PyTorch Zero To All 6

Logistic Regression

오수지

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Logistic Regression

Hours (x)	Points	fail/pass
1	2	0
2	4	0
3	6	1
4	?	?

Continuous Data

Discrete Data

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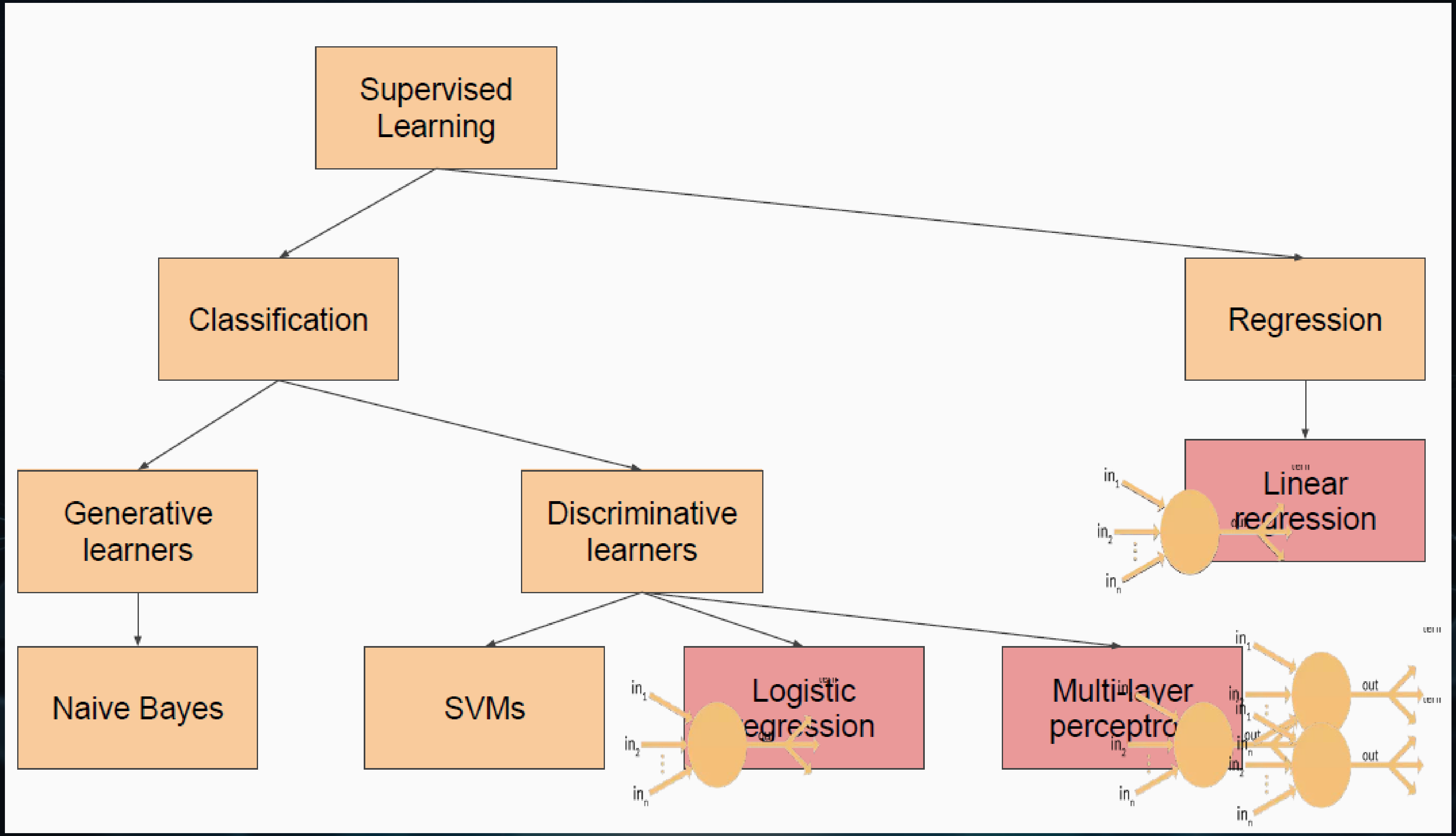
Logistic Regression



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Logistic Regression

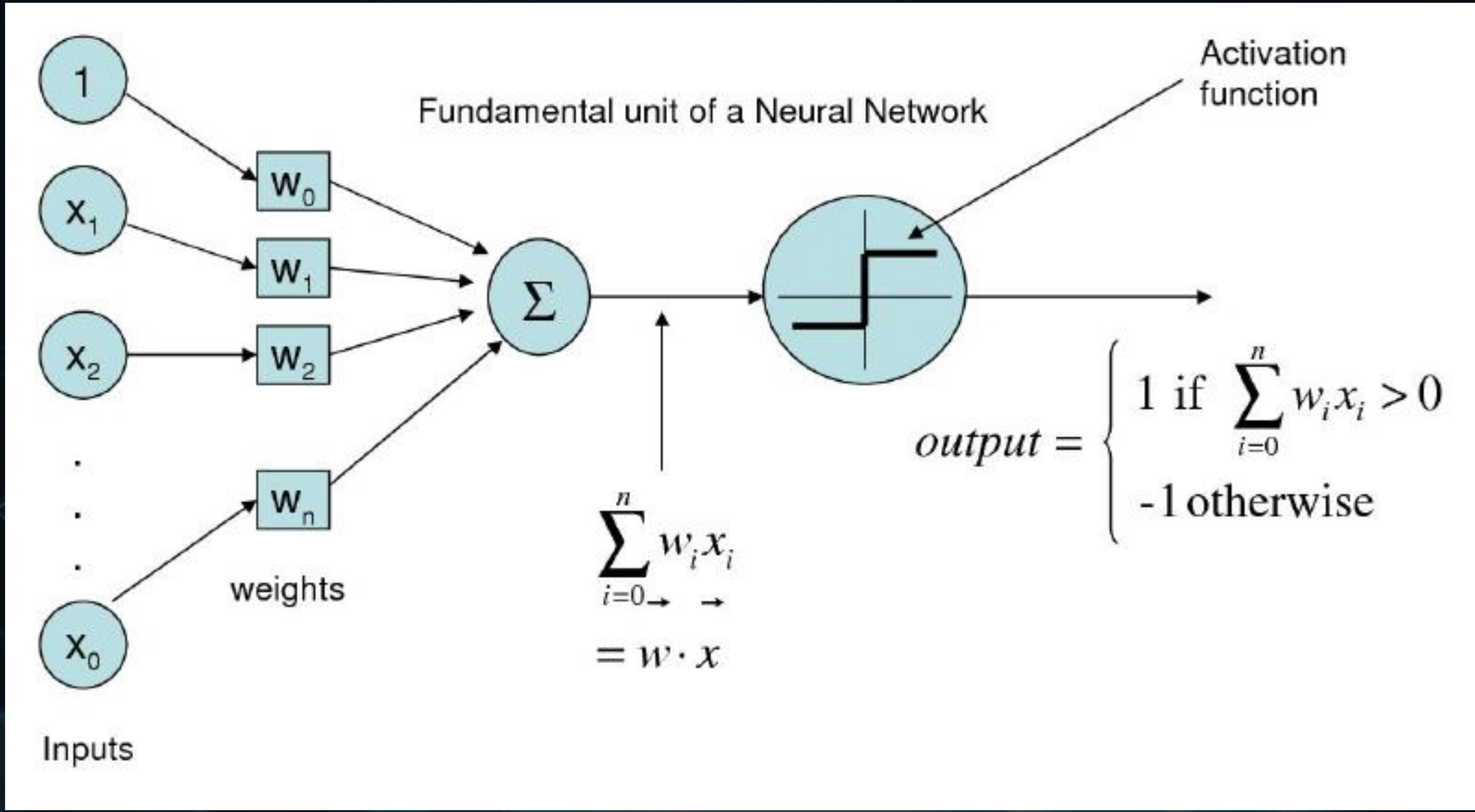
Linear Regression

Sample	Temperature x_1	Rain/snow x_2	km of biking
s1	-22	10	2
s2	-24	12	0
s3	-15	20	3
s4	-8	13	4
s5	-5	40	3
s6	8	45	8
s7	-2	5	10
s8	5	5	12
s9	12	2	12
s10	8	5	14
s11	12	20	20
s12	13	15	20
s13	15	10	25
s14	18	5	20
s15	19	20	40

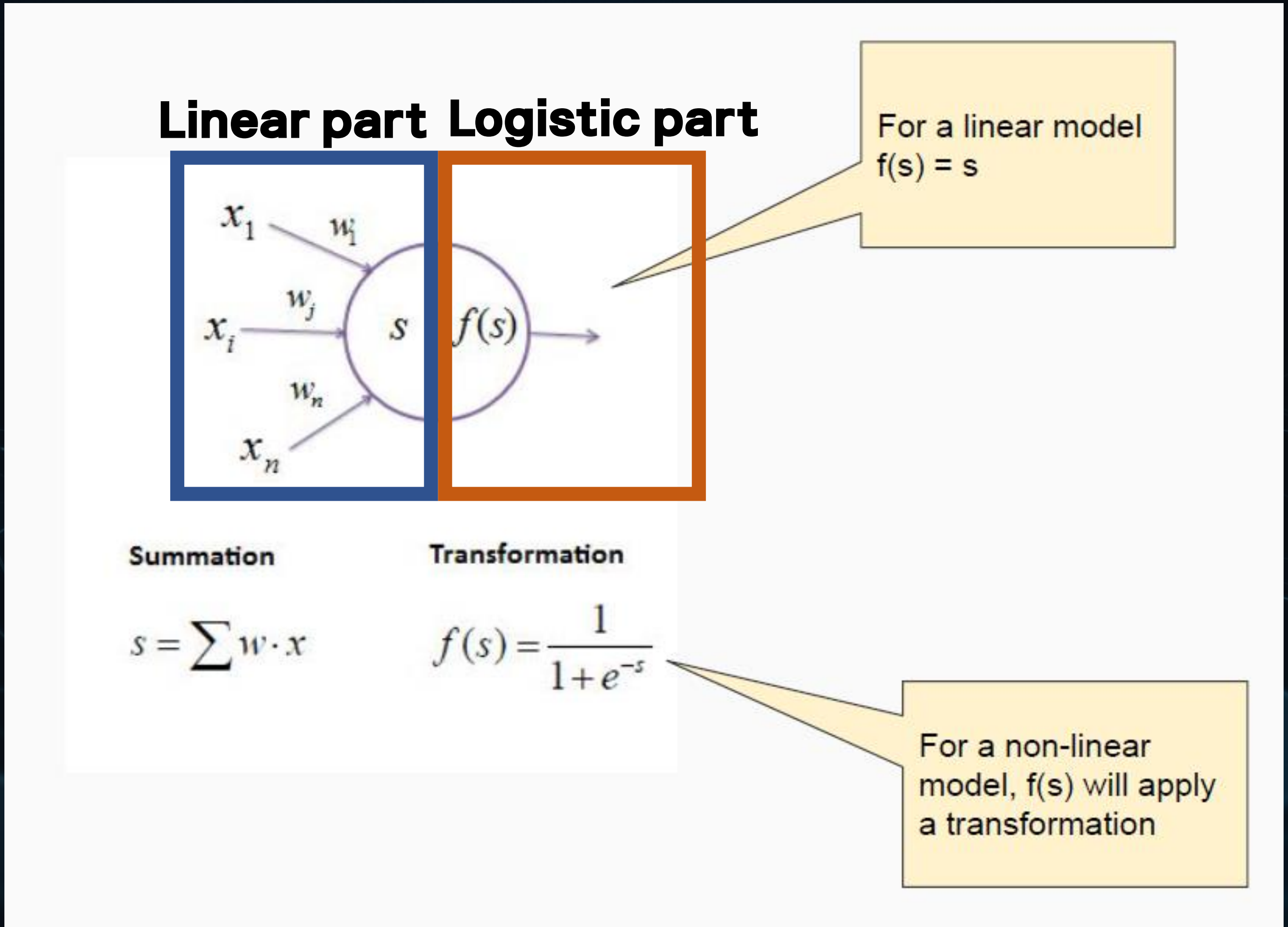
Logistic Regression

Sample	Temperature x_1	Rain/snow x_2	Bike / Drive
s1	-22	10	Drive
s2	-24	12	Drive
s3	-15	20	Drive
s4	-8	13	Drive
s5	-5	40	Drive
s6	8	45	Drive
s7	-2	5	Bike
s8	5	5	Bike
s9	12	2	Bike
s10	8	5	Bike
s11	12	20	Bike
s12	13	15	Bike
s13	15	10	Bike
s14	18	5	Bike
s15	19	20	Bike

Logistic Regression



Logistic Regression



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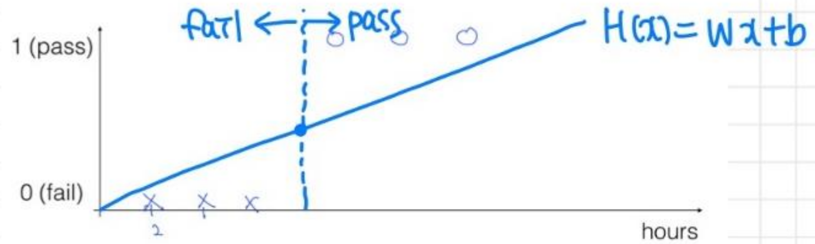
Logistic Regression

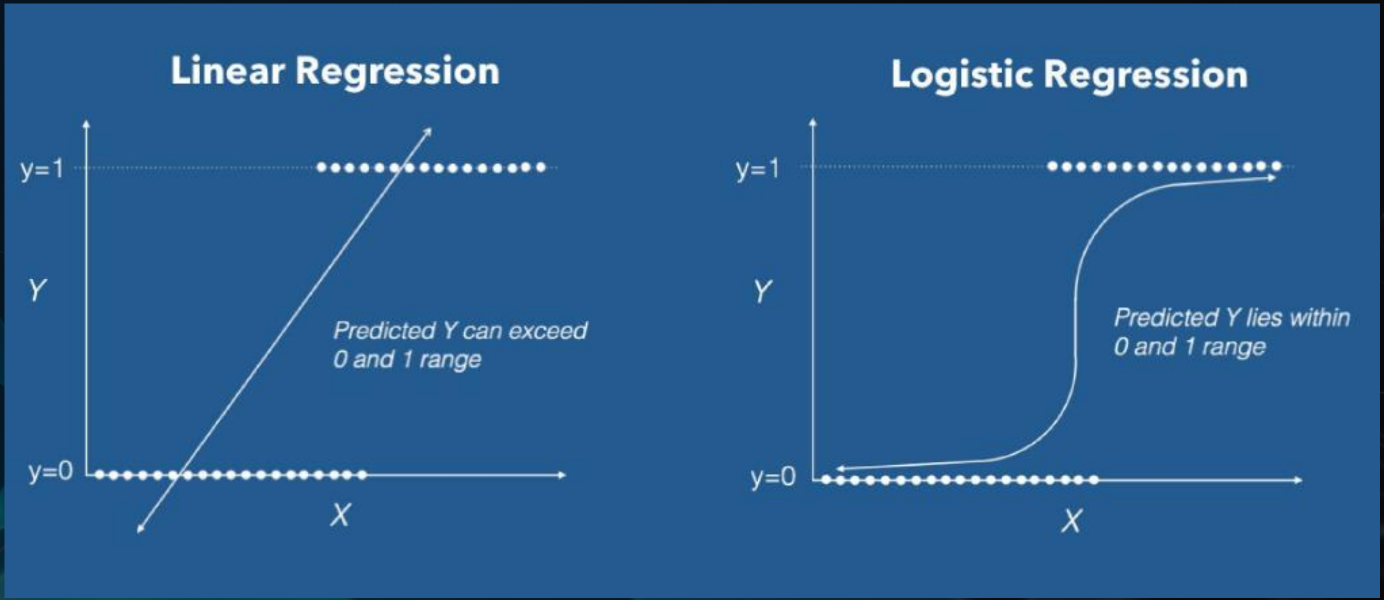
- Classification을 Linear Regression으로 할 수 없을까?



⇒ 가능은 함

⇒ BUT 예측값은 0 ~ 1 인데
Input에 따라 H(x)는 1보다 크거나 0보다 작은 값을 리턴함

↳ H(x) 값이 항상 0에서 1 사이에 있으려면?



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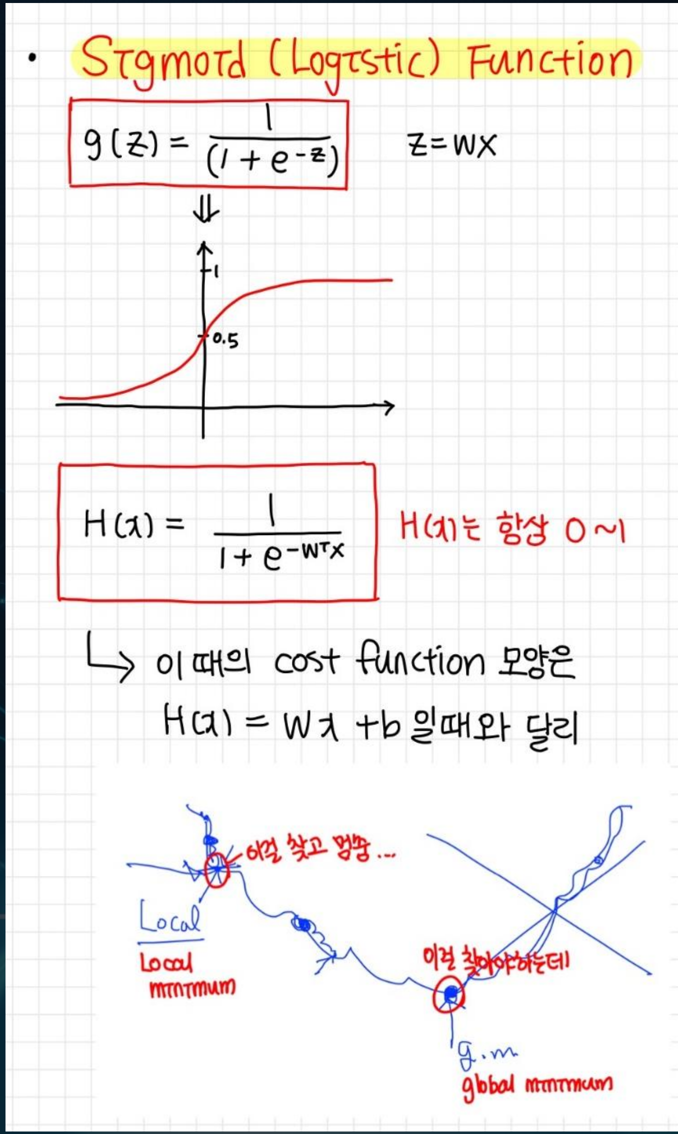
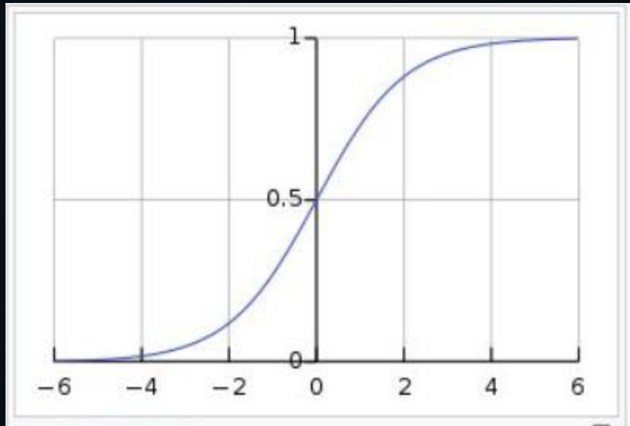
Logistic Regression





The logistic curve

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Logistic Regression

- 이 경우를 위한 NEW COST FUNCTION !

$$cost(W) = \boxed{\frac{1}{m}} \sum c(H(x), y)$$

전체 cost의 평균

$$c(H(x), y) = \begin{cases} -\log(H(x)) & : y=1 \\ -\log(1-H(x)) & : y=0 \end{cases}$$

$$= -y\log(H(x)) - (1-y)\log(1-H(x))$$

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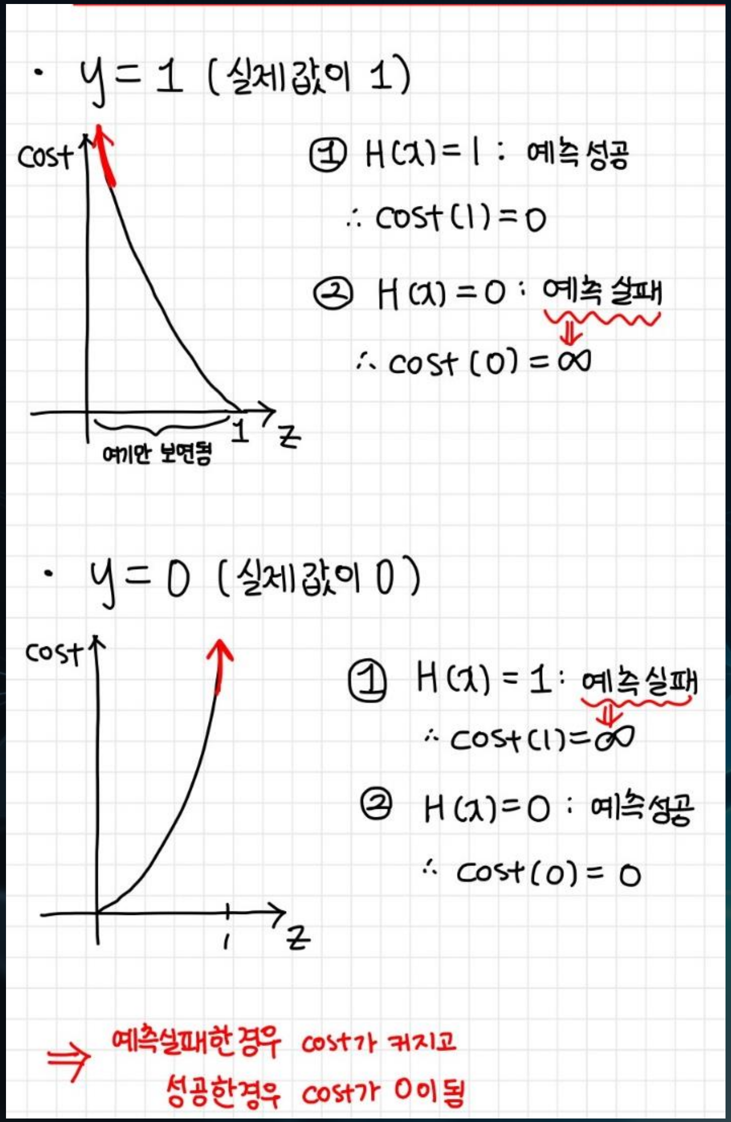
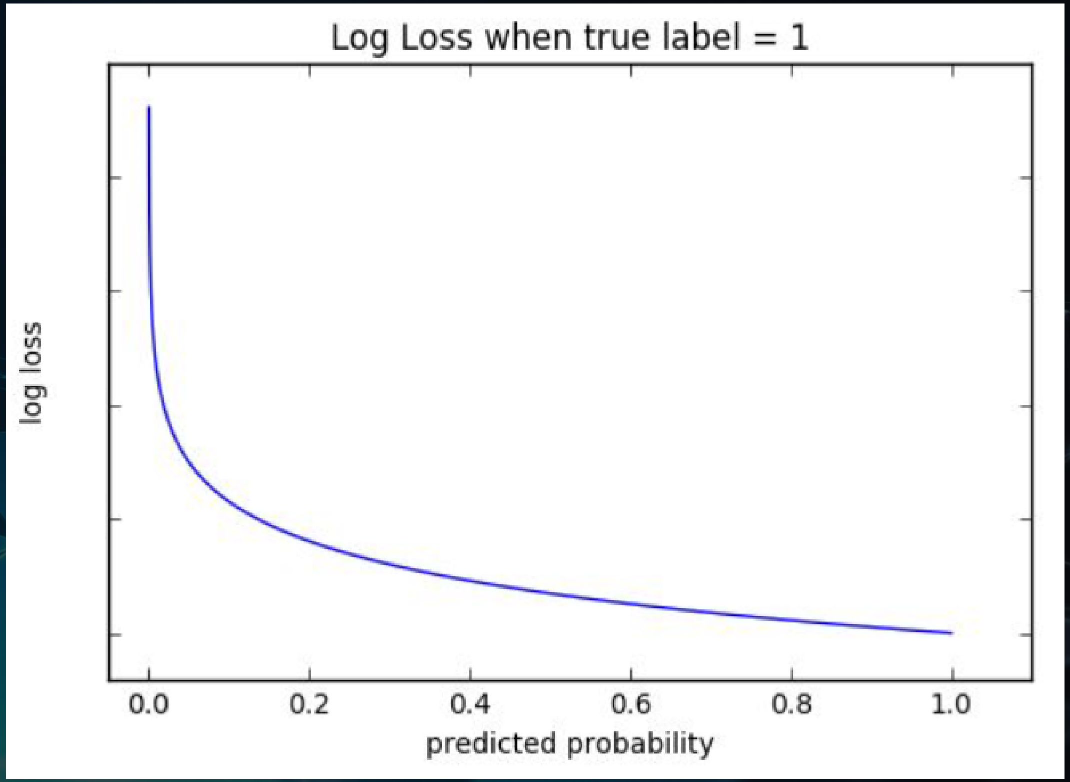
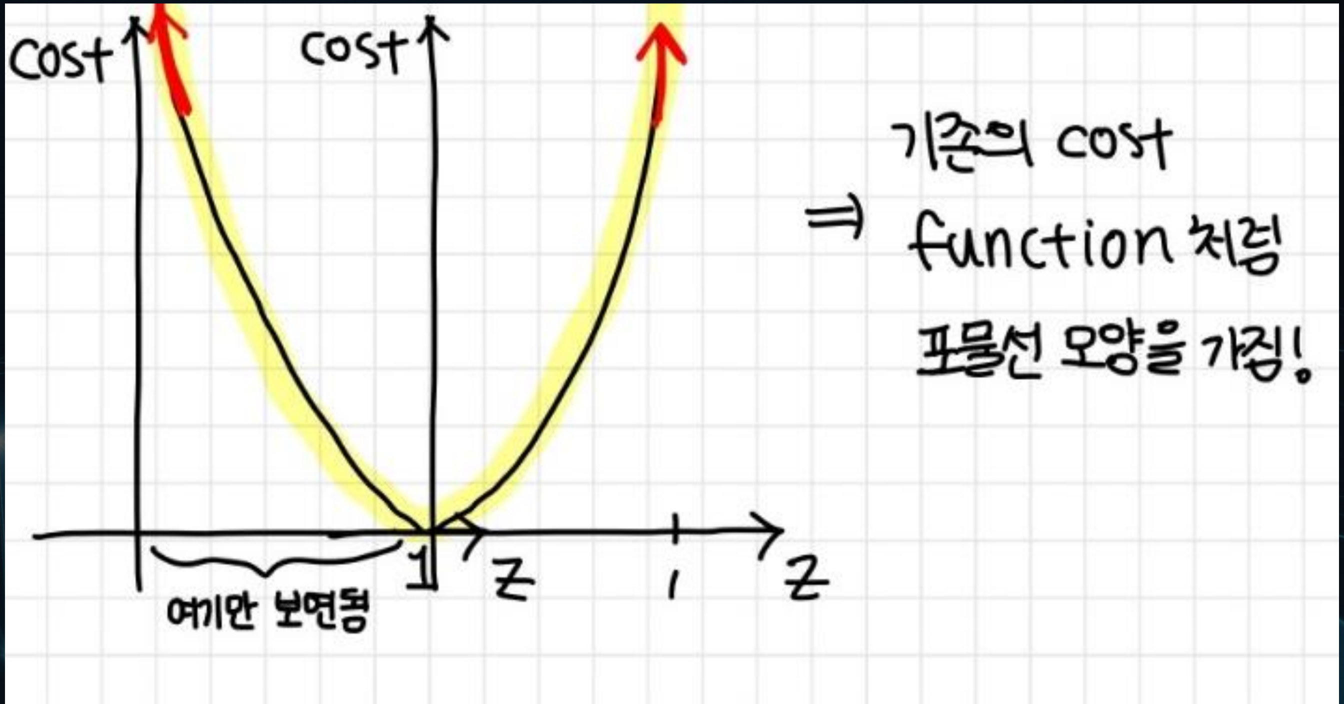
Logistic Regression





Logistic Regression



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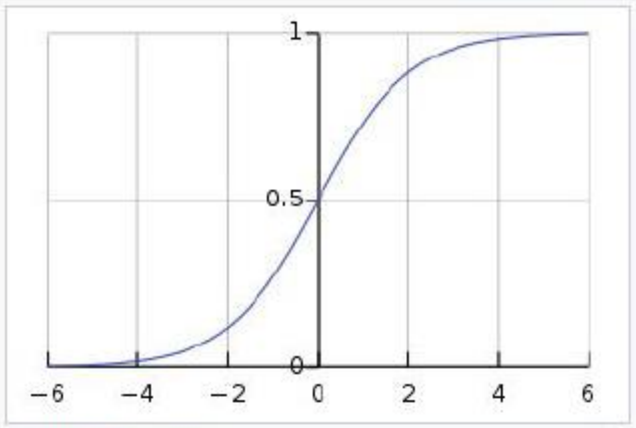
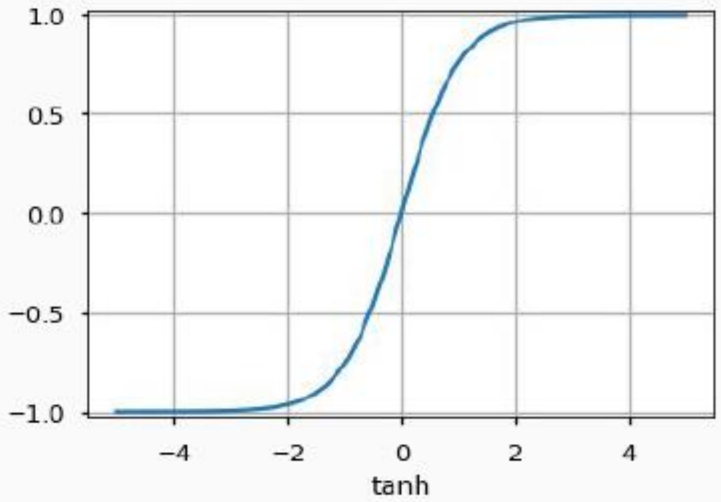
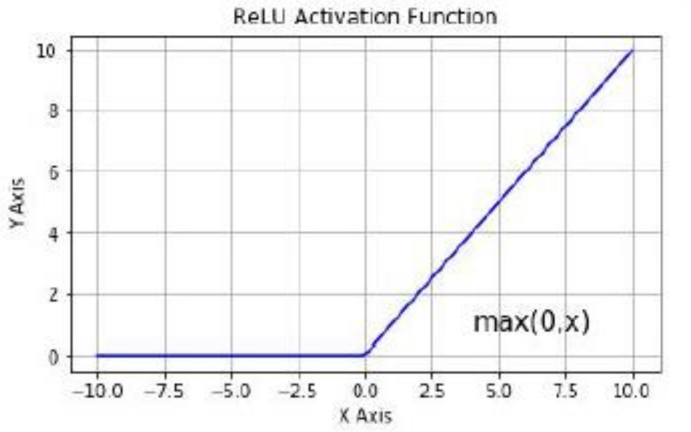
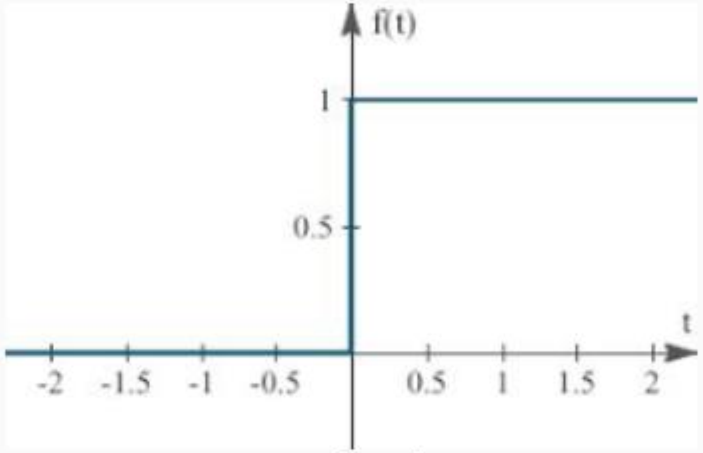


The logistic curve







Step function

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Logistic Regression

procedure *Logistic_regression_learner*(Xs, Y, Es, η)

Inputs

Xs: set of input features, $Xs = \{X_1, \ldots, X_n\}$

Y: target feature

Es: set of training examples

η: learning rate

Output

function to make prediction on examples

Local

$w_0, \ldots, w_n$: real numbers

initialize $w_0, \ldots, w_n$ randomly

define $pred(e) = sigmoid\left(\sum_i w_i * X_i(e)\right)$

repeat

for each example e in Es in random order **do**

$error := Y(e) - pred(e)$

$update := \eta * error$

for each $i \in [0, n]$ **do**

$w_i := w_i + update * X_i(e)$

until termination

return $pred$

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D-ai-ving

감사합니다!