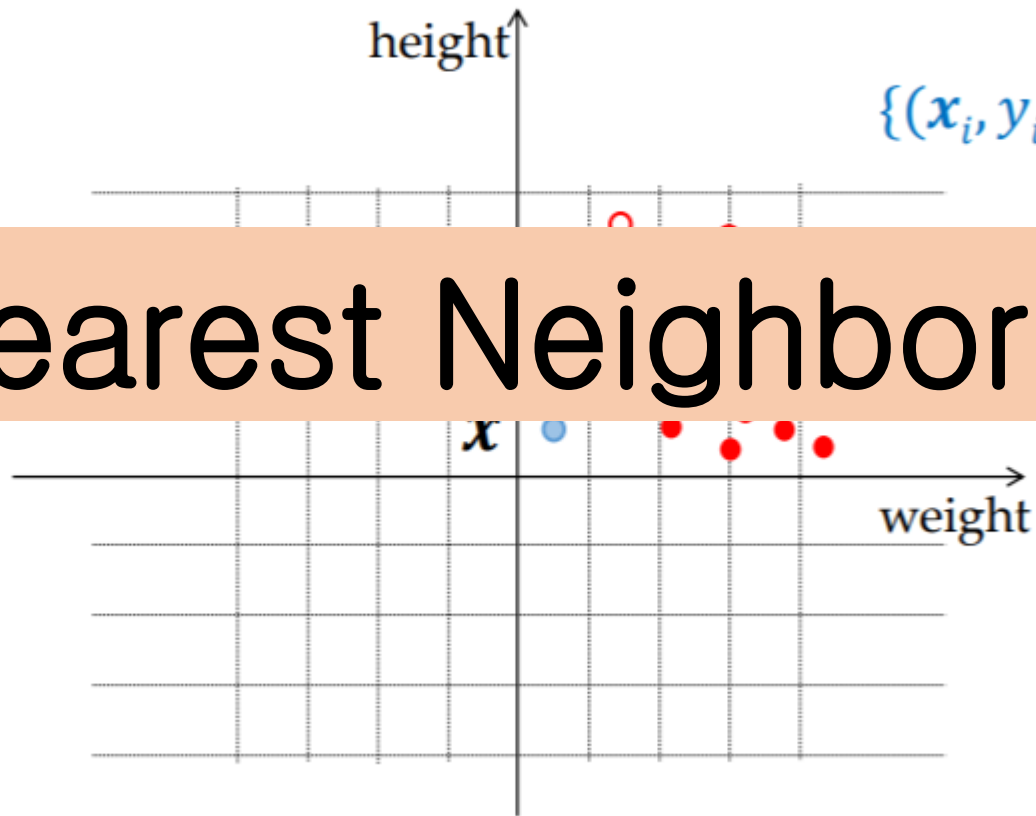
퍼셉트론



왜?

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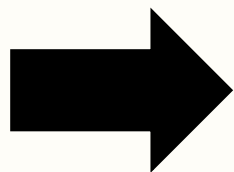
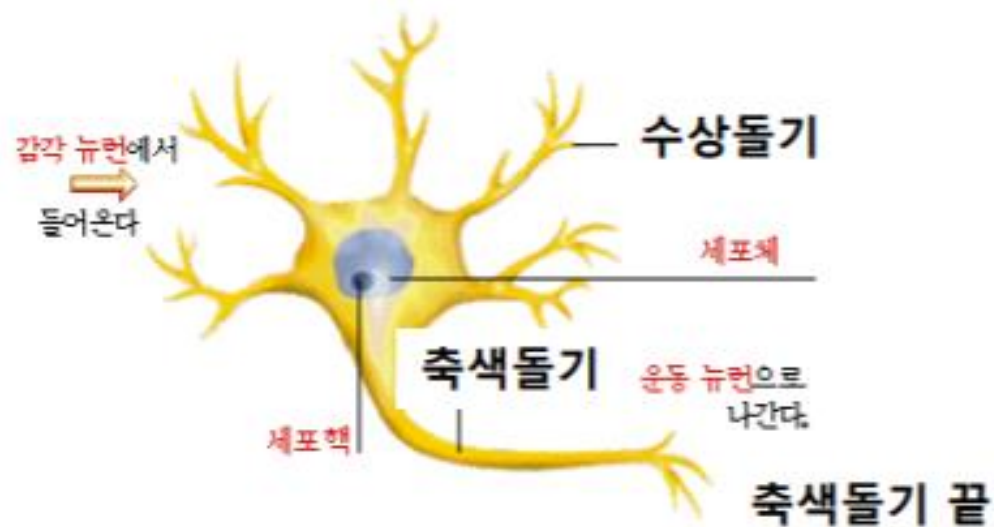
Nearest Neighbor Classification



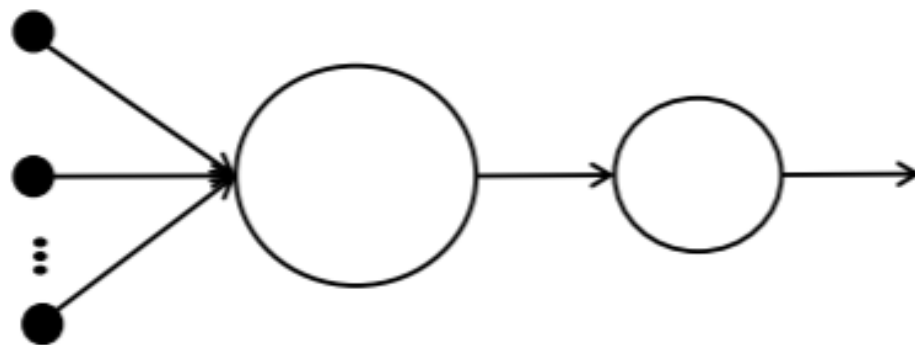
$$\{(x_i, y_i)\}_{i=1 \dots m}$$

$$y_i = \underset{i}{\operatorname{argmin}} |x_i - x|_{i=1 \dots m}$$

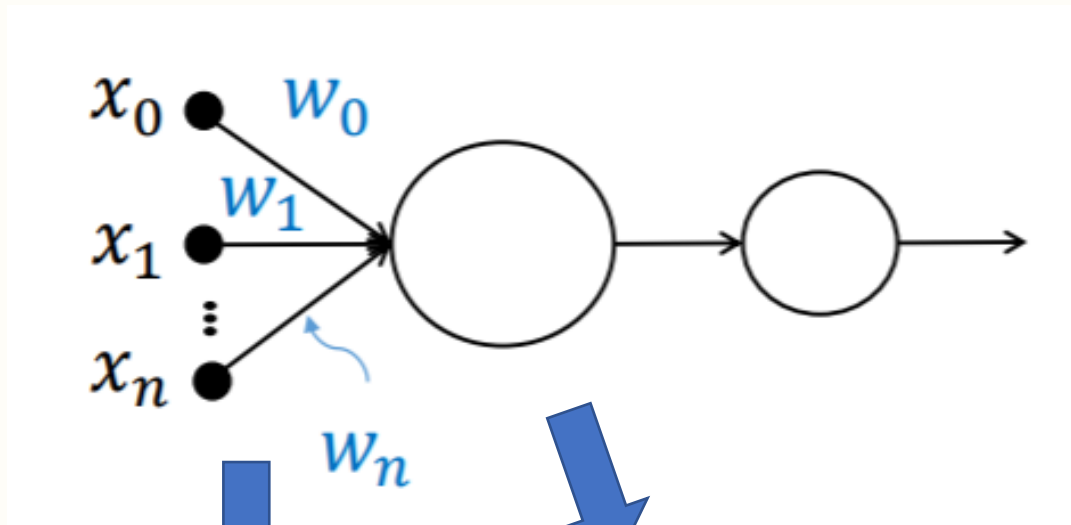
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모델링



퍼셉트론

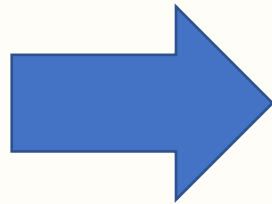
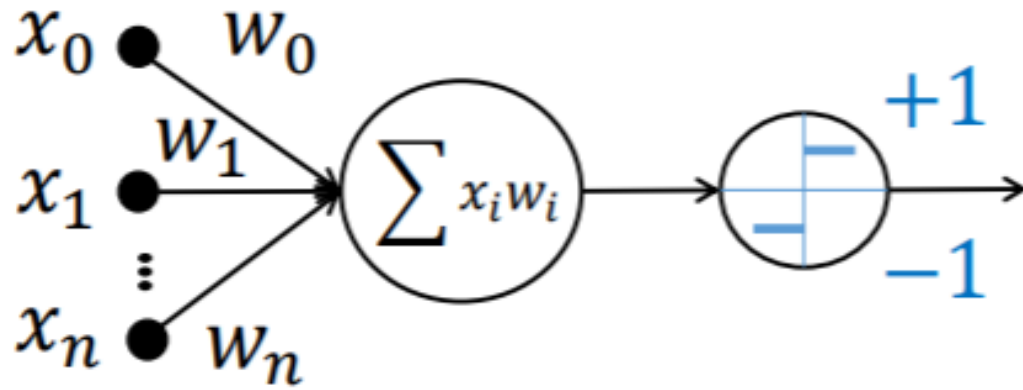


$$\begin{aligned} x_0 \times w_0 \\ x_1 \times w_1 \\ x_n \times w_n \end{aligned}$$

$$\begin{aligned} x_0 \times w_0 + \\ x_1 \times w_1 + \\ x_n \times w_n \end{aligned}$$

$$\sum (x_i w_i)$$

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$$\hat{y} = \begin{cases} +1 & \text{if } \sum_{i=0}^n w_i x_i \geq 0 \\ -1 & \text{otherwise.} \end{cases}$$

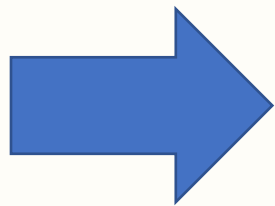
퍼셉트론

퍼셉트론

$$\hat{y} = \begin{cases} +1 & \text{if } \sum_{i=1}^n w_i x_i + w_0 > 0 \\ -1 & \text{otherwise.} \end{cases}$$

$$y = ax + b$$

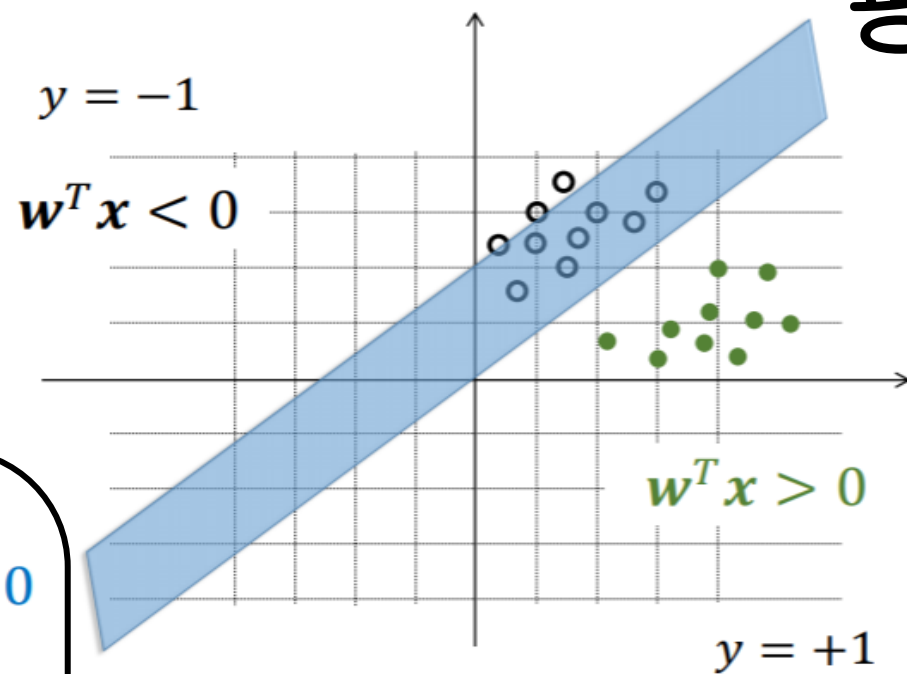
$$\hat{y}(x_1, \dots, x_n) = \begin{cases} +1 & \text{if } w_0 + w_1 x_1 + \dots + w_n x_n > 0 \\ -1 & \text{otherwise.} \end{cases}$$



$$\hat{y}(\mathbf{x}) = \begin{cases} +1 & \text{if } \mathbf{w}^T \mathbf{x} > 0 \\ -1 & \text{otherwise.} \end{cases}$$

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평면



$$\left. \begin{aligned} w_1 x_1 + w_0 x_0 &= 0 \\ (w_0 \ w_1) \begin{pmatrix} x_0 \\ x_1 \end{pmatrix} &= 0 \\ \mathbf{w}^T &= (w_0 \ w_1) \\ \mathbf{x} &= \begin{pmatrix} x_0 \\ x_1 \end{pmatrix} \end{aligned} \right\} \mathbf{w}^T \mathbf{x} = 0$$

퍼셉트론

“퍼셉트론에서 학습이란?”



직선 / 평면 / 초평면
방정식의 계수(자극의 세기;
가중치) 구하기

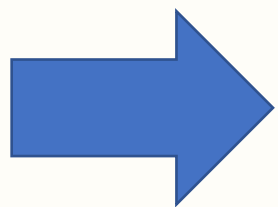
퍼셉트론

$$\hat{y} = w_0 + w_1x_1 + \dots + w_nx_n$$

1. 각각의 가중치에 대해 임의의 값으로 설정한다.
2. 잘 될 때 까지 조금씩 값을 변경한다.

퍼셉트론

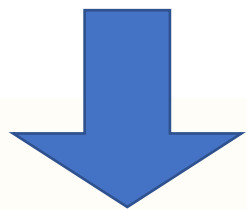
$$w_i \leftarrow w_i + \Delta w_i$$



$$\Delta w_i = 0.1 \times \sum_{d \in D} (y_d - \hat{y}_d) \times x_i$$

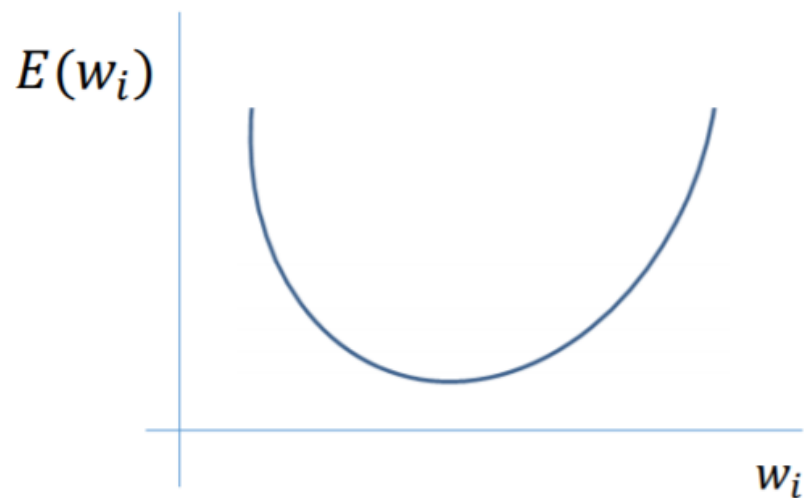
퍼셉트론

$$E(\mathbf{w}) \equiv \frac{1}{2} \sum_{d \in D} (\overset{\text{정답}}{y_d} - \underset{\text{출력 값}}{\hat{y}_d})^2$$

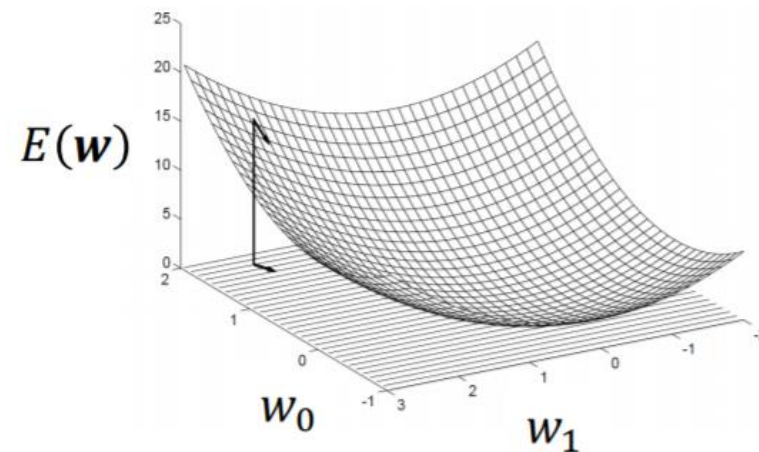


이 식이 최소가 되도록 하는
그때의 w 값을 구하면 된다.

퍼셉트론

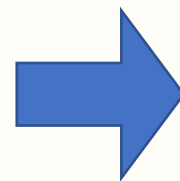
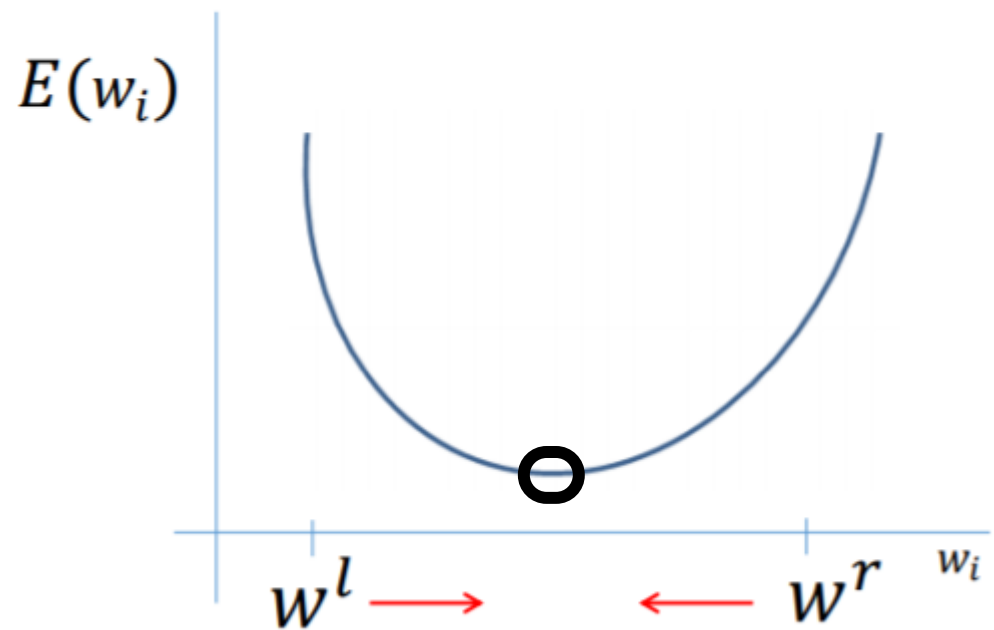


w값이 한 개



w값이 두 개

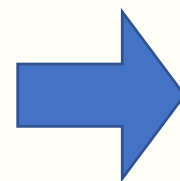
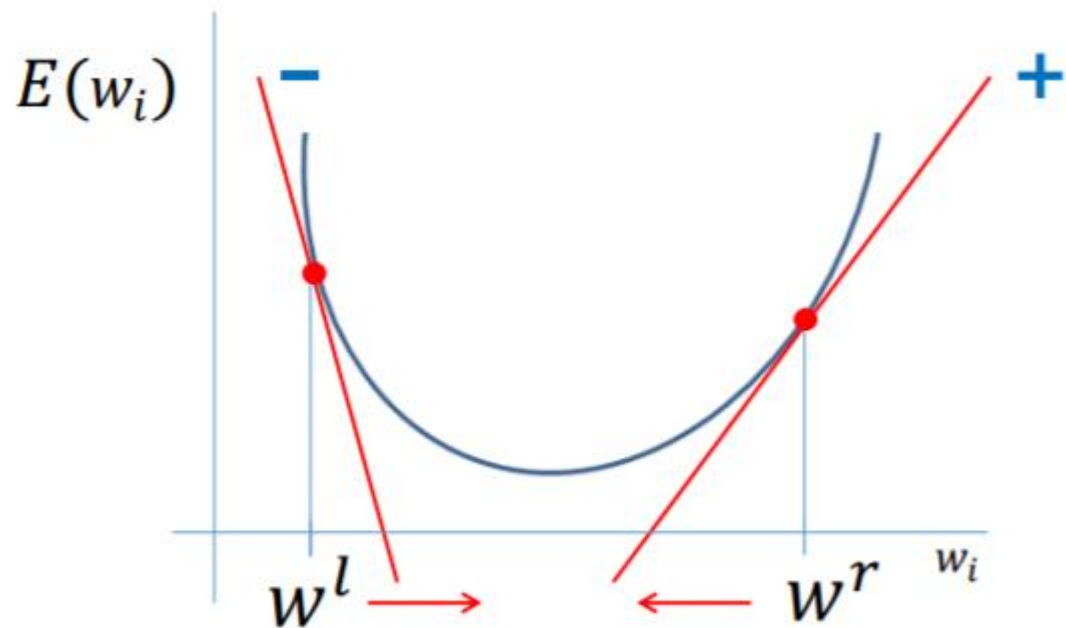
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$\Delta w_i = \text{음수}$ for w^r

$\Delta w_i = \text{양수}$ for w^l

퍼셉트론

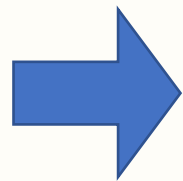
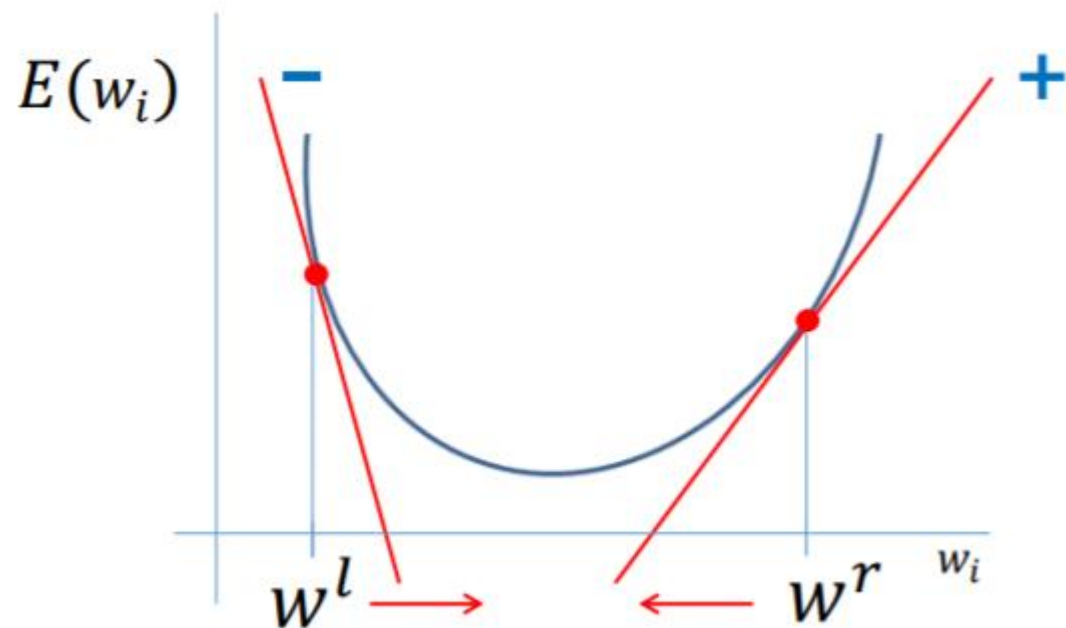


$$\Delta w_i = \text{■ 기울기}$$



$$\Delta w_i = \text{■ 기울기} \times \text{아주 작은 값}$$

경사 하강 법



$$\Delta w_i = - \text{기울기} \times \text{아주 작은 값}$$



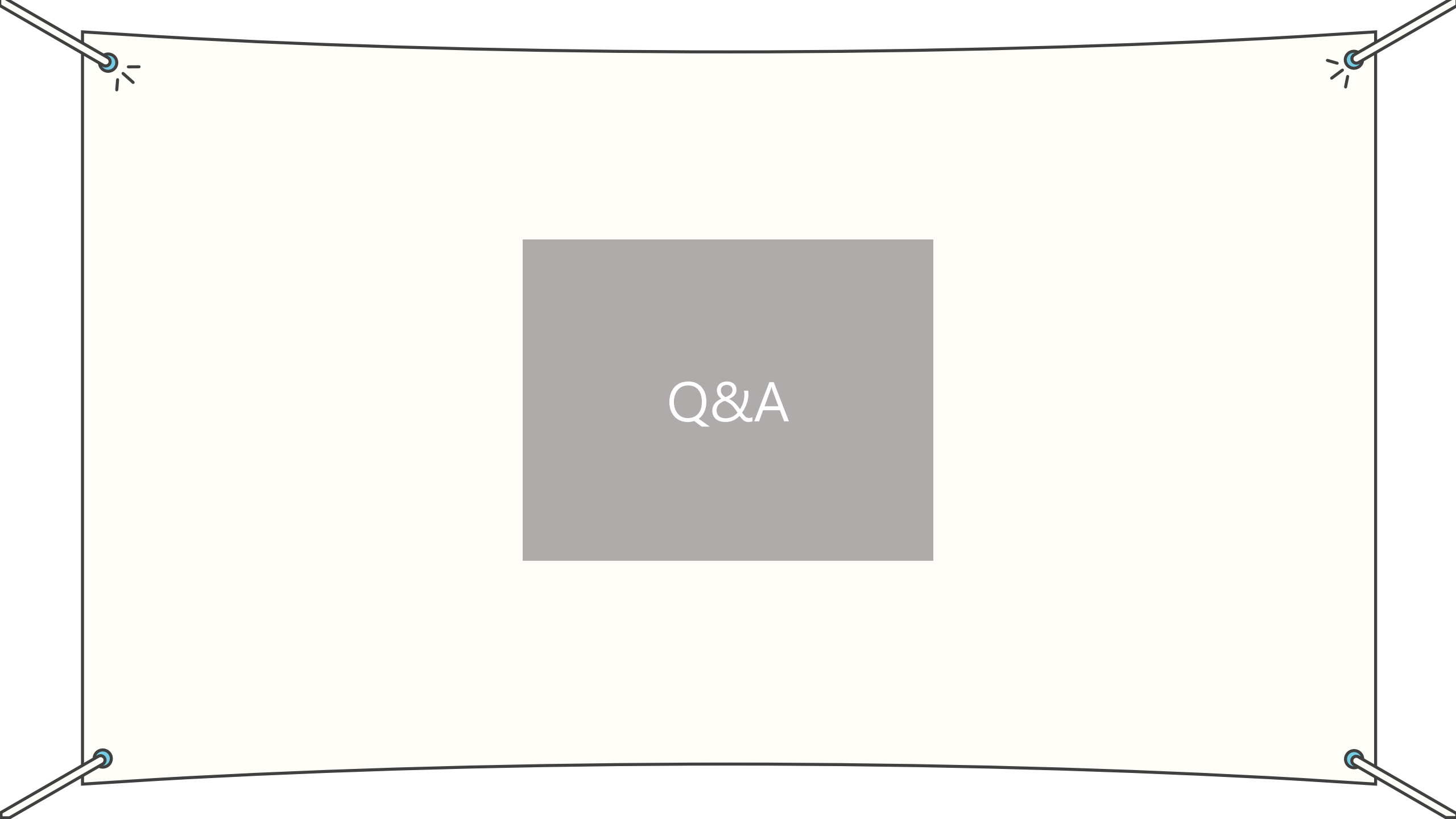
$$\Delta w_i = -\eta \frac{\partial E}{\partial w_i}$$

기울기 기호

학습률; learning rate

학습률 기호; 에타

일단 적당히 정해준다.
0.01, 0.001 ...



Q&A