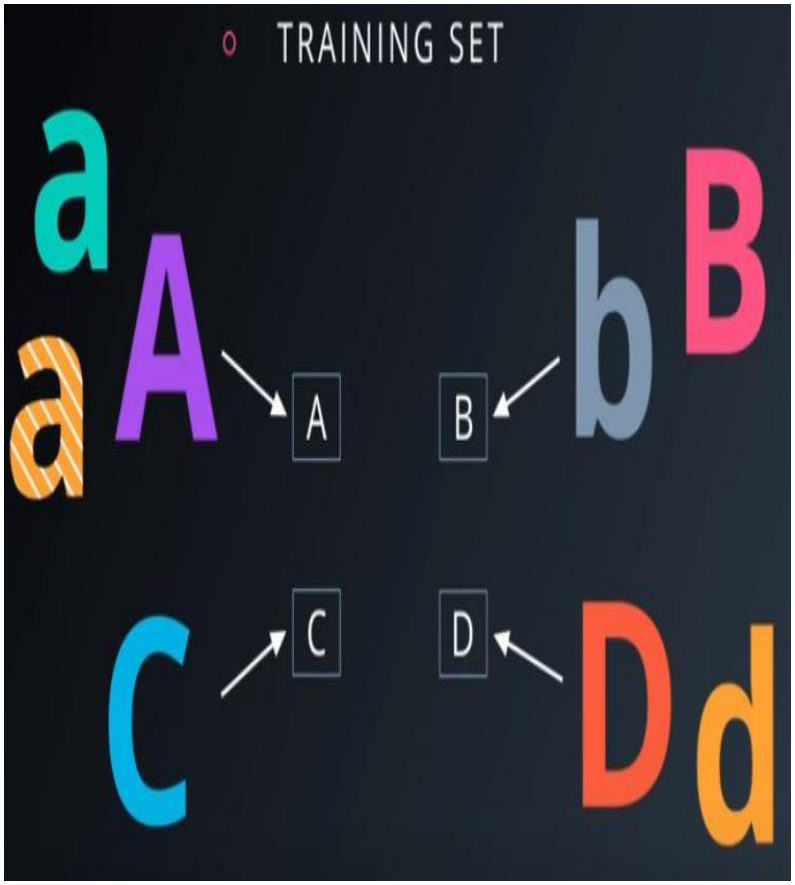
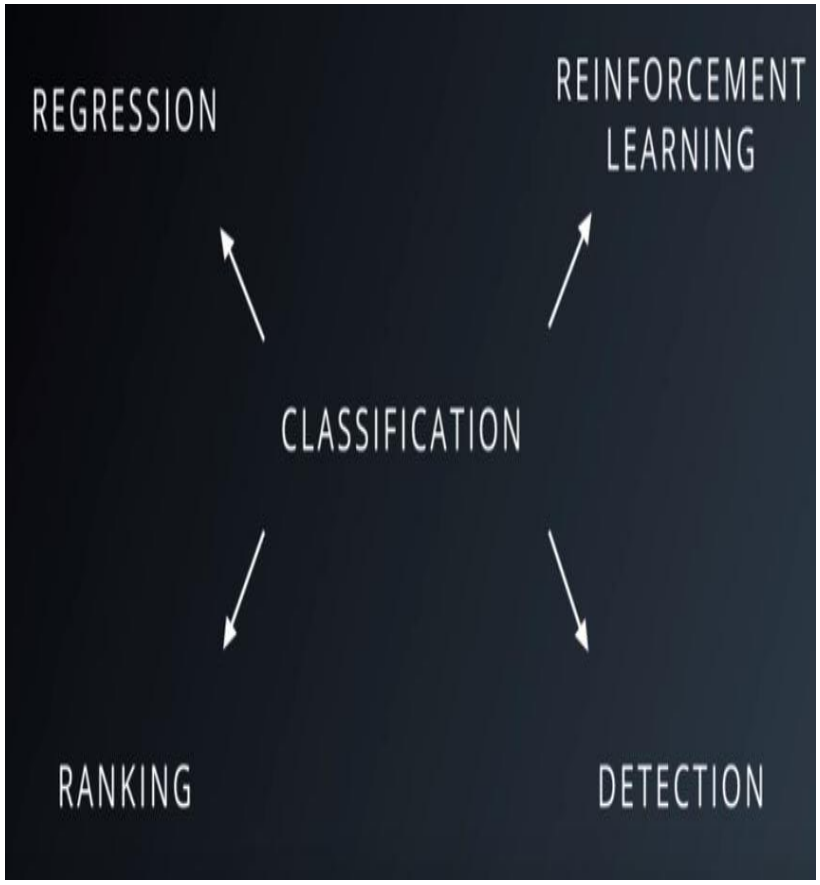
UDACITY Deep Learning
1강

"From Machine Learning
To Deep Learning"

1. What is Deep Learning?

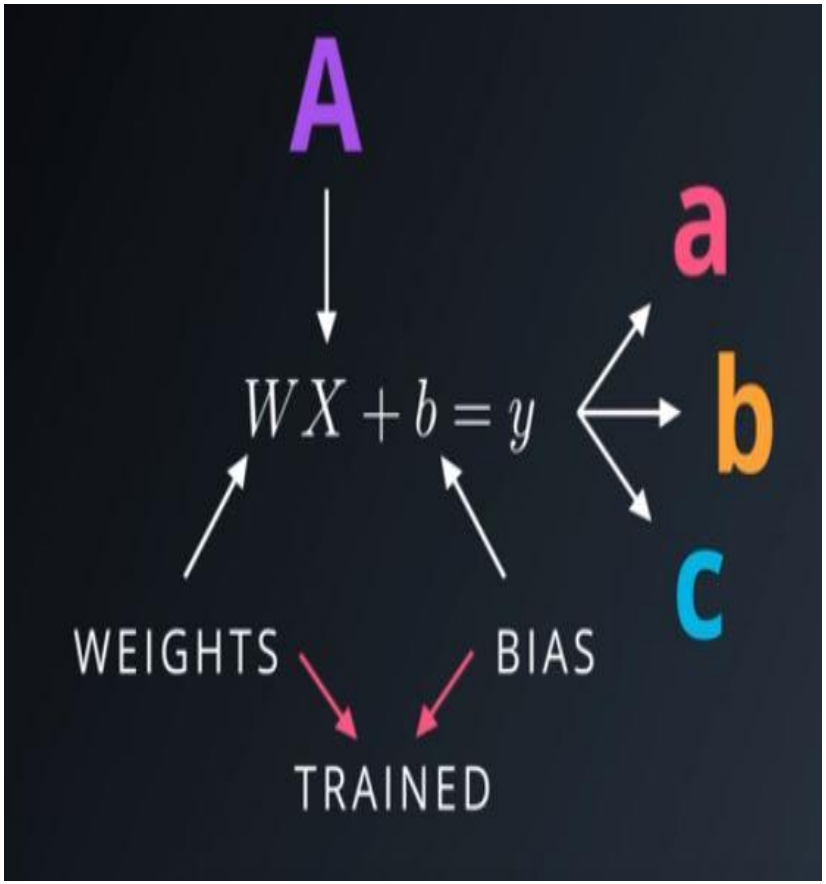
2. Superviesed Classification

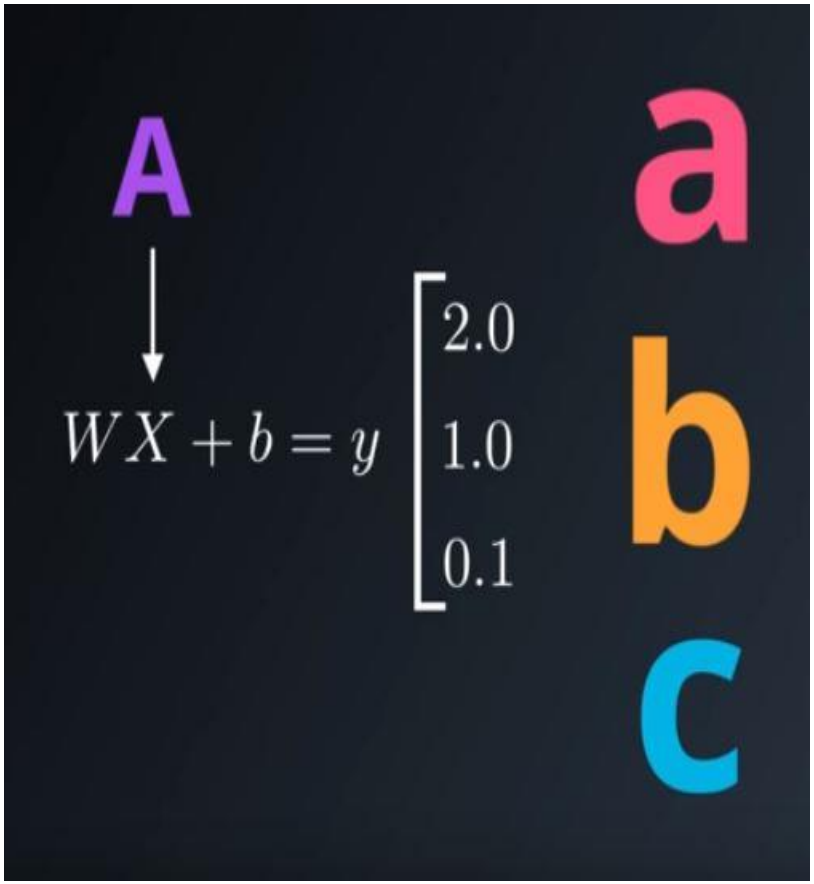




2. Superviesed Classification

Bio Keras



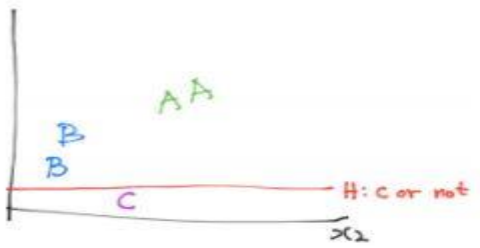


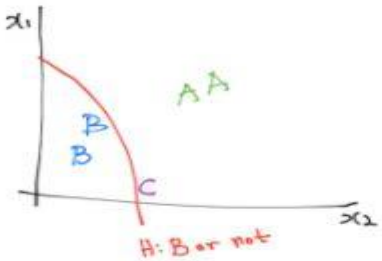
2. Superviesed Classification

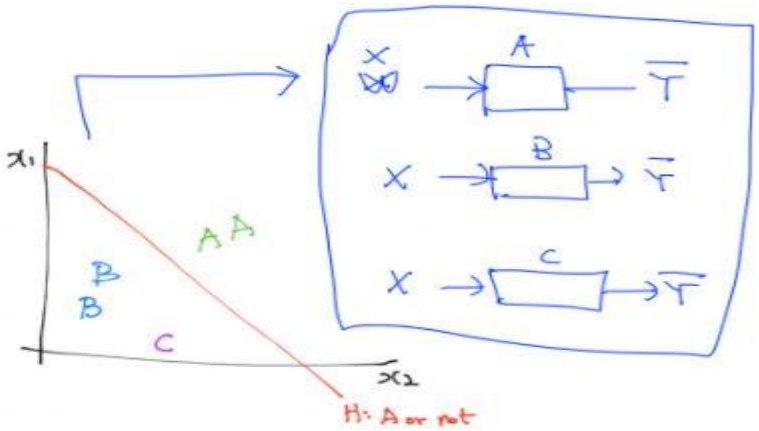
x1(hours)	x2(attendance)	y(grade)
10	5	A
9	5	A
3	2	B
2	4	B
11	1	C

`A, B, C` 세 개가 있을 때

- A or B, C
- B or A, C
- C or A, C 이렇게 세개의 Classifier가 있으면 가능 하다.

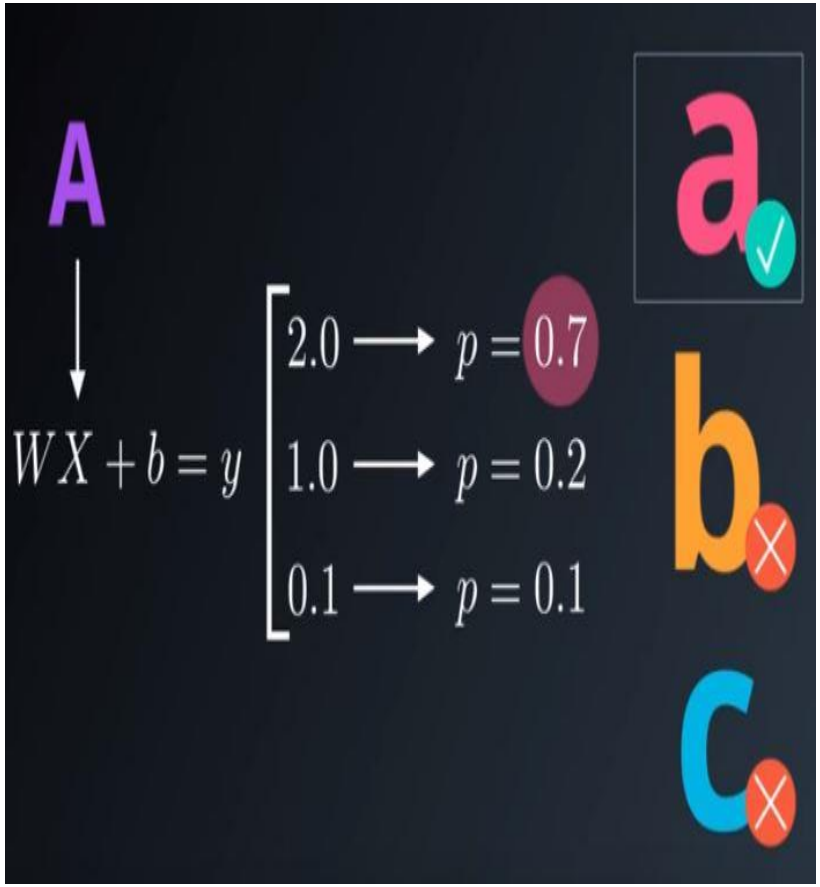


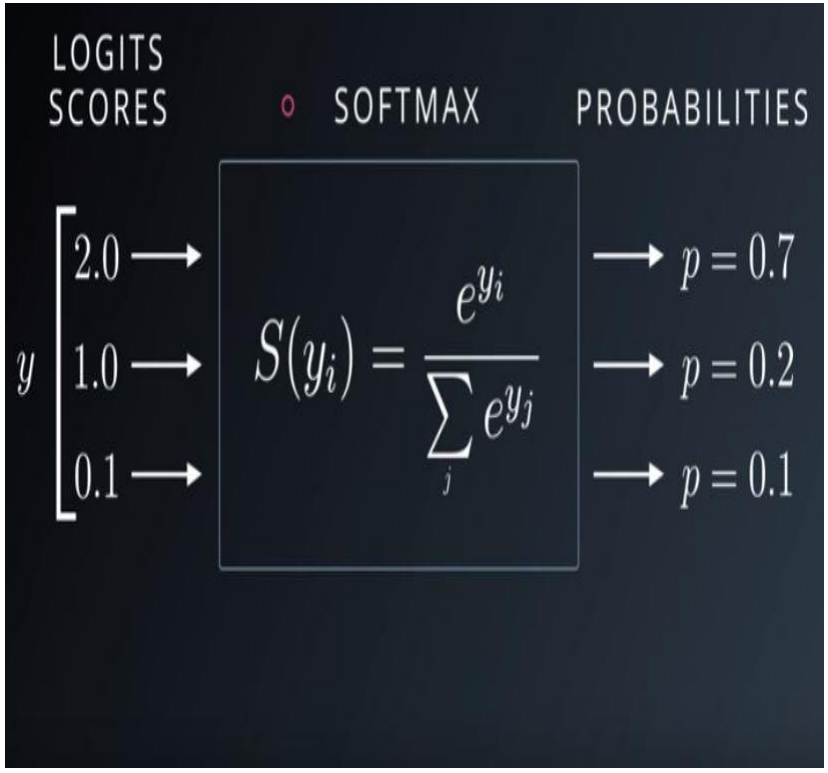




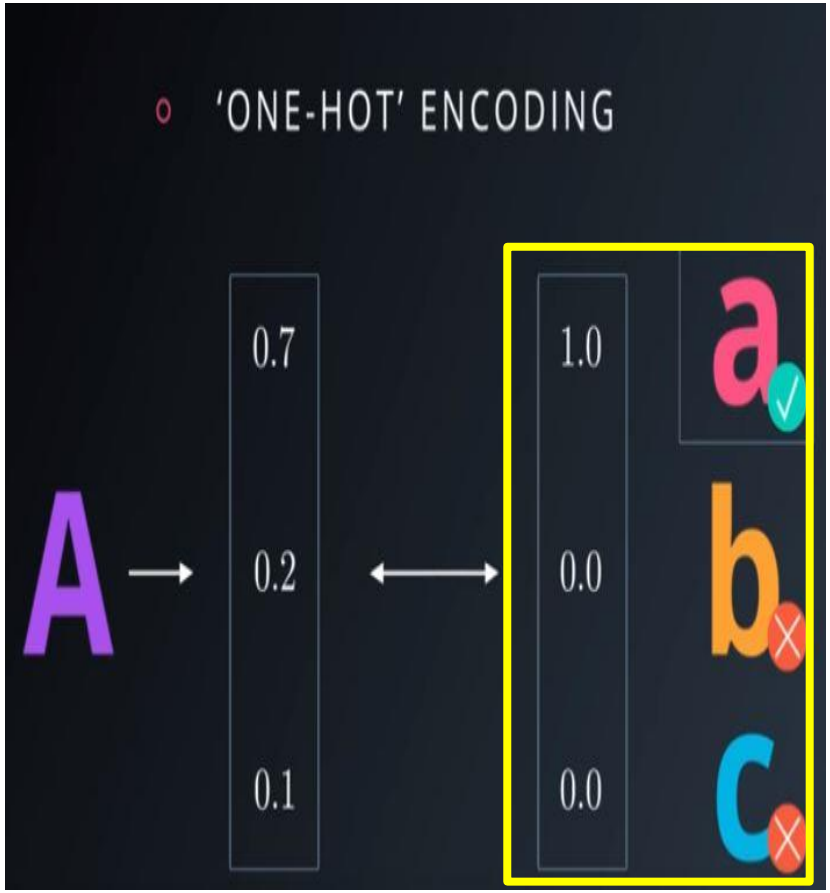
3. Softmax

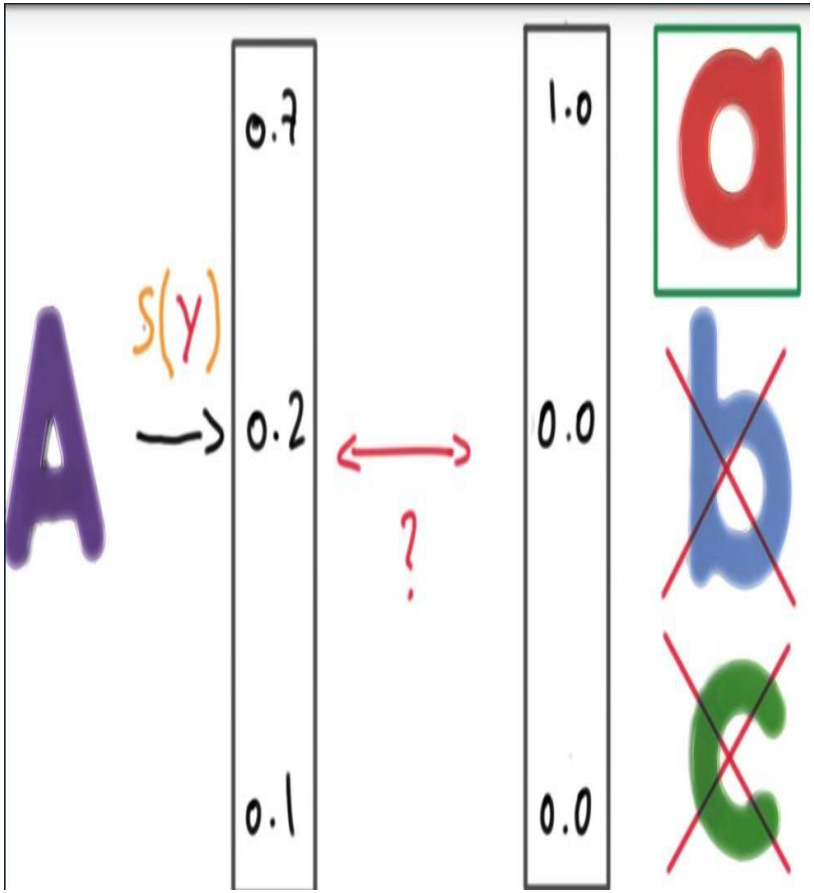
1. $0 \leq y_i \leq 1 (i = 1,2,..n)$
2. $\sum S(y_i) = 1$





4. Cross – Entropy

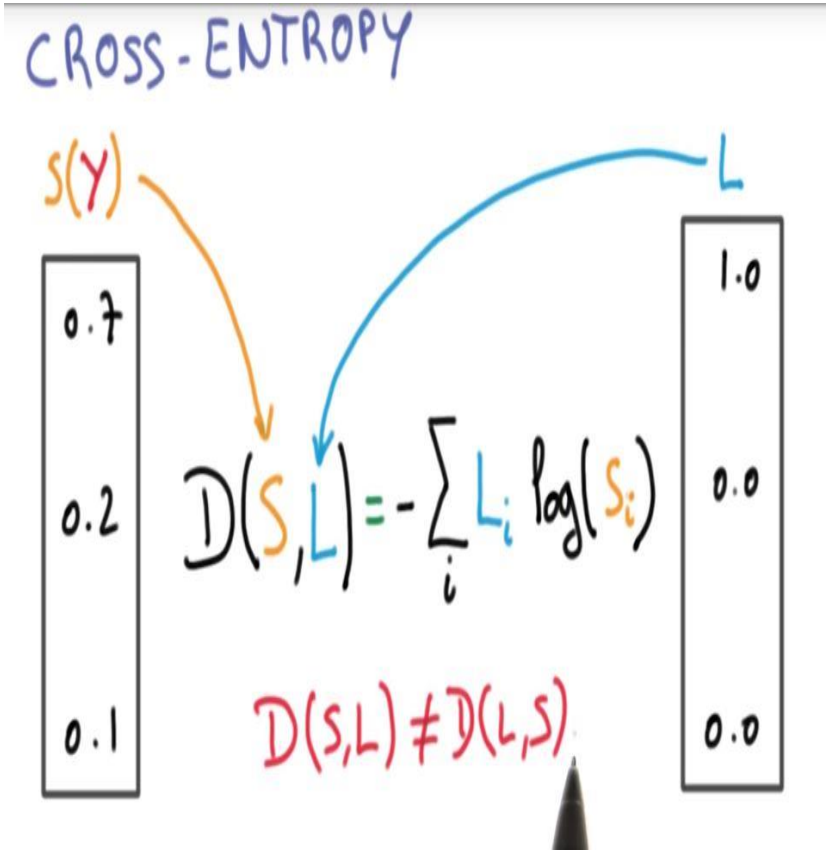


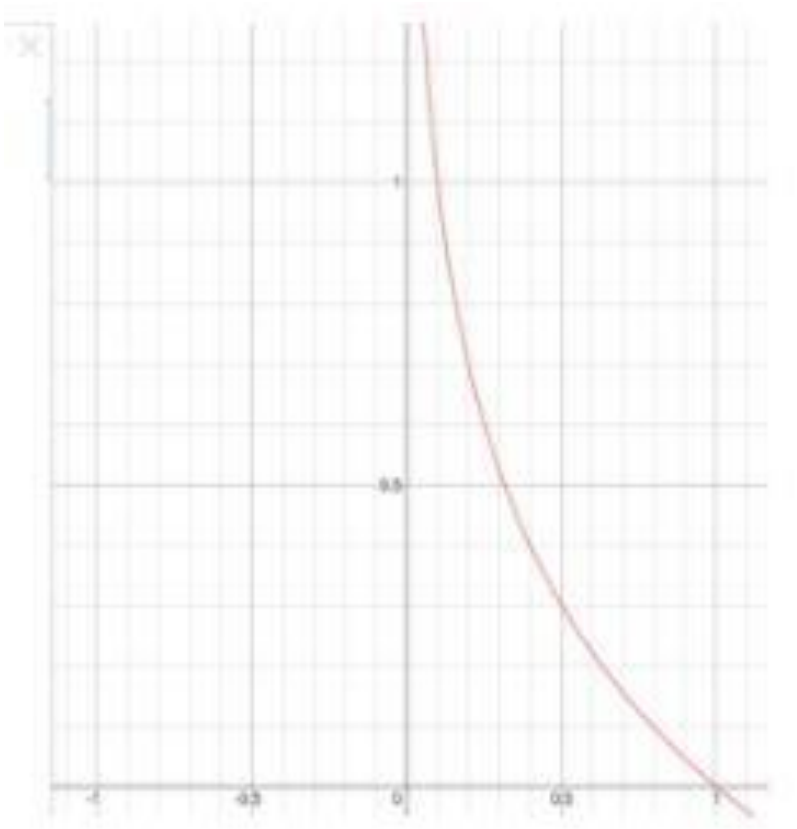


4. Cross – Entropy

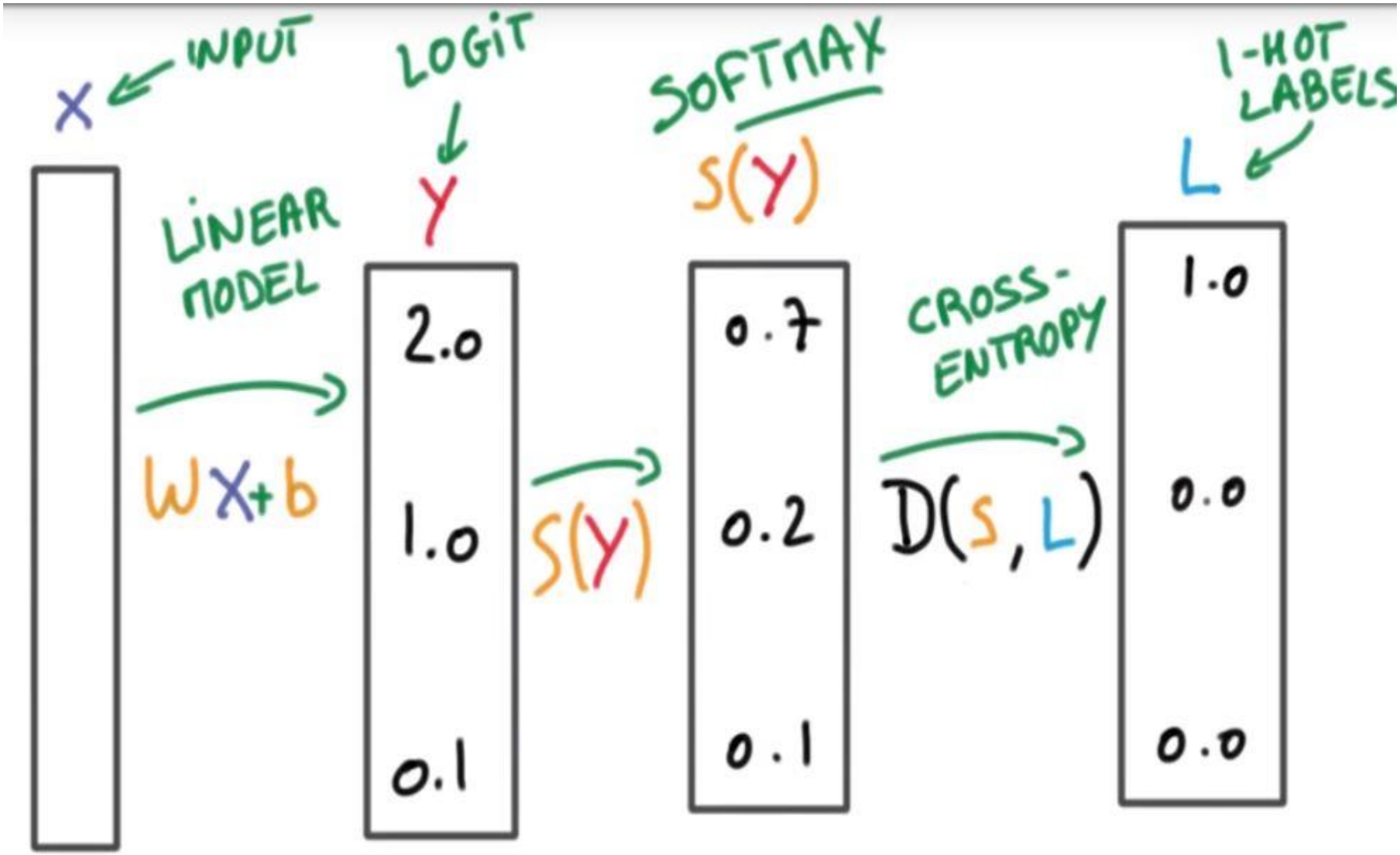
$-\sum L_i \, logS(y_i) = -\sum L_i \, logS(\text{y(hat)})$

y = -log(x)의 그래프





5. Recapitulation



6. Optimization

$$D(S(wx + b), L)$$

$$D(A, a) \qquad D(A, b)$$

$$\mathcal{L} = \frac{1}{N} \sum_i D(S(wx_i + b), L_i)$$

TRAINING SET

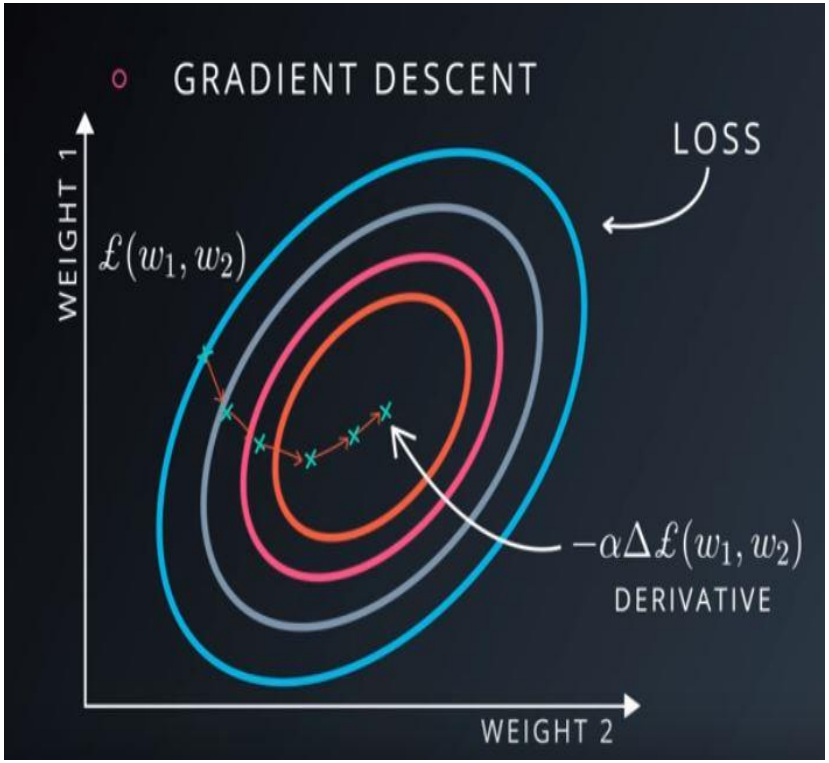
LOSS = AVERAGE CROSS-ENTROPY

BIG MATRIX!!

$$\mathcal{L} = \frac{1}{N} \sum_i D(S(wx_i + b), L_i)$$

BIG SUM!!

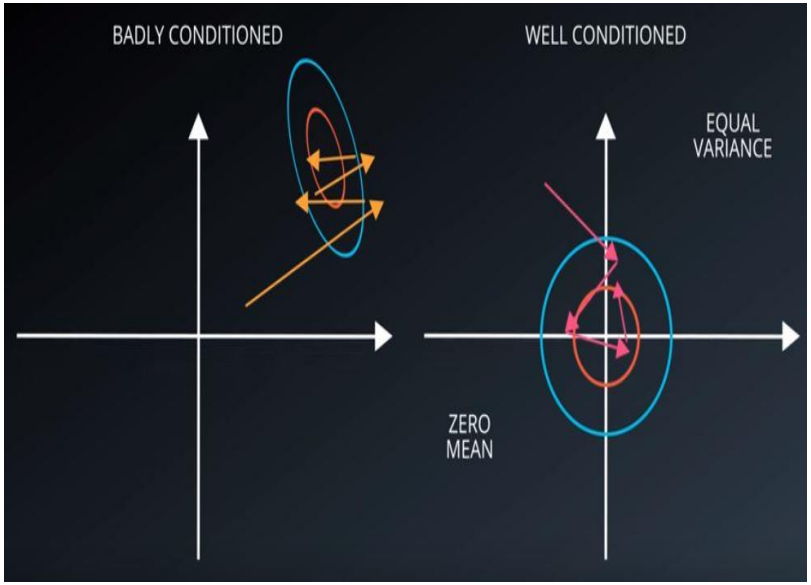
6. Optimization



원점수(raw score)를 z점수로 변환하기

$$z = \frac{X - \mu}{\sigma}$$ (전집(population)자료의 경우)

$$z = \frac{X - \bar{X}}{s}$$ (표본(sample)자료의 경우)



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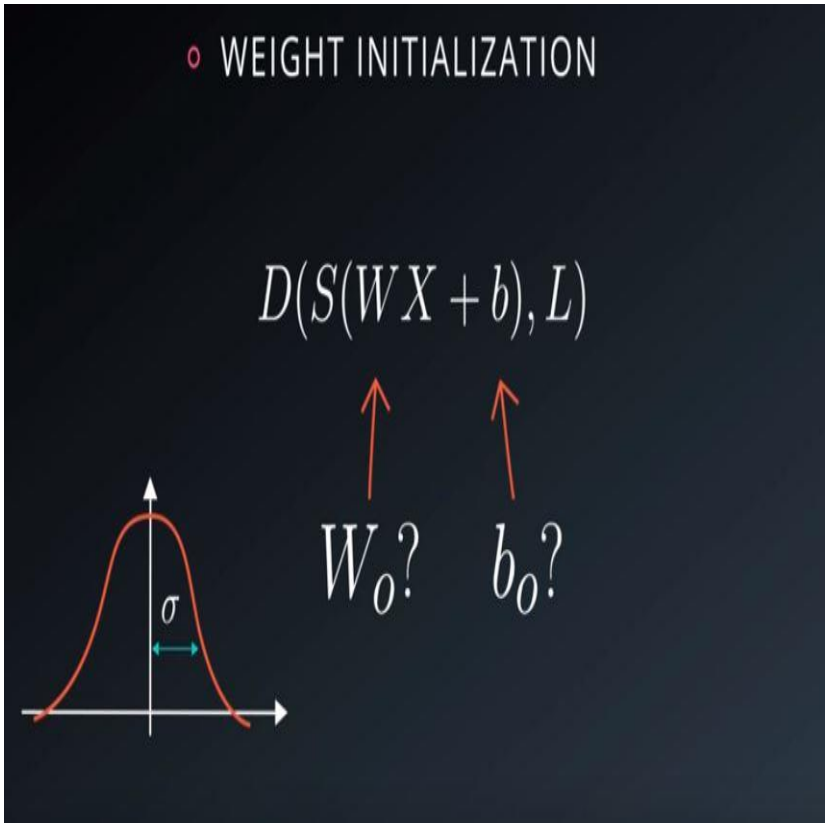
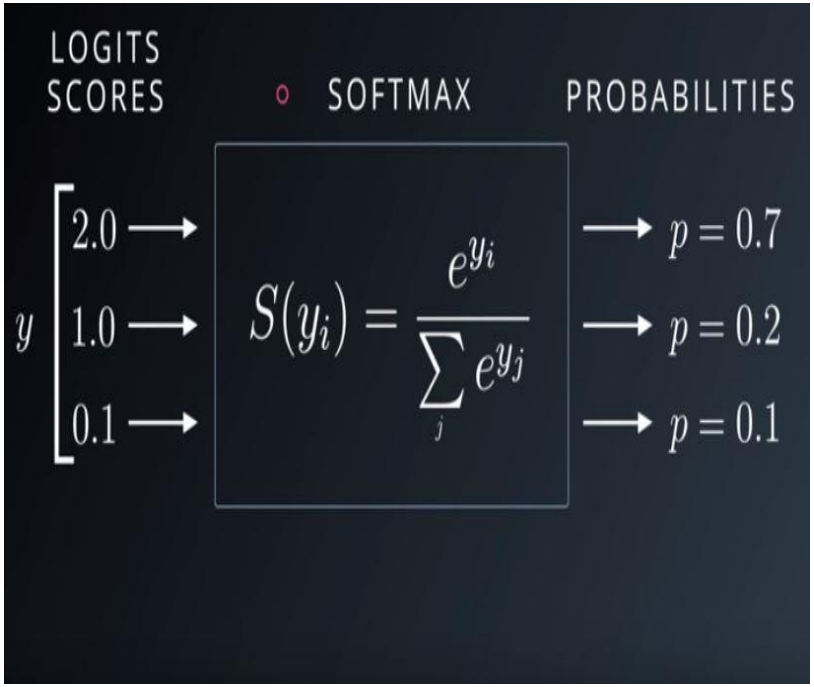
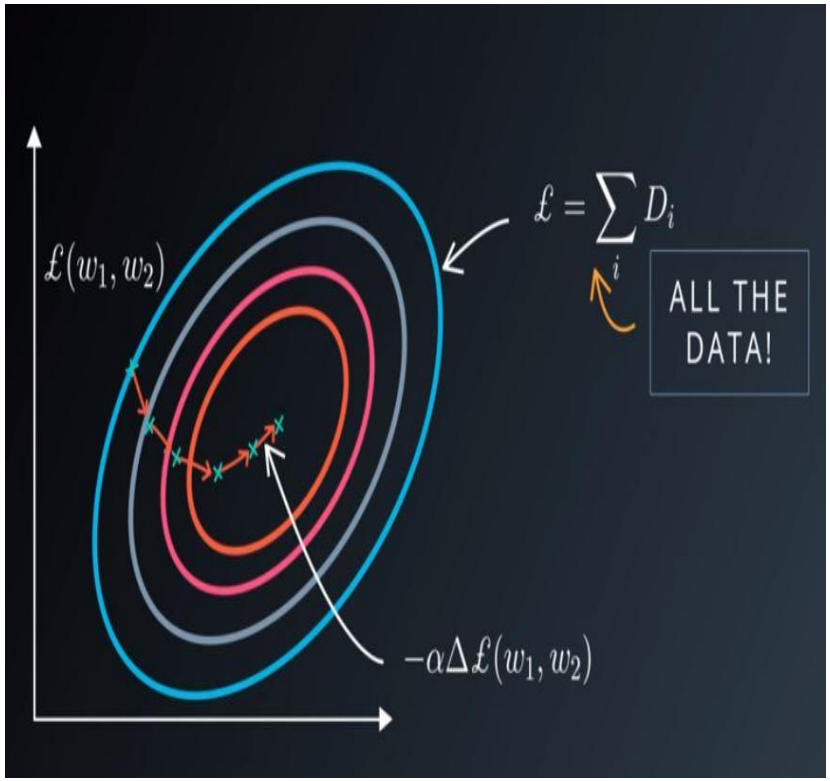
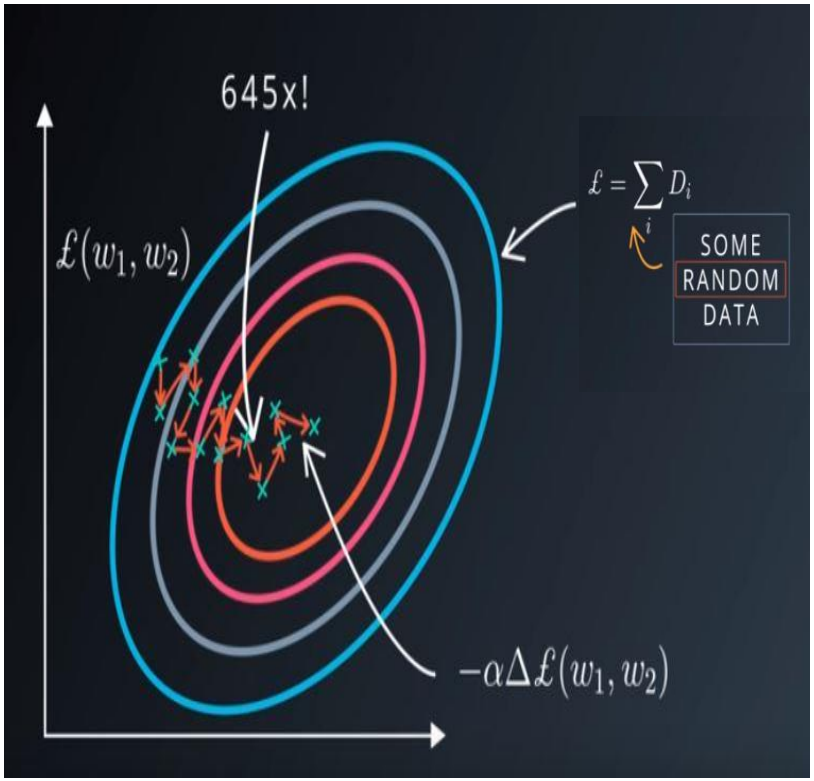




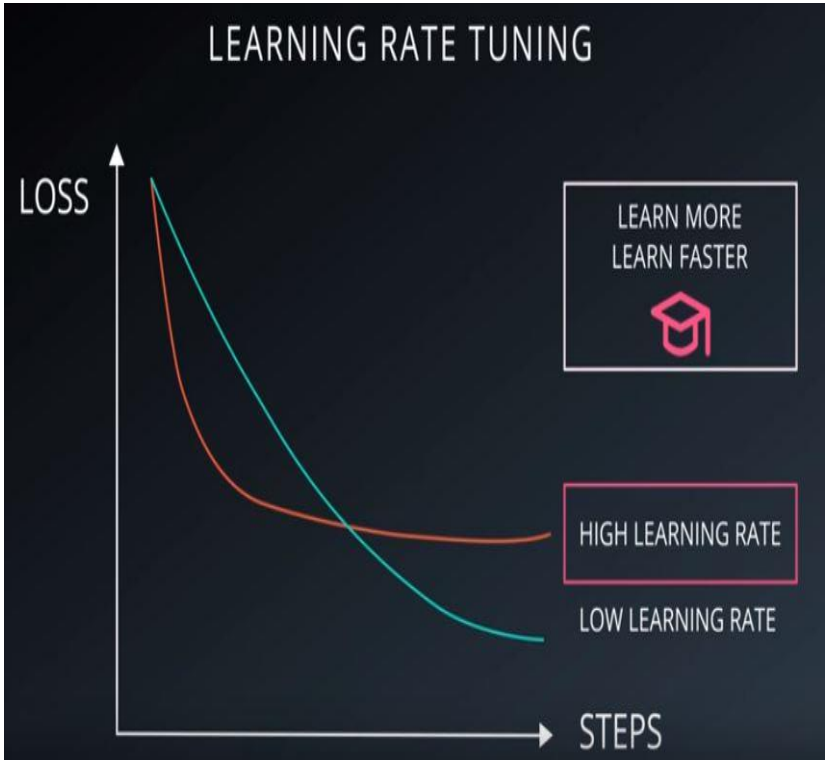
- ✓ 22. Measuring Performance

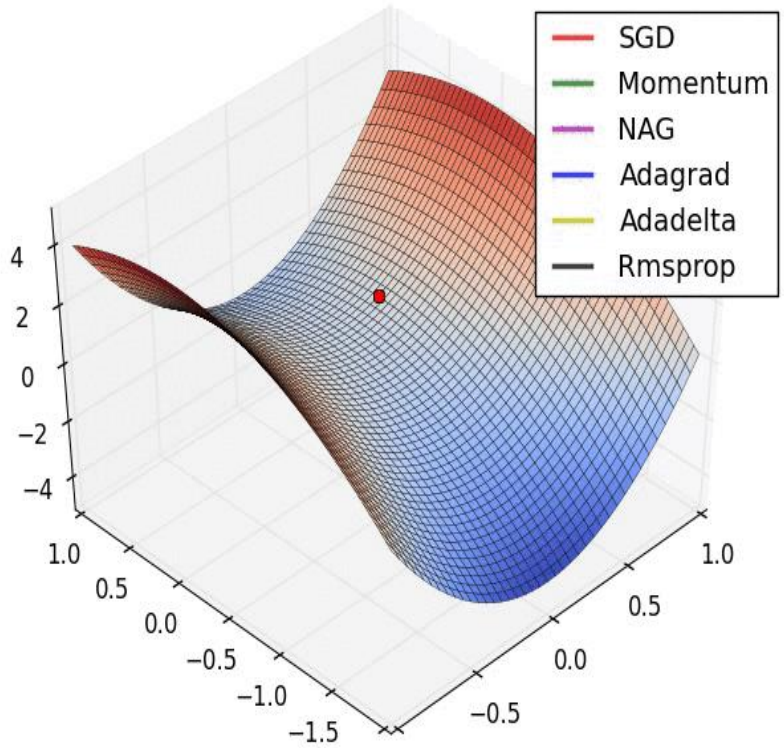
6. Stochastic Gradient Descent





6. Stochastic Gradient Descent





6. Stochastic Gradient Descent

Momentum

Momentum 방식은 말 그대로 Gradient Descent를 통해 이동하는 과정에 일종의 '관성'을 주는 것이다. 현재 Gradient를 통해 이동하는 방향과는 별개로, 과거에 이동했던 방식을 기억하면서 그 방향으로 일정 정도를 추가적으로 이동하는 방식이다. 수식으로 표현하면 다음과 같다. v_t를 time step t에서의 이동 벡터라고 할 때, 다음과 같은 식으로 이동을 표현할 수 있다.

$$v_t = \gamma v_{t-1} + \eta \nabla_\theta J(\theta)$$

$$\theta = \theta - v_t$$

이 때, γ는 얼마나 momentum을 줄 것인지에 대한 momentum term으로서, 보통 0.9 정도의 값을 사용한다. 식을 살펴보면 과거에 얼마나 이동했는지에 대한 이동 항 v를 기억하고, 새로운 이동항을 구할 경우 과거에 이동했던 정도에 관성항만큼 곱해준 후 Gradient을 이용한 이동 step 항을 더해준다. 이렇게 할 경우 이동항 v_t 는 다음과 같은 방식으로 정리할 수 있어, Gradient들의 지수평균을 이용하여 이동한다고도 해석할 수 있다.

$$v_t = \eta \nabla_\theta J(\theta)_t + \gamma \eta \nabla_\theta J(\theta)_{t-1} + \gamma^2 \eta \nabla_\theta J(\theta)_{t-2} + \ldots$$