

Perceptron의 이해

수업 목표

이번 수업의 핵심:

- Perceptron의 개념
- Perceptron의 구성 요소
- Perceptron을 활용한 선형 문제 풀이

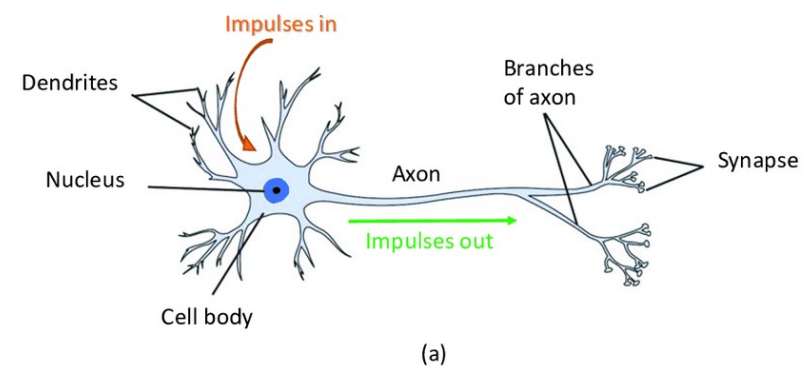
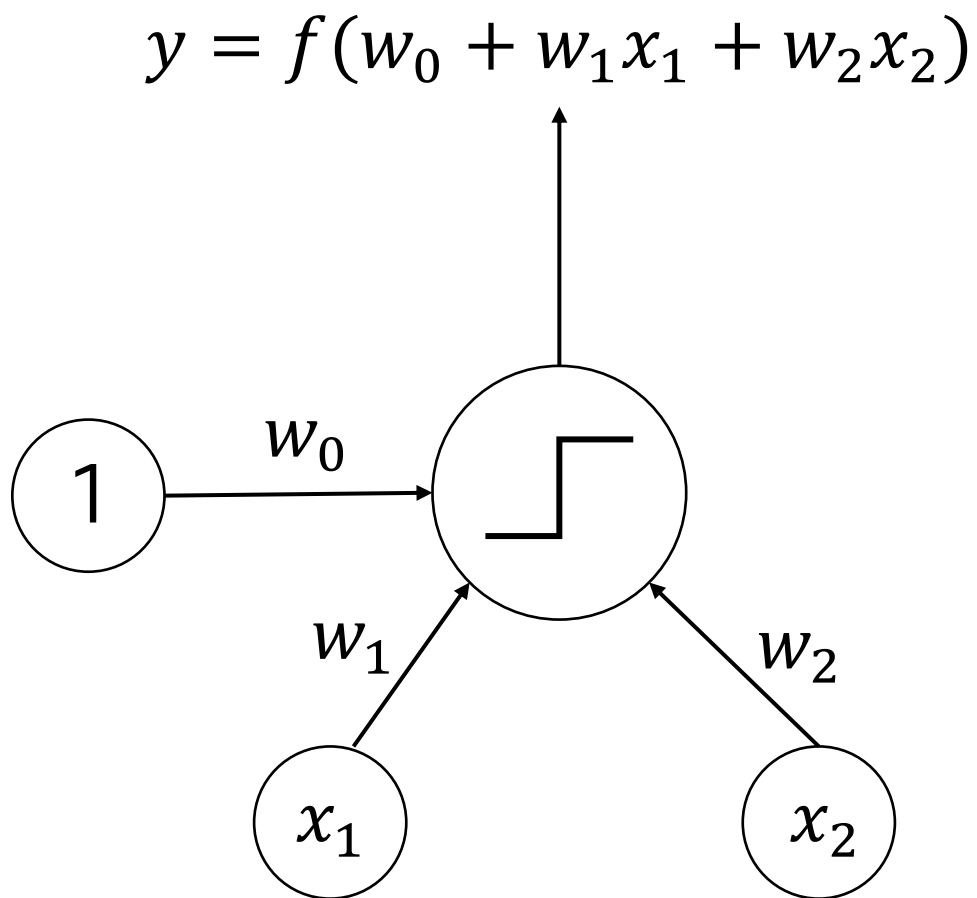
핵심 개념

- Perceptron, 선형 문제, 가중치 (Weight)

Perceptron이란?

Perceptron (퍼셉트론)

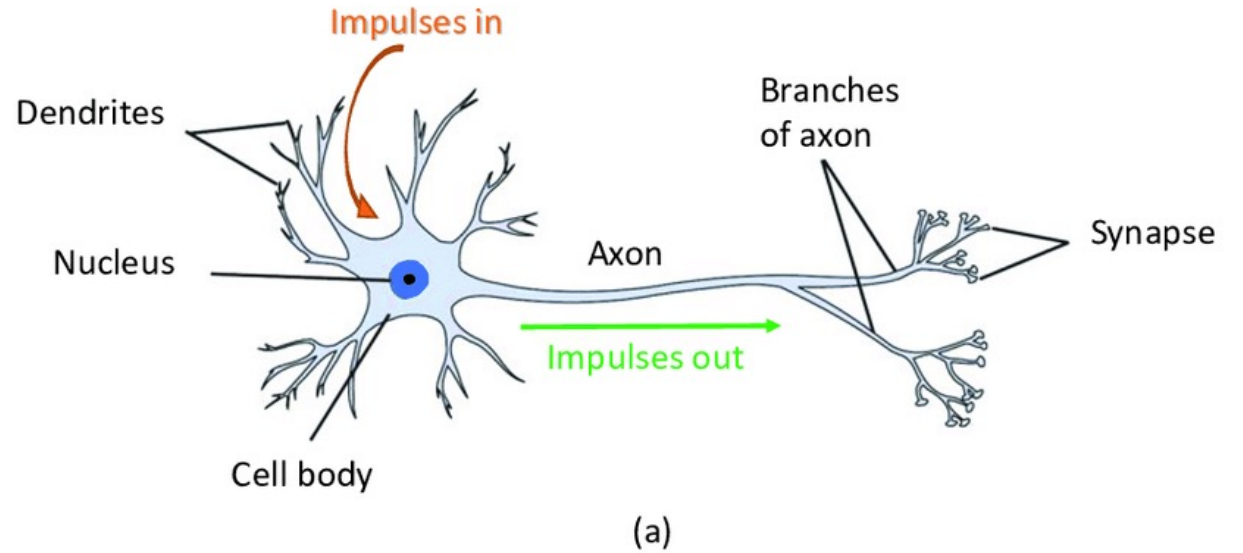
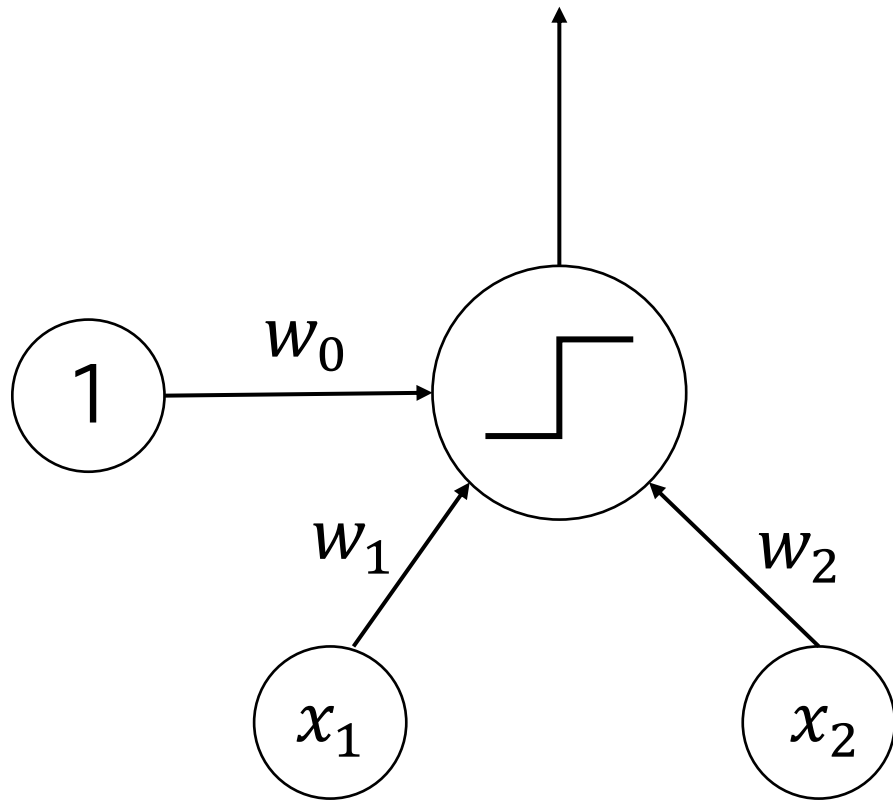
- Neural Network의 한 종류
- 1957년에 Frank Rosenblatt에 의해 고안
- 일종의 선형 분류기



- Neuron과 비슷한 구조
 - 수용층: 외부 자극 수용
 - 연합층: 가중 입력을 받아 전달
 - 반응층: 최종 출력

Perceptron이란?

$$y = f(w_0 + w_1x_1 + w_2x_2)$$

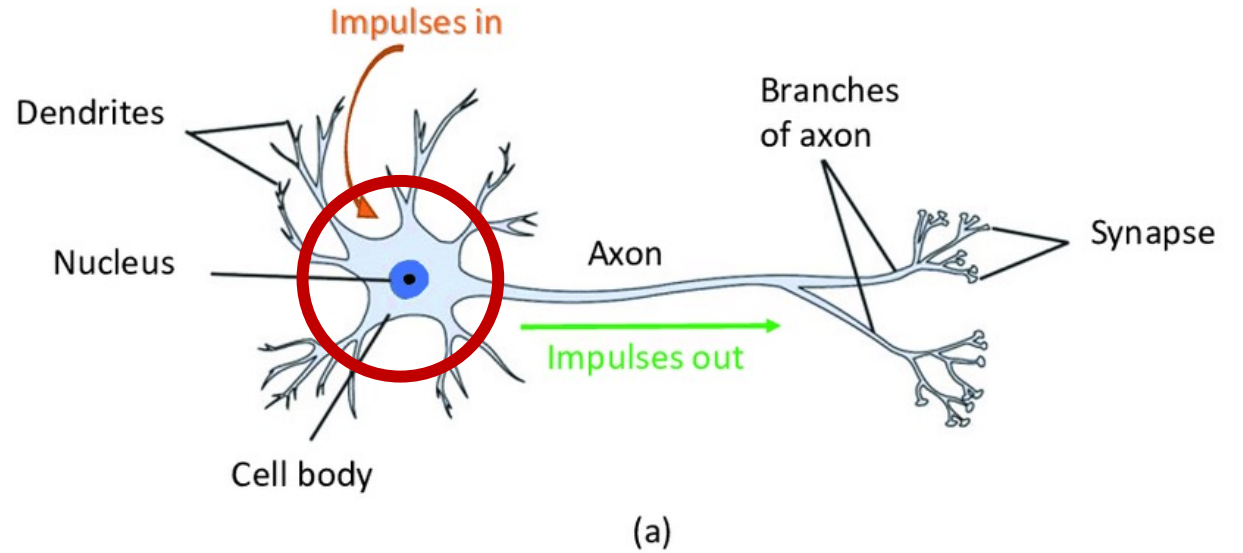
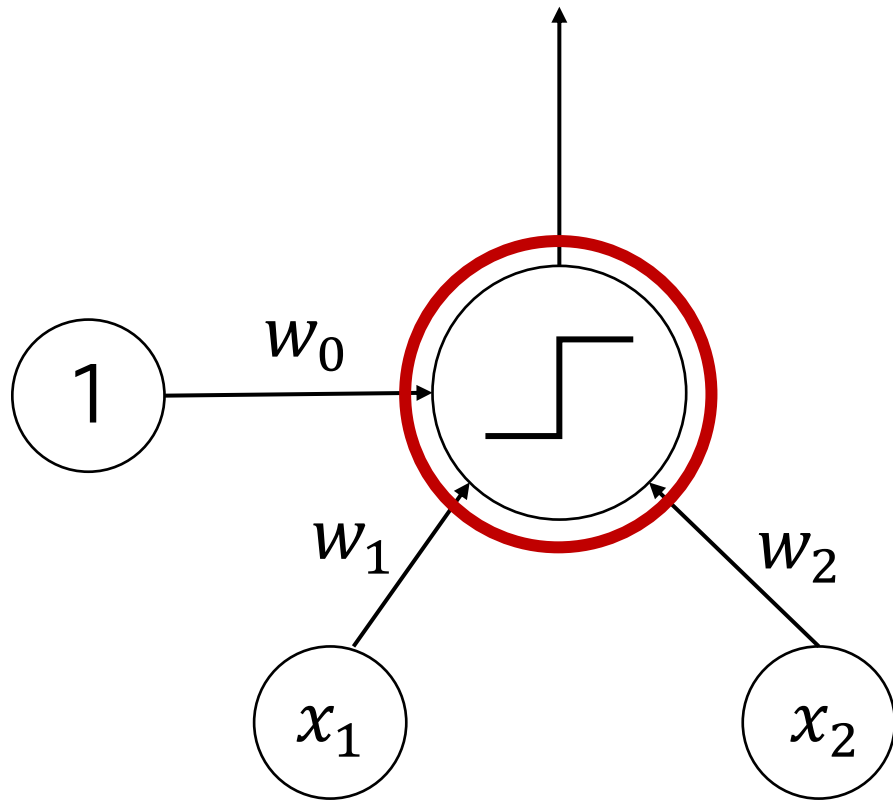


Input: x_1, x_2 Output: y

Weights: w_0, w_1, w_2

Perceptron이란?

$$y = f(w_0 + w_1x_1 + w_2x_2)$$

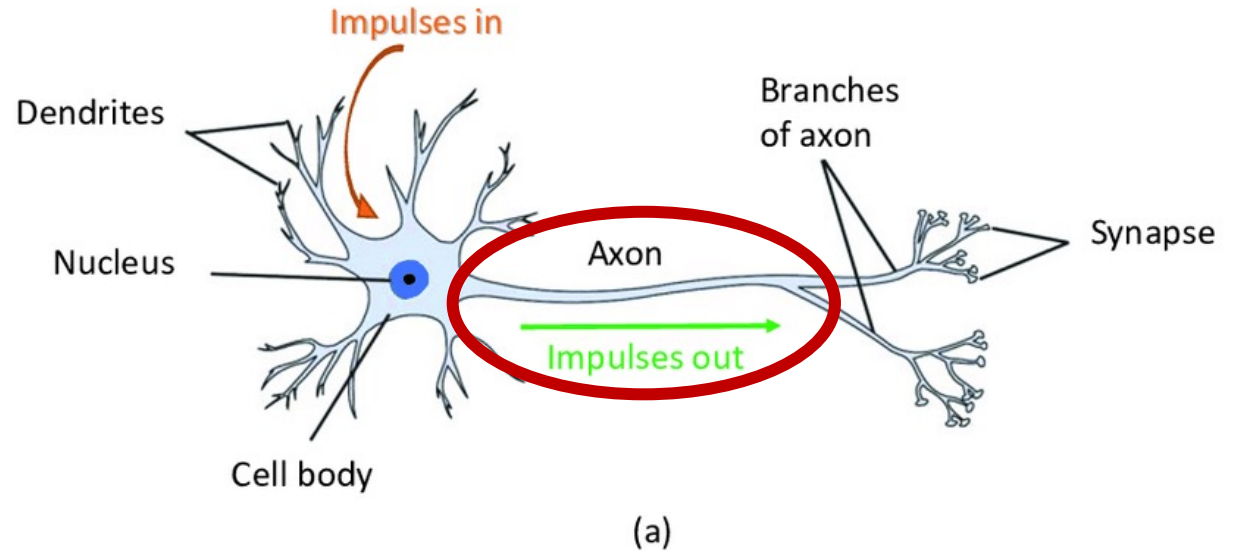
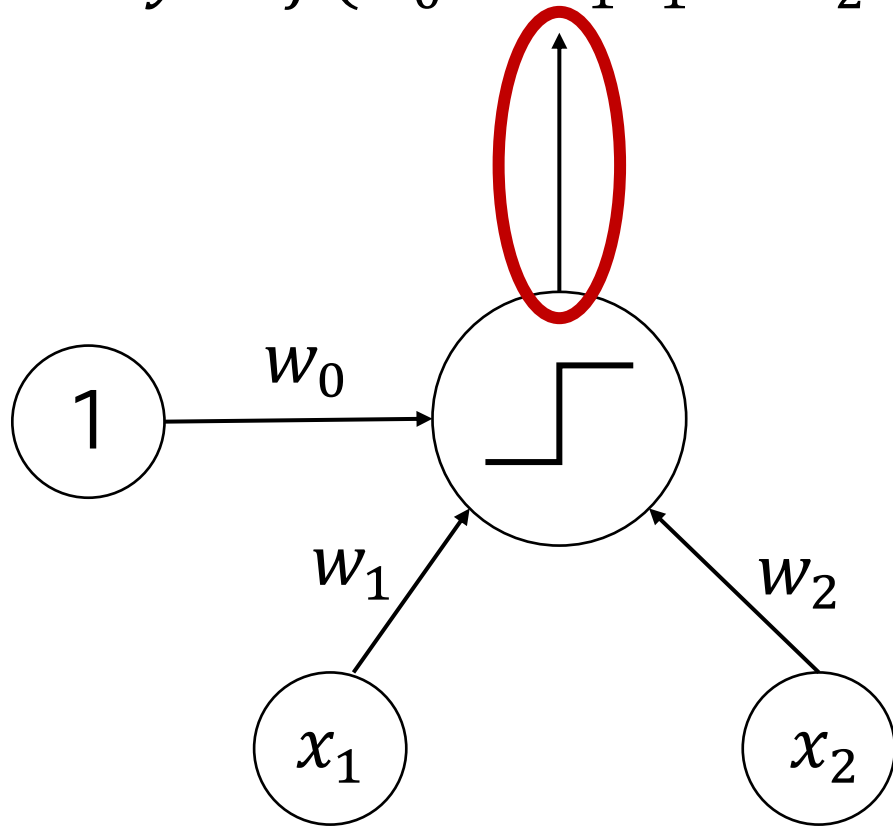


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Perceptron이란?

$$y = f(w_0 + w_1x_1 + w_2x_2)$$

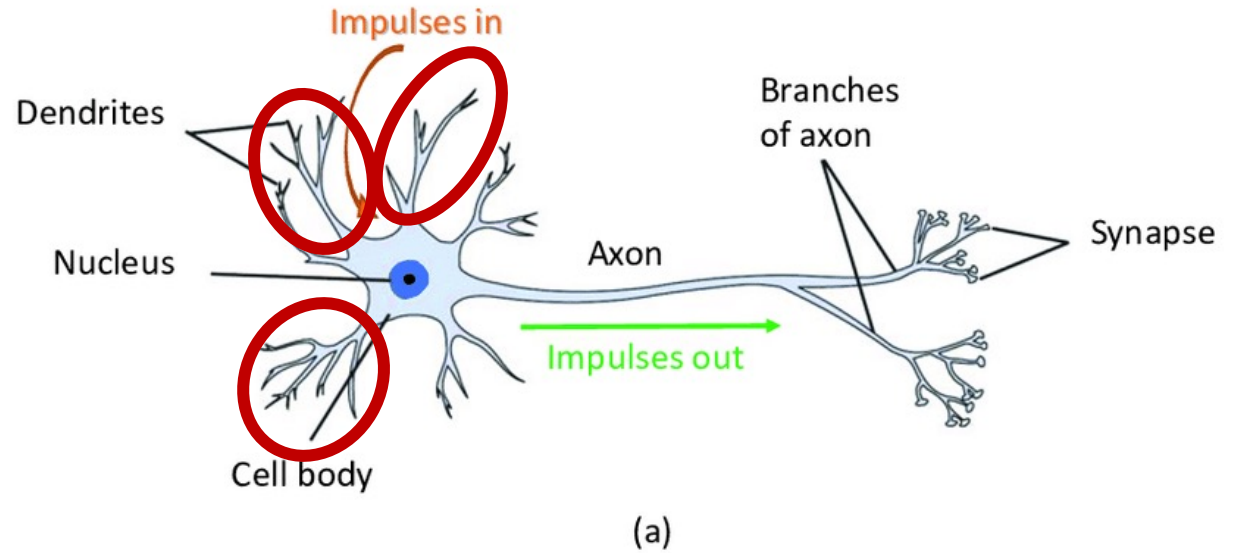
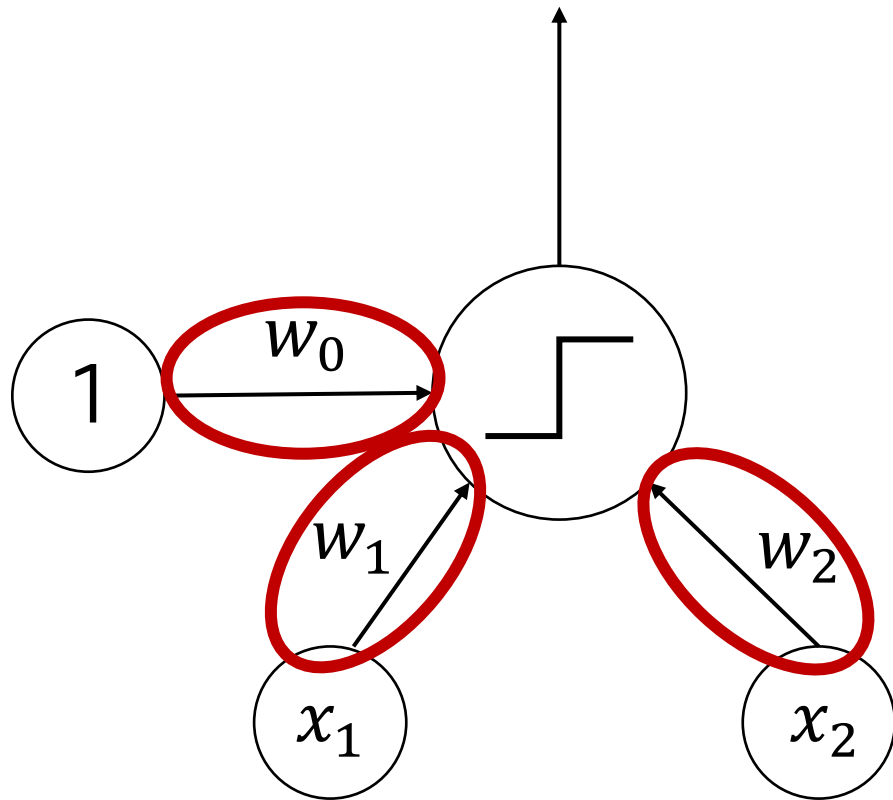


Input: x_1, x_2 Output: y

Weights: w_0, w_1, w_2

Perceptron이란?

$$y = f(w_0 + w_1x_1 + w_2x_2)$$

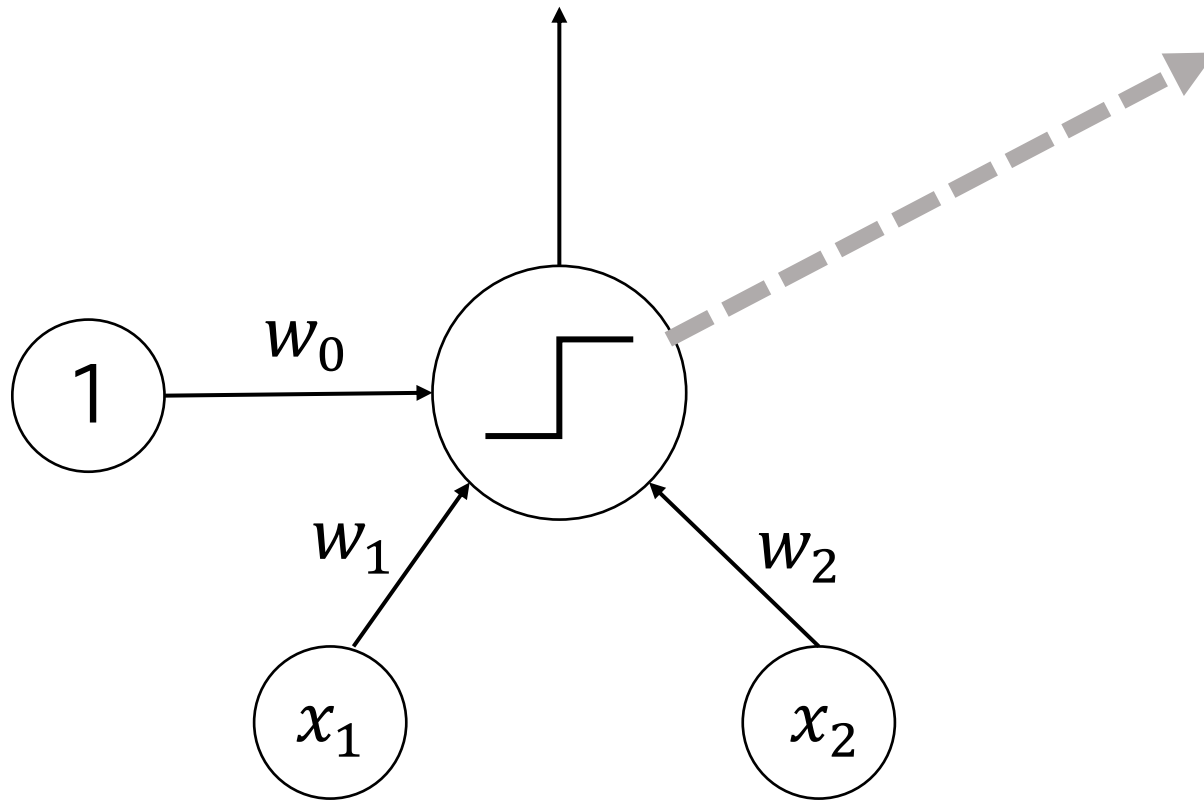


Input: x_1, x_2 Output: y

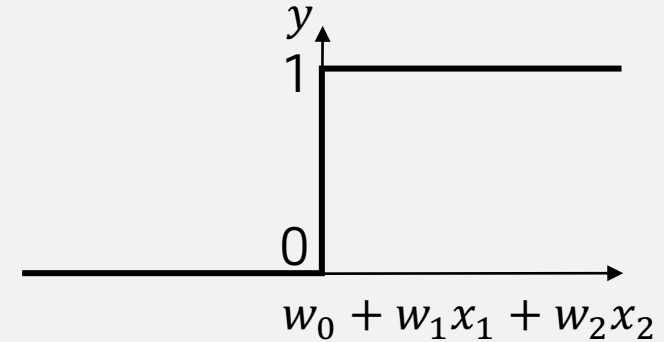
Weights: w_0, w_1, w_2

Perceptron이란?

$$y = f(w_0 + w_1x_1 + w_2x_2)$$



Hard thresholding function



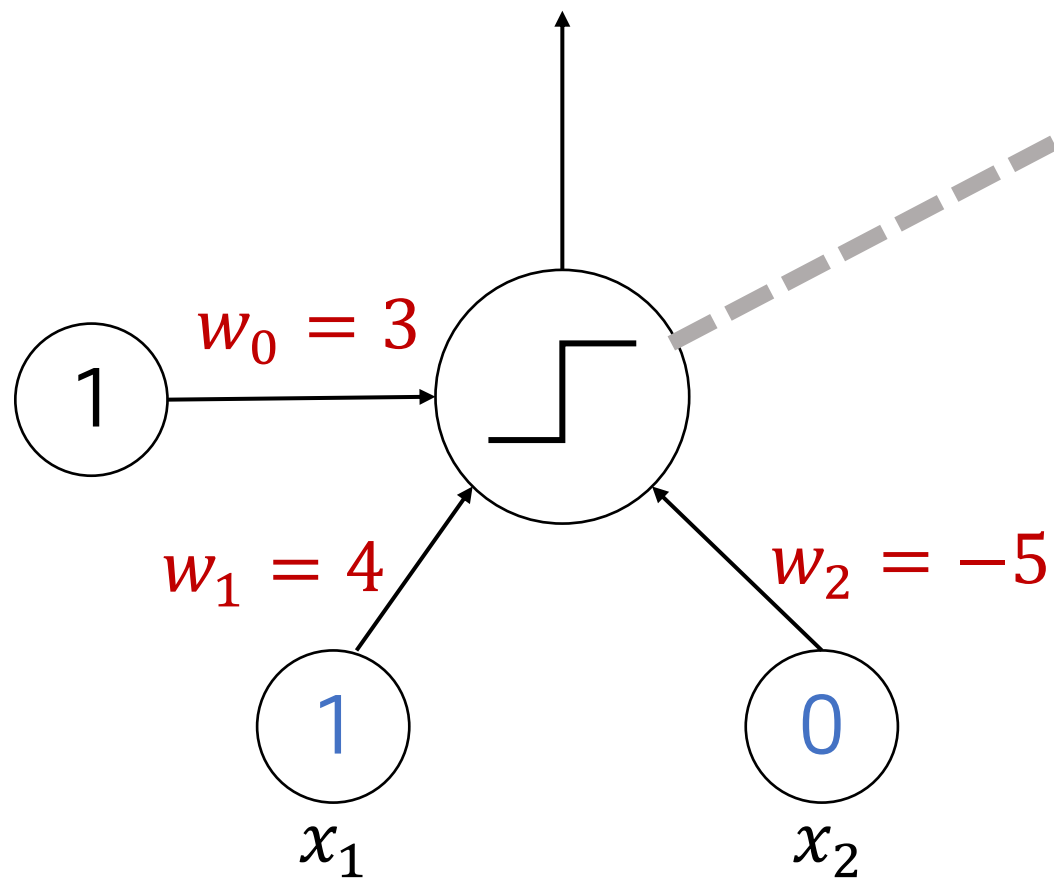
$$y = \begin{cases} 1 & w_0 + w_1x_1 + w_2x_2 \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Input: x_1, x_2 Output: y

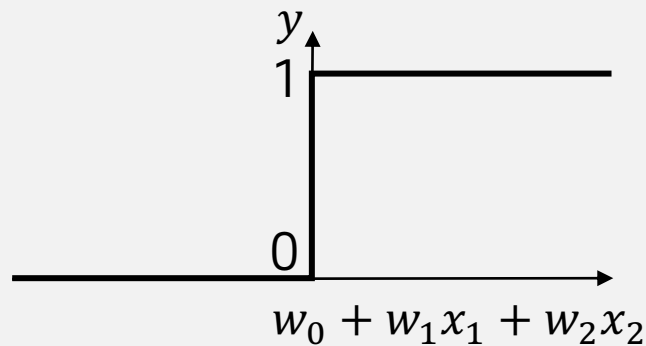
Weights: w_0, w_1, w_2

Perceptron이란?

$$y = f(3 + 4 \times 1 - 5 \times 0) = 1$$



Hard thresholding function



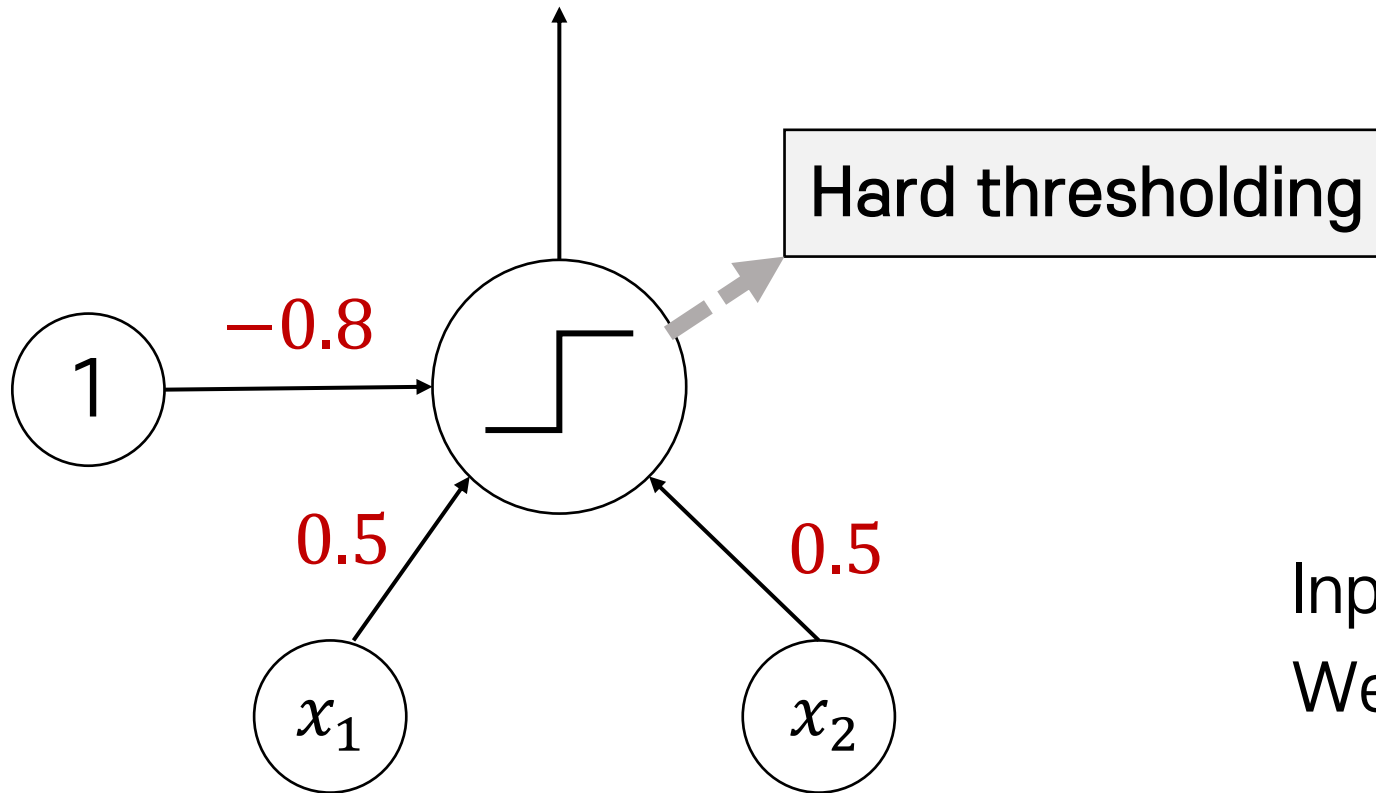
$$y = \begin{cases} 1 & w_0 + w_1x_1 + w_2x_2 \geq 0 \\ 0 & \text{otherwise} \end{cases}$$

Input: x_1, x_2 Output: y

Weights: w_0, w_1, w_2

Perceptron으로 AND Gate 만들기

$$y = f(-0.8 + 0.5x_1 + 0.5x_2)$$



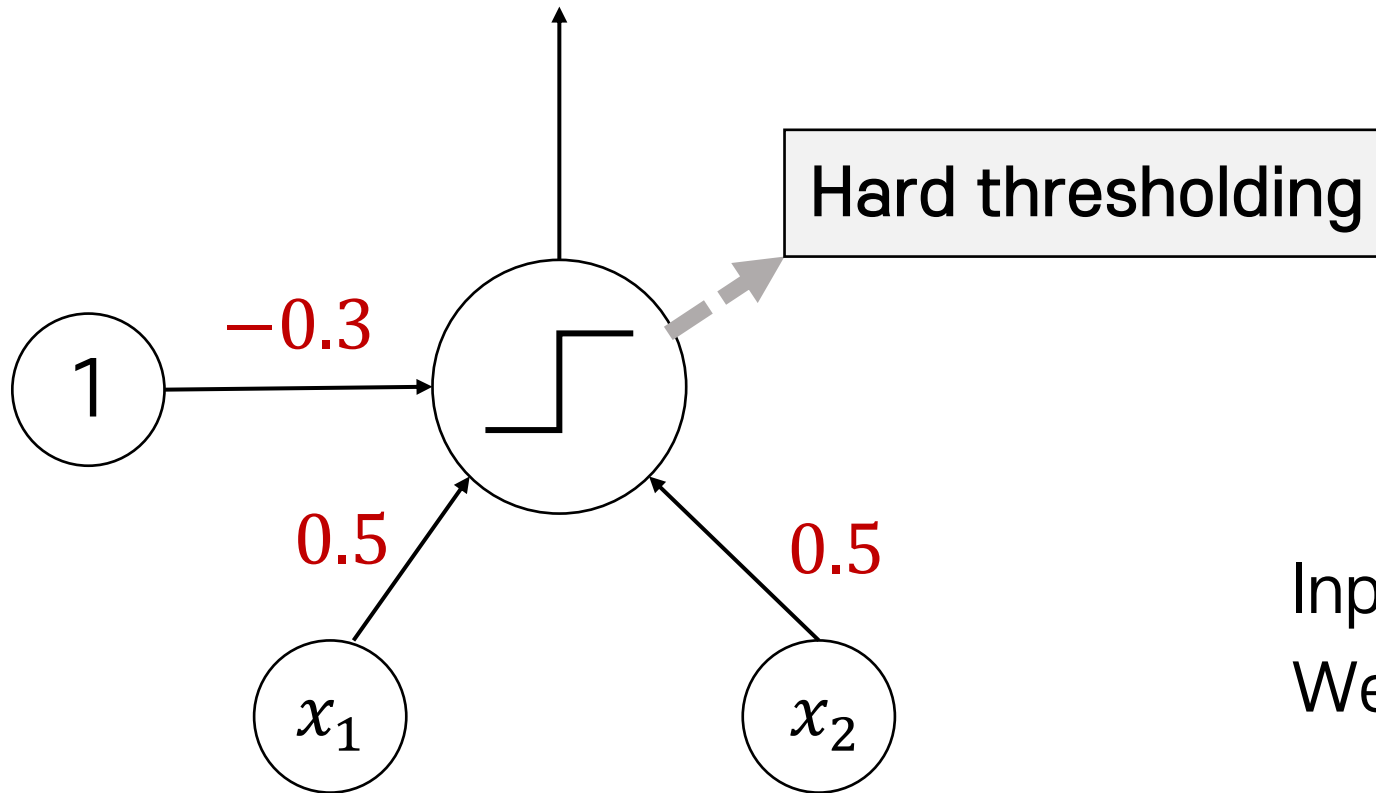
AND Gate		
x_1	x_2	y
0	0	0
0	1	0
1	0	0
1	1	1

Input: x_1, x_2 Output: y

Weights: w_0, w_1, w_2

Perceptron으로 OR Gate 만들기

$$y = f(-0.3 + 0.5x_1 + 0.5x_2)$$

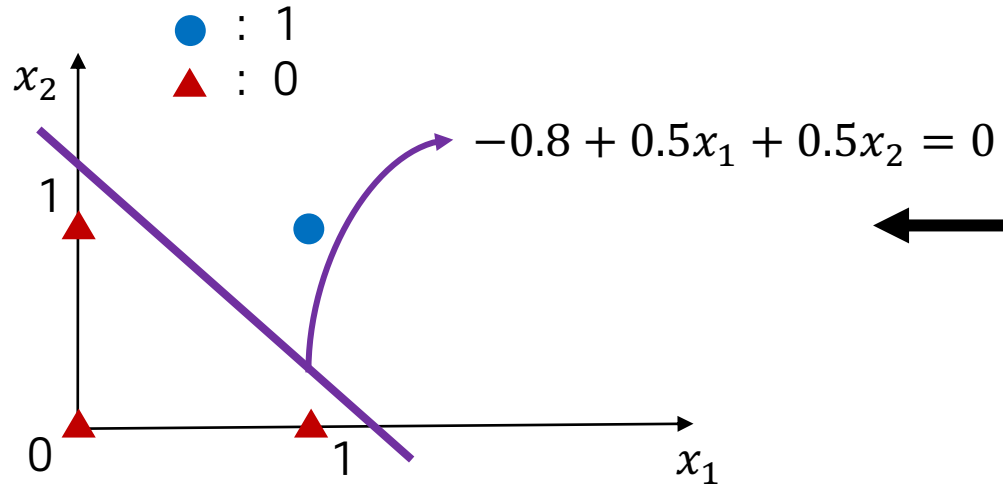


OR Gate		
x_1	x_2	y
0	0	1
0	1	1
1	0	1
1	1	1

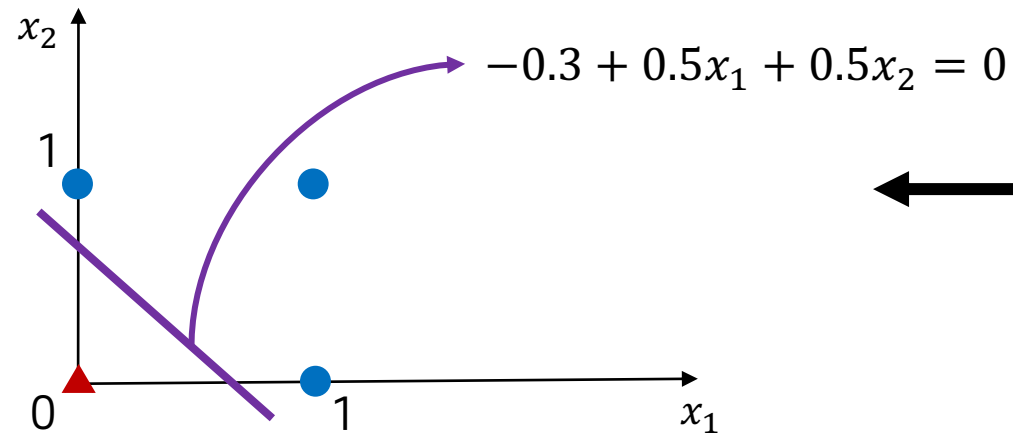
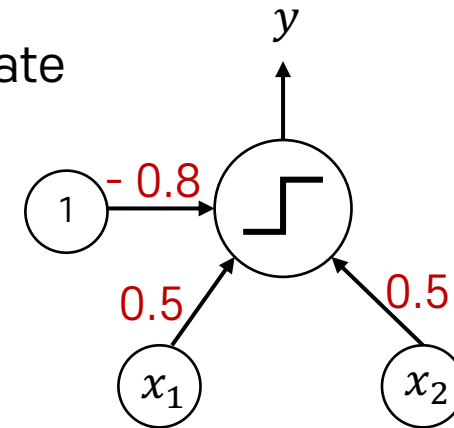
Input: x_1, x_2 Output: y

Weights: w_0, w_1, w_2

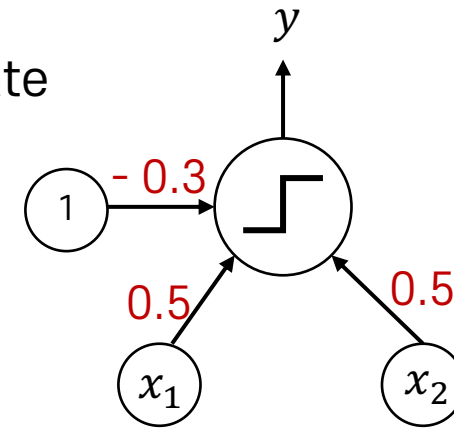
Perceptron Decision Boundary



AND Gate



OR Gate



요약

- Neuron을 모사한 Perceptron의 구조
- Perceptron을 이용한 AND/OR gate 의 구현
- Perceptron을 이용한 선형 문제 및 Decision Boundary의 개념

