

Lecture 6 :- Logistic Regression. ①

$$\hat{y} = x * w + b \rightarrow \text{Linear}$$

$$\text{Sigmoid } \sigma(z) = \frac{1}{1 + e^{-z}} \rightarrow \text{Linear + Sigmoid}$$

$$\hat{y} = \sigma(x * w + b)$$

→ Cross Entropy Loss

$$x \rightarrow \text{Linear} \rightarrow \text{Sigmoid} \rightarrow \hat{y}$$

$$\text{loss} = -\frac{1}{N} \sum_{n=1}^N y_n \log \hat{y}_n + (1 - y_n) \log (1 - \hat{y}_n)$$

(Binary) Cross Entropy Loss

(2)

$$\text{loss} = -\frac{1}{N} \sum_{n=1}^N y_n \log \hat{y}_n + (1 - y_n) \log (1 - \hat{y}_n)$$

n	y	y-pred	loss
1	1	0.2	
2	0	0.1	

1) $y=1$, $\hat{y}=0.2$, $\text{loss}=?$, $N=1$

~~$\text{loss} = -\frac{1}{1} \sum_{n=1}^1 \frac{1}{1} \log(0.2) + (1-1) \log(1-0.2)$~~

$$\text{loss} = -\frac{1}{1} \sum (1 \log(0.2) + (1-1) \log(1-0.2))$$

$$= -1 \sum (1 \log(0.2) + 0)$$

$$\text{loss} = -1 \log(0.2)$$

2) $y=0$, $\hat{y}=0.1$, $\text{loss}=?$, $N=1$

$$= -\frac{1}{1} \sum (0(\log(0.1)) + (1-0) \log(1-0.1))$$

$$= -1 \sum (0 + 1 \log(0.9))$$

$$\text{loss} = -\log(0.9)$$