

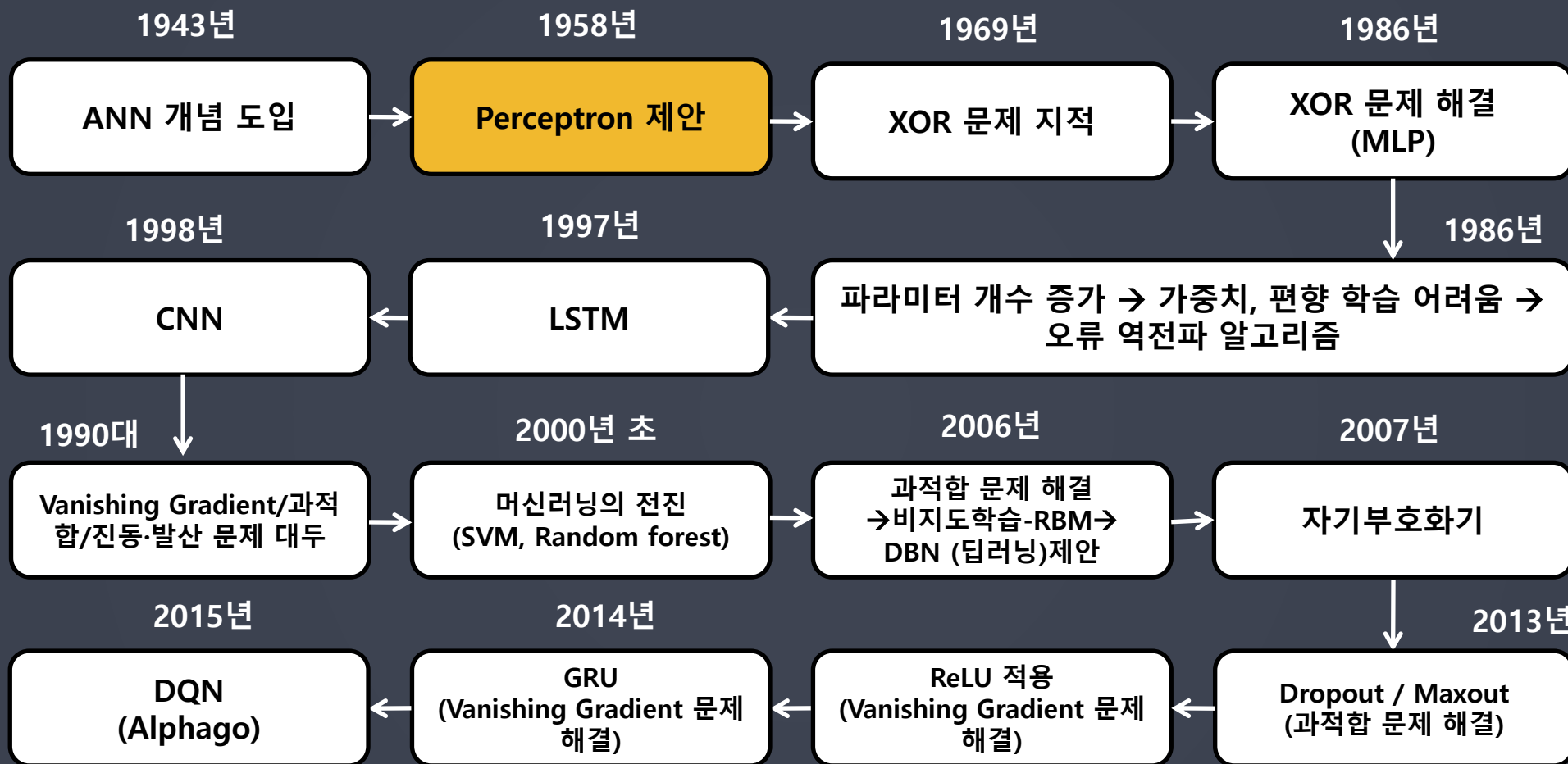
Deep Learning

Chapter 2 퍼셉트론, 다층 퍼셉트론(Perceptron, MLP)



START

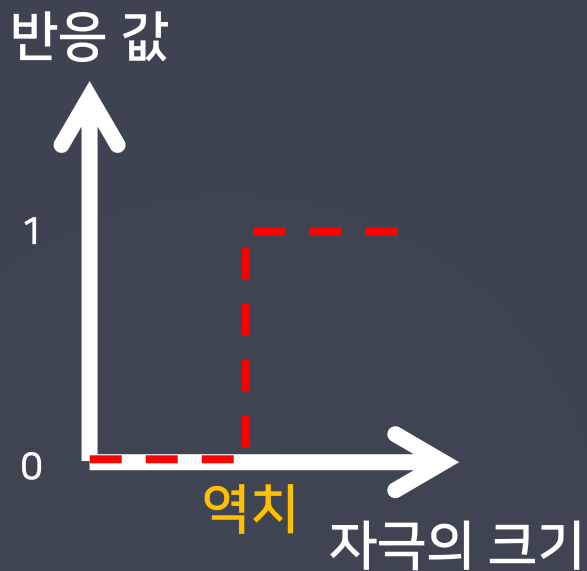
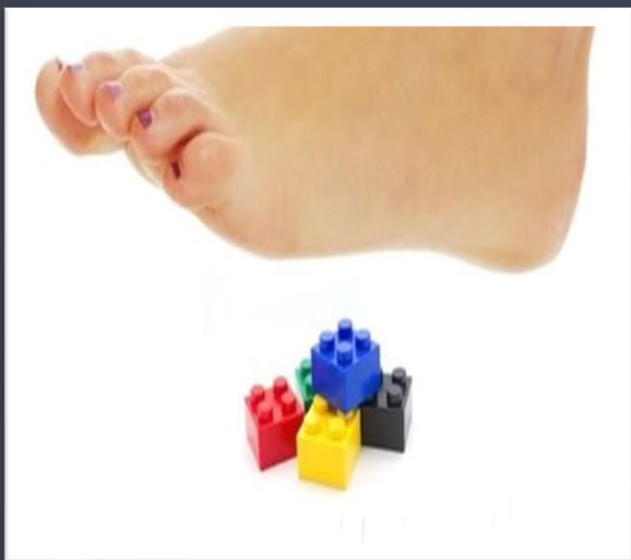
- 퍼셉트론의 개념을 이해 할 수 있다.
- 다층 퍼셉트론의 개념을 이해 할 수 있다.





신경의 흥분이 전달되기 위해서는 뉴런에 전달되는 자극의 크기가 **역치 이상**이 되어야함

인공신경망 - 퍼셉트론(Perceptron)



자극
(전기화학적신호)



반응



$$y = wx + b$$

노드
(선형모델)

퍼셉트론 (Perceptron)

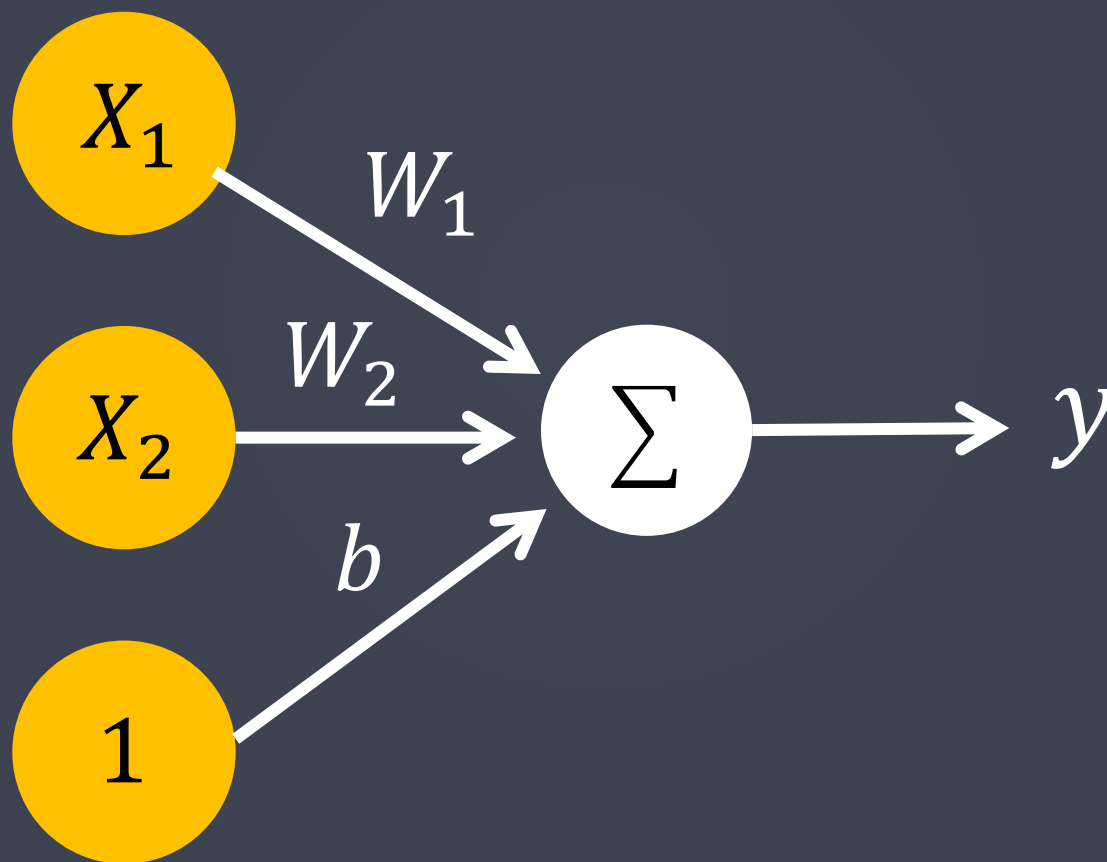
프랑크 로젠블라트가 1957년에 고안한 알고리즘

The Perceptron :

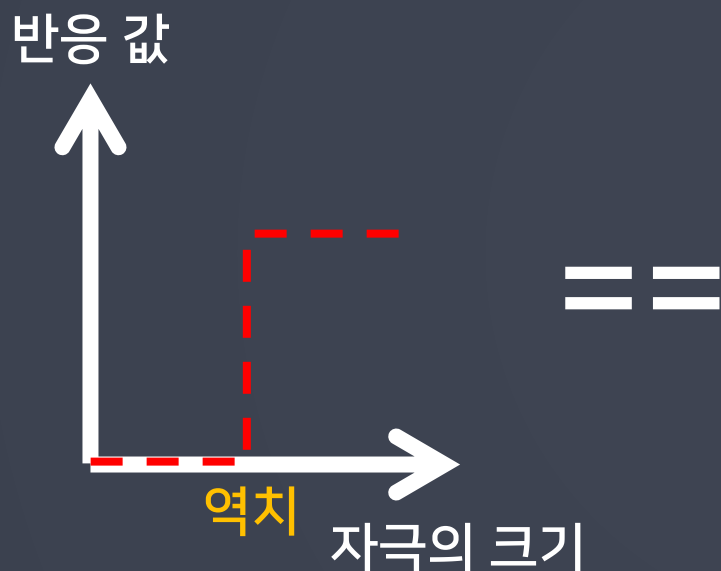
A Probabilistic Model for Information Storage and Organization in the Brain



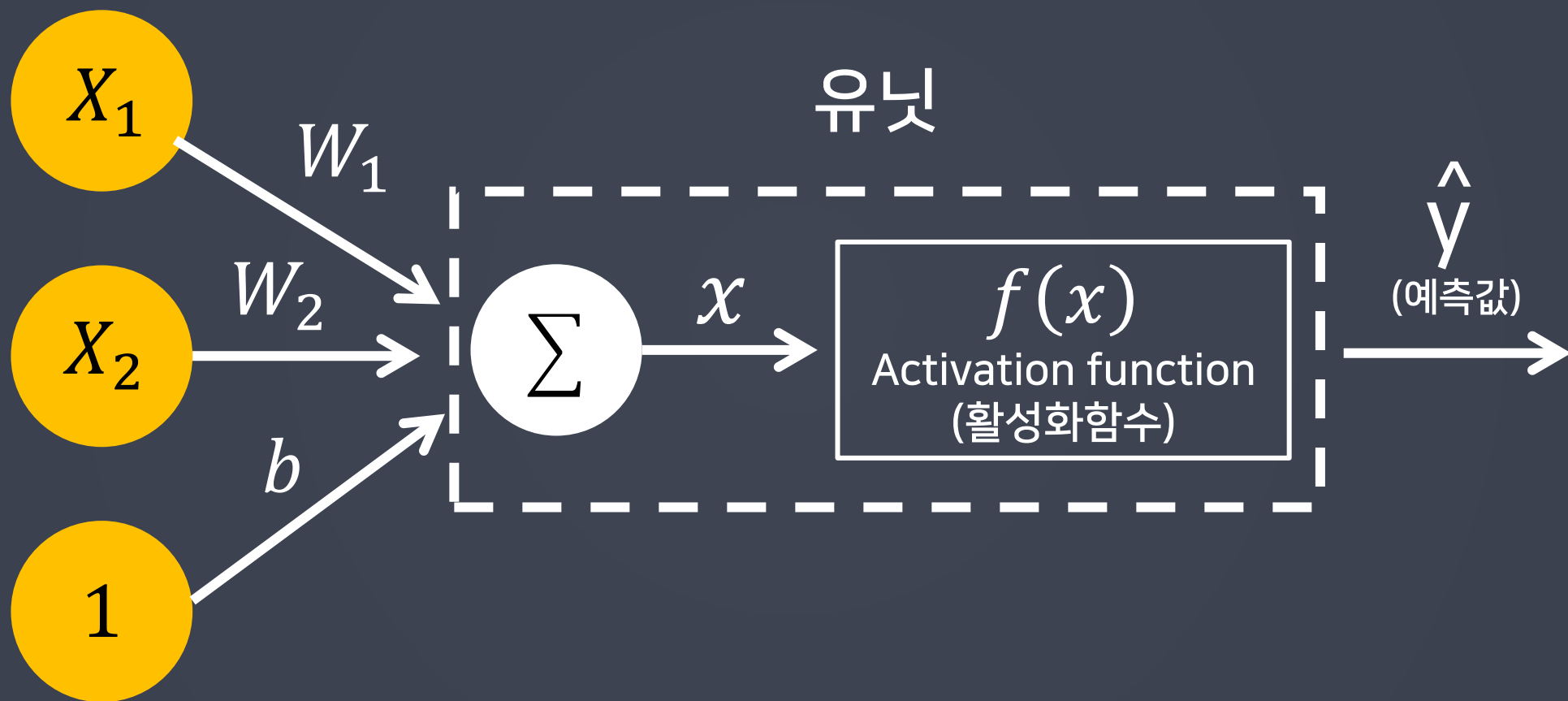
$$y = W_1X_1 + W_2X_2 + b$$



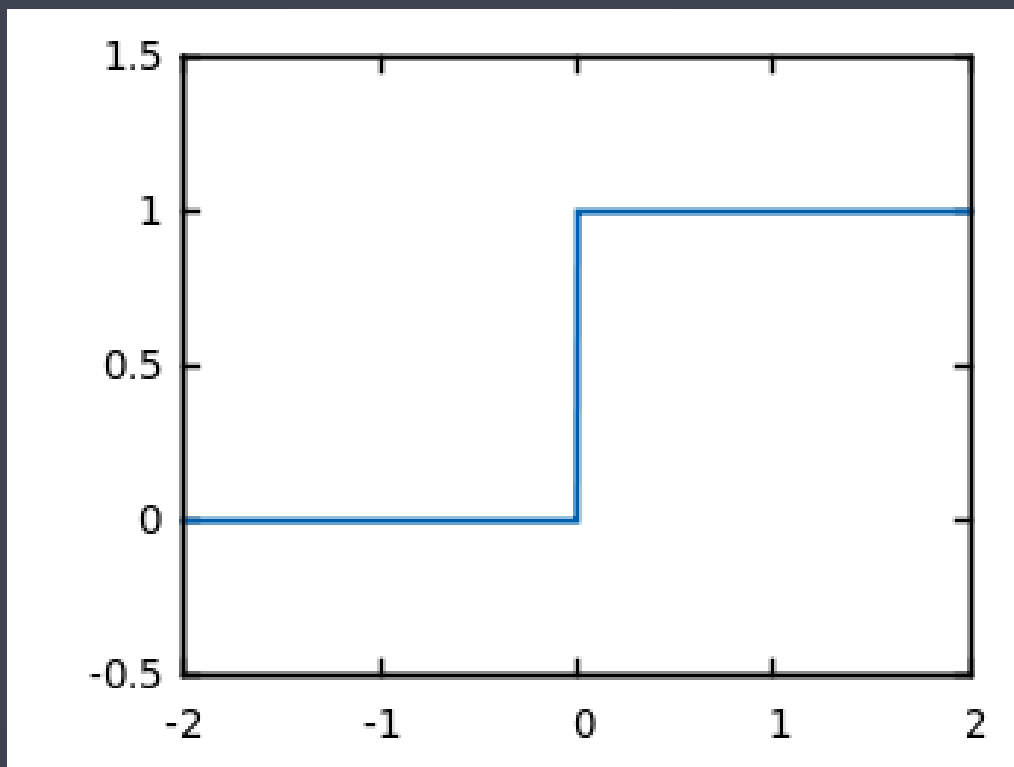
$$y = W_1X_1 + W_2X_2 + b$$



$f(x)$
Activation function
(활성화함수)



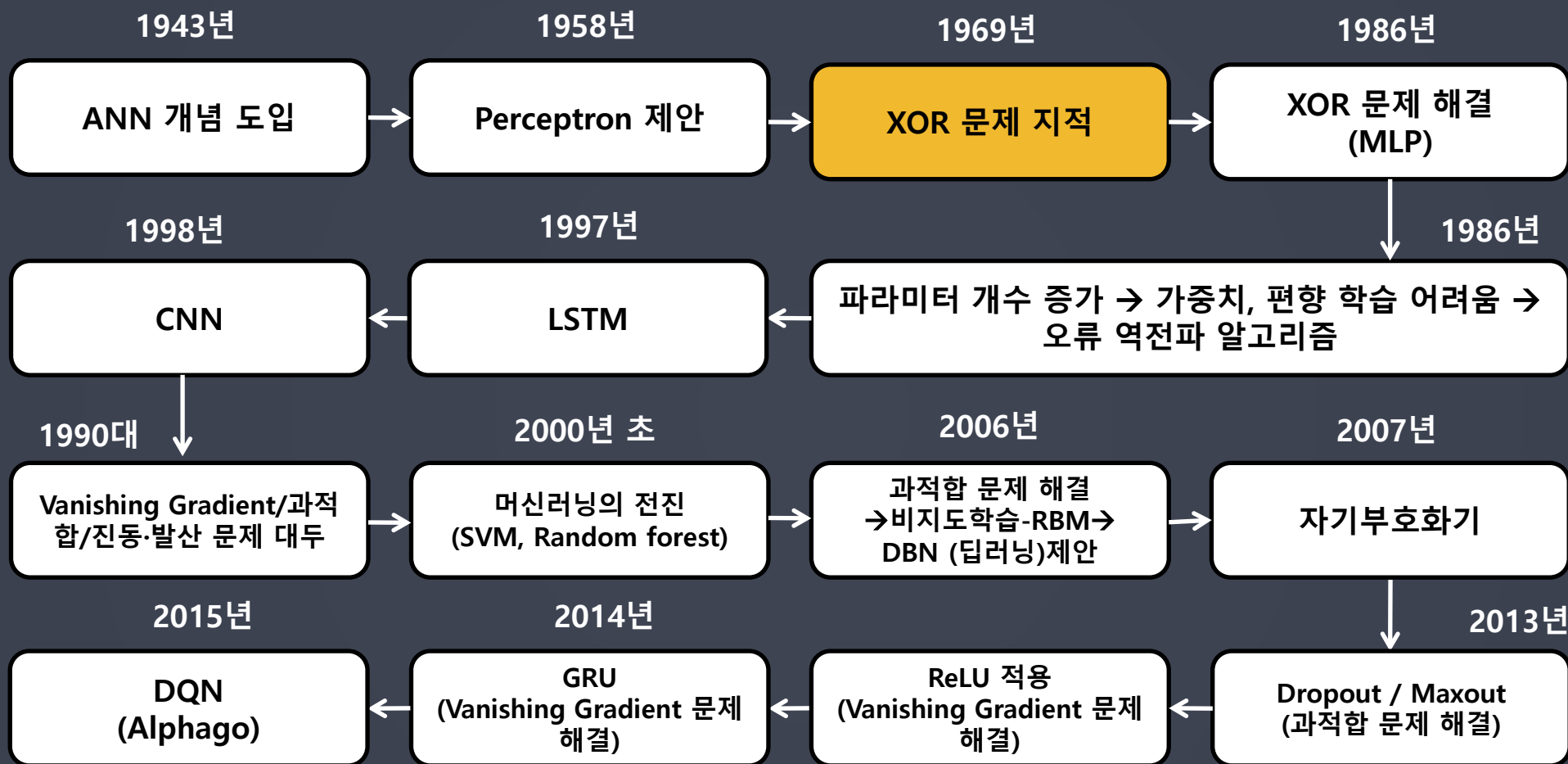
Step function(계단함수)



$$y = \begin{cases} 0, & (W_1X_1 + W_2X_2 + b \leq 0) \\ 1, & (W_1X_1 + W_2X_2 + b > 0) \end{cases}$$

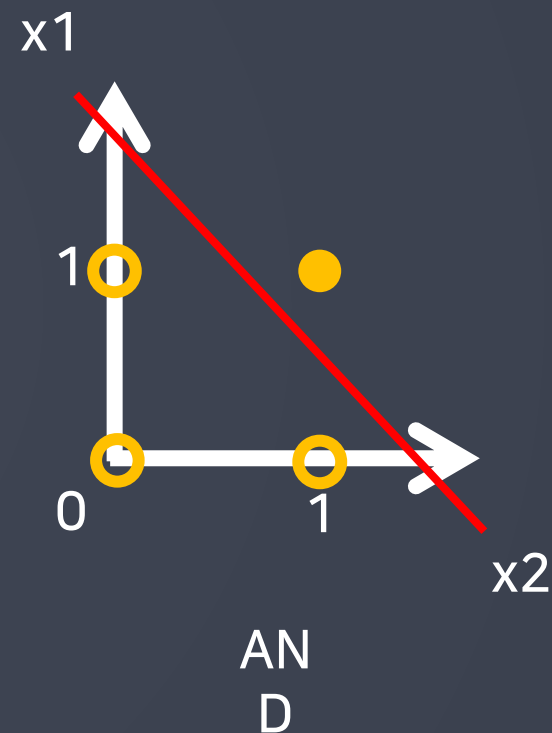
W_1, W_2 : 가중치 (weight) - 각 입력 신호가 결과에 주는 영향력을 조절하는 매개변수

b : 편향 (bias) - 뉴런이 얼마나 쉽게 활성화하느냐를 조절하는 매개변수



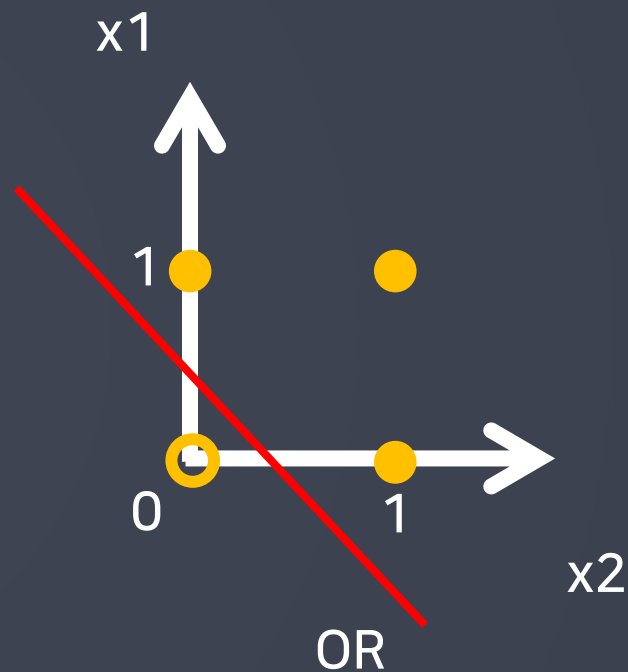
AND 게이트

x1	x2	AND
0	0	0
0	1	0
1	0	0
1	1	1



OR 게이트

x1	x2	OR
0	0	0
0	1	1
1	0	1
1	1	1

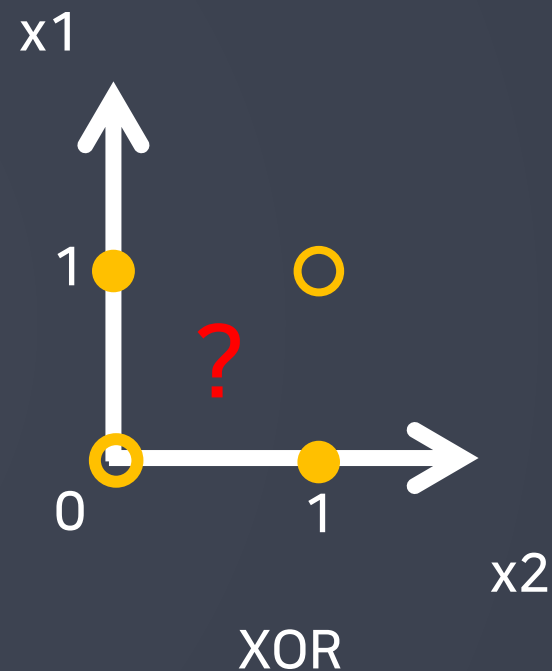


AND, OR는 해결이 가능하지만
간단한 XOR 문제를 해결 할 수 없다.

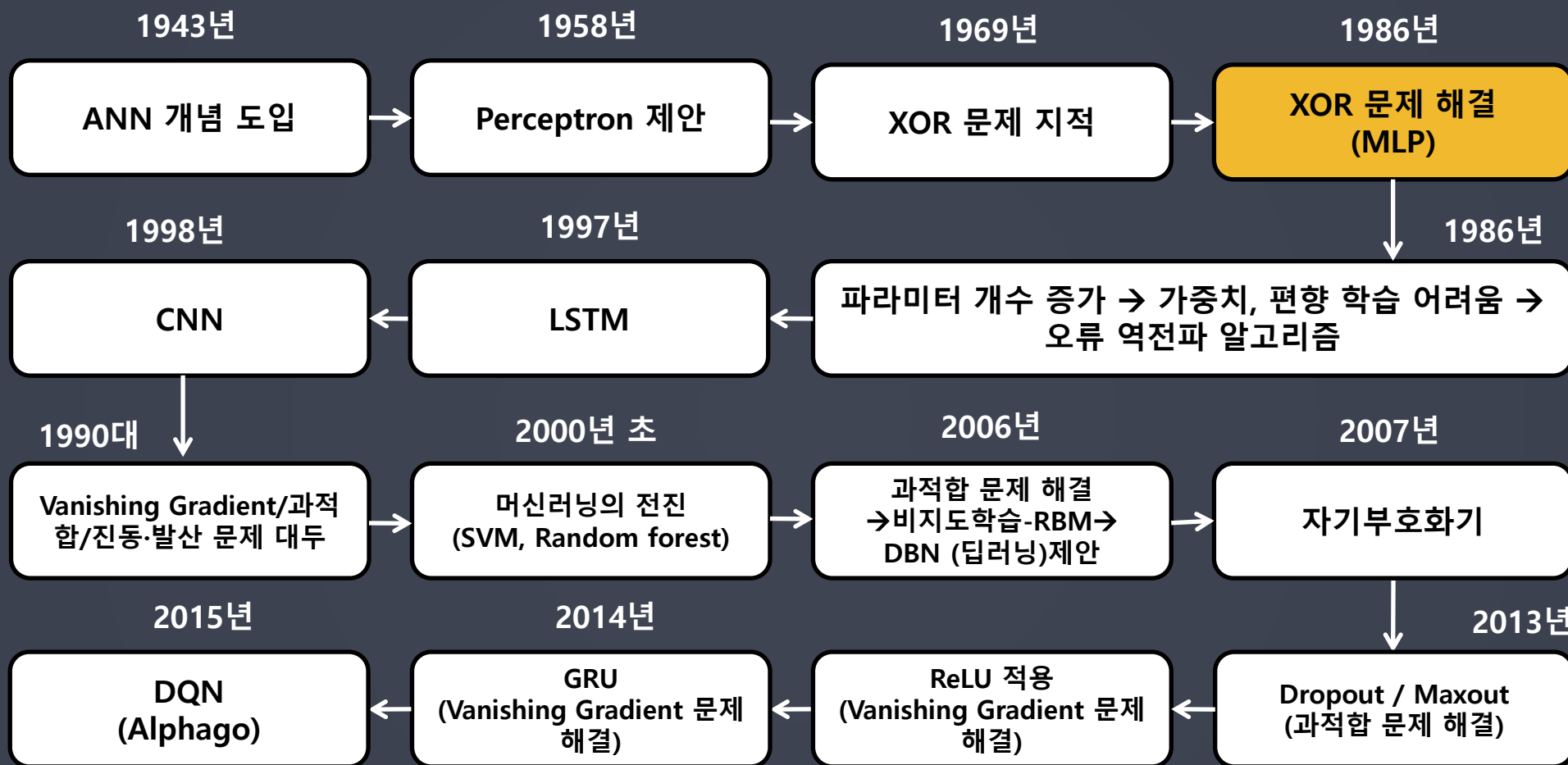


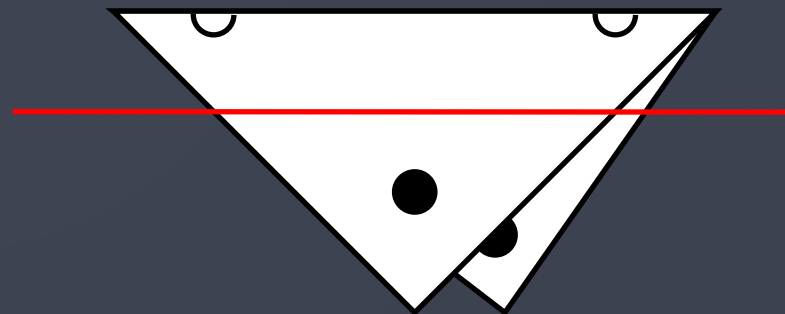
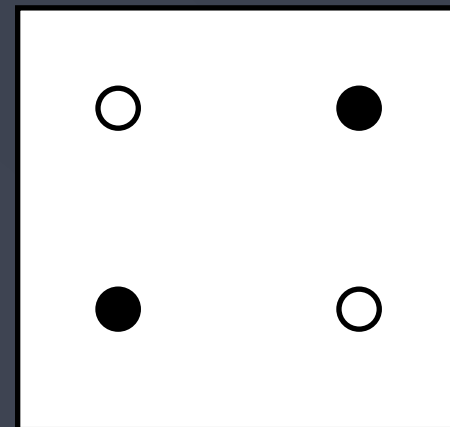
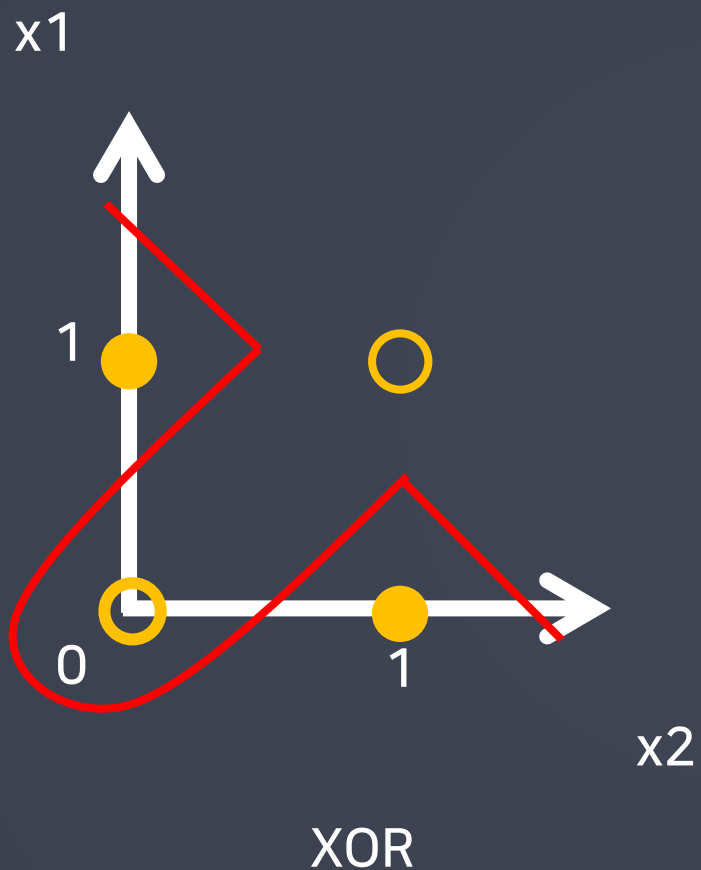
XOR 게이트

x1	x2	XOR
0	0	0
0	1	1
1	0	1
1	1	0



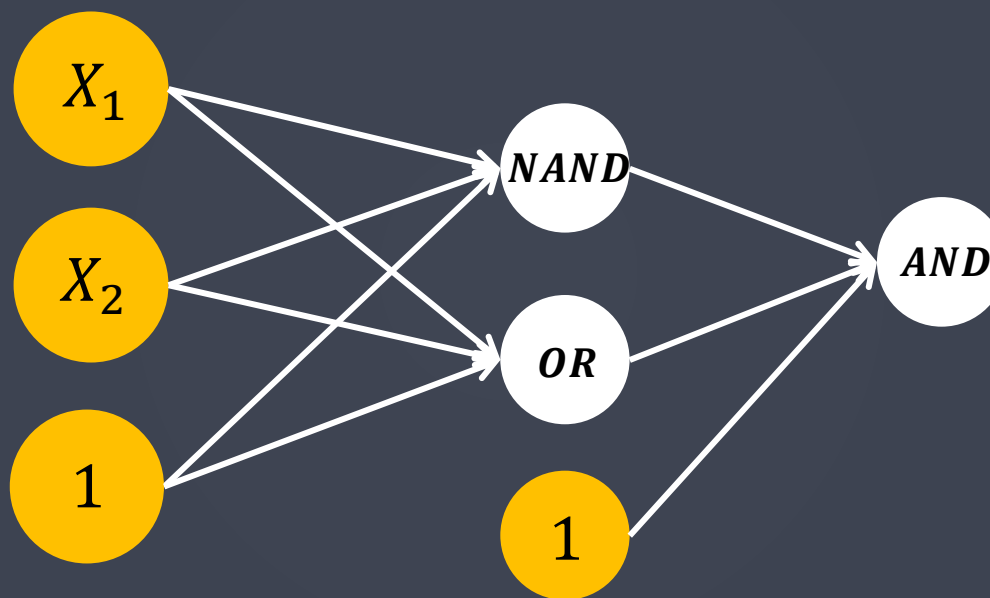
딥러닝 역사 - XOR 문제 해결(MLP)





다층 퍼셉트론(Multilayer Perceptron)

퍼셉트론을 여러 개의 층으로 구성하여 만든 신경망



NAND 게이트

x1	x2	NAND
0	0	1
0	1	1
1	0	1
1	1	0

x1	x2	NAND
0	0	1
0	1	1
1	0	1
1	1	0

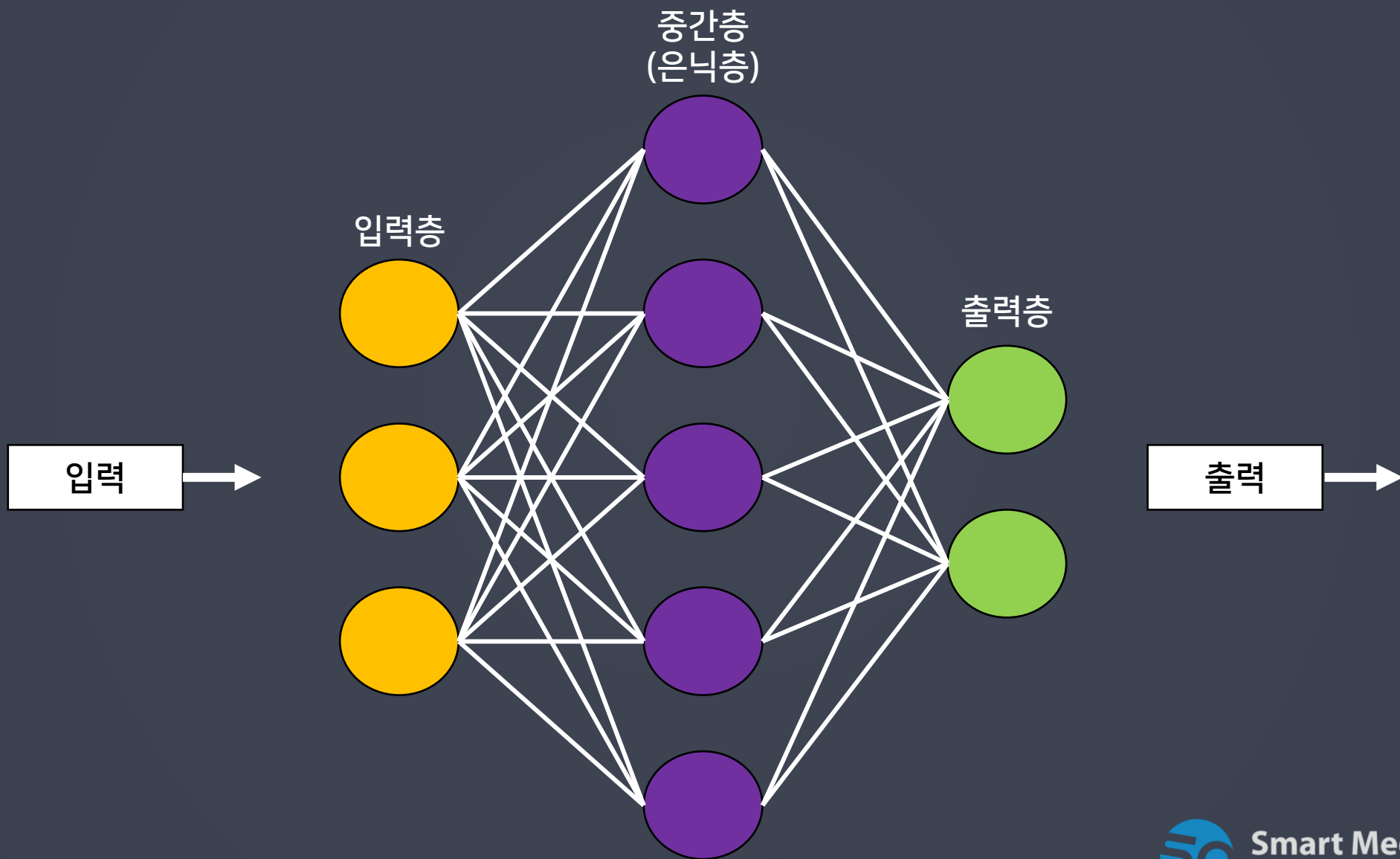
x1	x2	OR
0	0	0
0	1	1
1	0	1
1	1	1

NAND	OR	AND
1	0	0
1	1	1
1	1	1
0	1	0

==

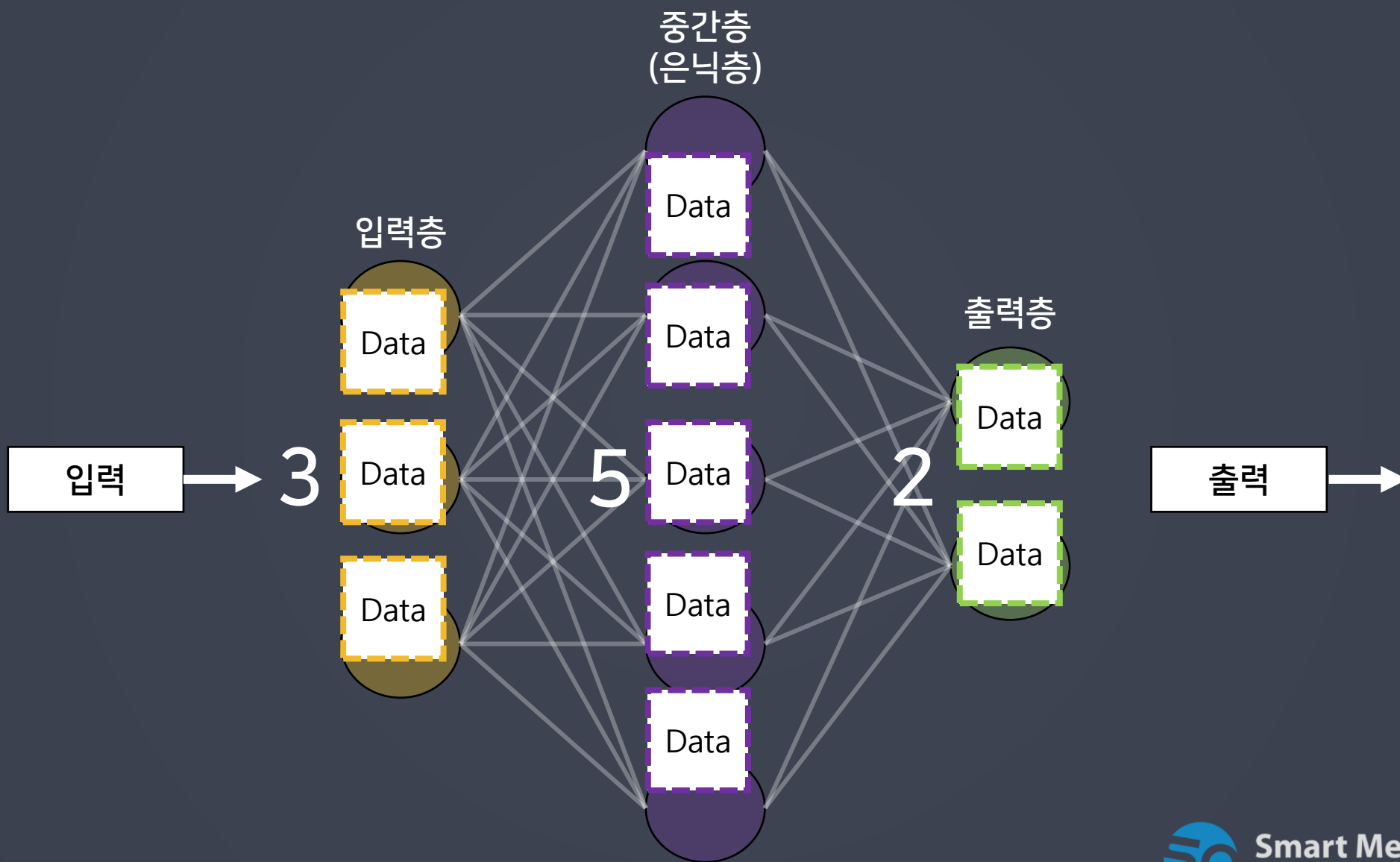
XOR
0
1
1
0

다층 퍼셉트론(Multilayer Perceptron)

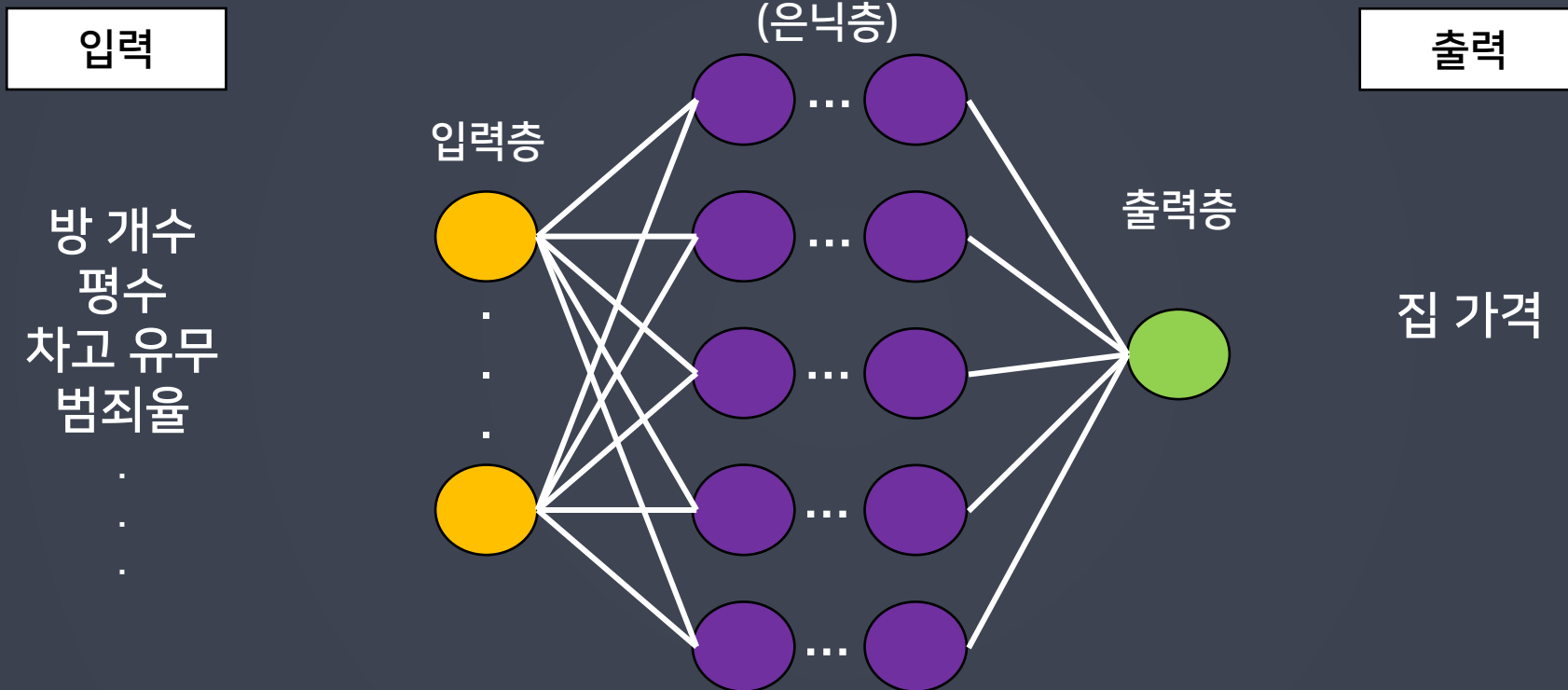


- 비선형 데이터를 분리 할 수 있다.
- 학습시간이 오래 걸린다.
- 가중치 파라미터가 많아 과적합되기 쉽다.
- 가중치 초기 값에 민감하며 지역 최적점에 빠지기 쉽다.

다층 퍼셉트론(Multilayer Perceptron)



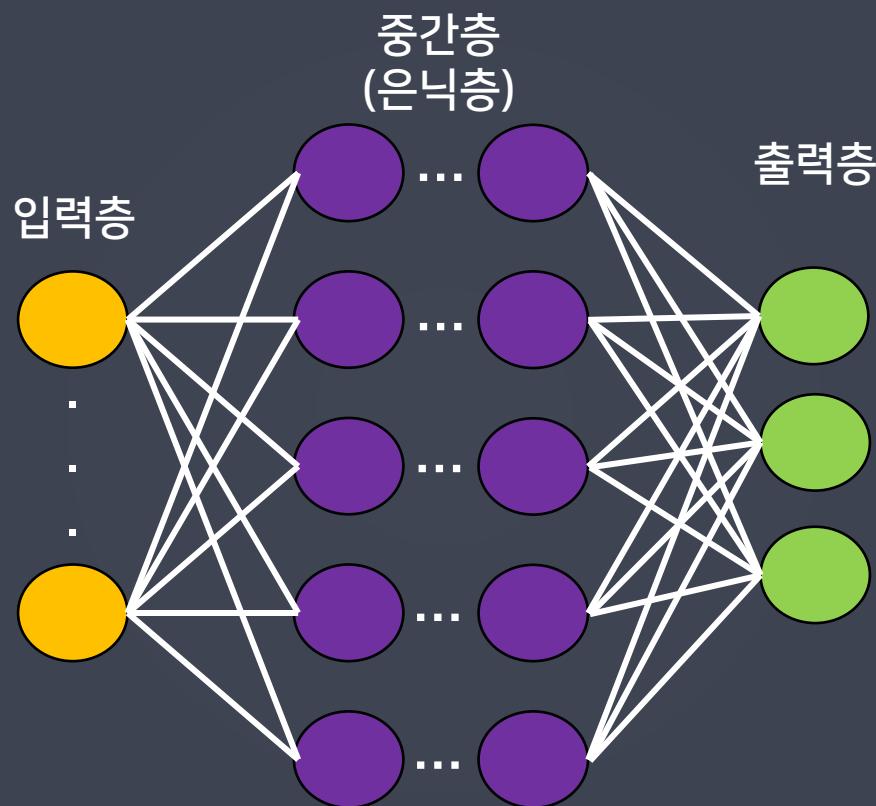
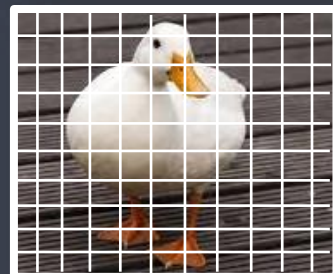
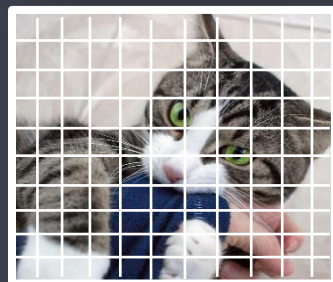
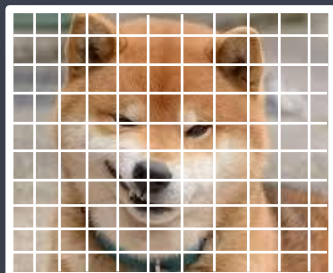
다층 퍼셉트론(Multilayer Perceptron)



다층 퍼셉트론(Multilayer Perceptron)

입력

28 x 28 사진



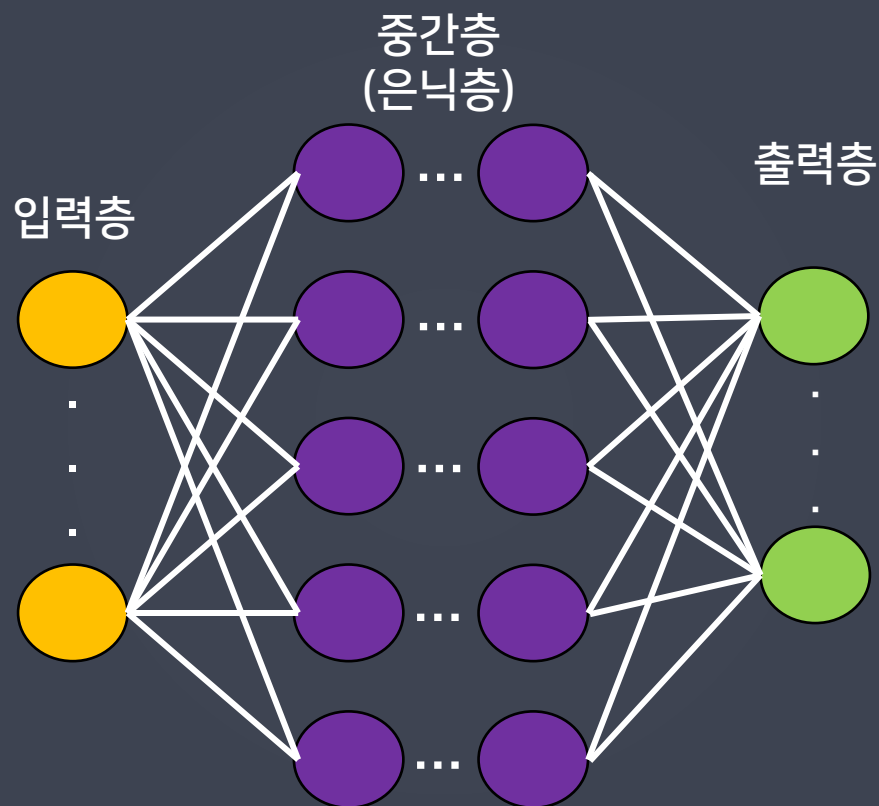
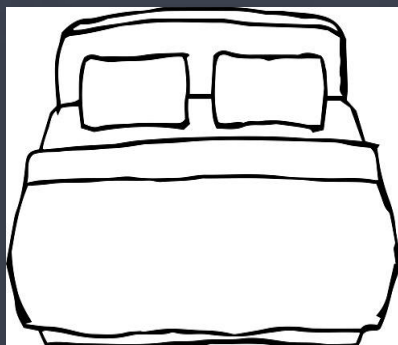
출력

강아지 사진일 확률
고양이 사진일 확률
오리 사진일 확률

다층 퍼셉트론(Multilayer Perceptron)

입력

28 x 28 사진



출력

28 x 28 사진

