

Lecture 5-1

Logistic (regression) classification

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Classification 들 중에서 정확도가 높은 알고리즘으로 알려져 있음

Acknowledgement

- Andrew Ng's ML class
 - <https://class.coursera.org/ml-003/lecture>
 - <http://www.holehouse.org/mlclass/> (note)
- Convolutional Neural Networks for Visual Recognition
 - <http://cs231n.github.io/>
 - <http://cs231n.stanford.edu/>
- TensorFlow
 - <https://www.tensorflow.org>
 - <https://github.com/aymericdamien/TensorFlow-Examples>

Regression (HCG)

- H

x1 (hours)	x2 (attendance)	y (score)
10	5	90
9	5	80
3	2	50
2	4	60
11	1	40

- C

- G

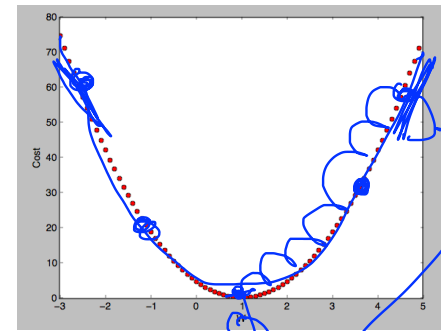
cost 는 우리가 가설로 세운 이 선과 실제값과의 차이

Regression

- Hypothesis: $H(X) = WX$

- Cost: $cost(W) = \frac{1}{m} \sum (WX - y)^2$

x1 (hours)	x2 (attendance)	y (score)
10	5	90
9	5	80
3	2	50
2	4	60
11	1	40



- Gradient decent: $W := W - \alpha \frac{\partial}{\partial W} cost(W)$

http://www.cse.iitk.ac.in/users/se367/10/presentation_local/Binary%20Classification.html

위의 그래프에서 한 발자국에 얼마나 움직이는지를 결정하는 값

Binary

Classification

둘 중 한개를 고르는 것

Gmail

- Spam Detection: Spam or Ham

- Facebook feed: show or hide

- Credit Card Fraudulent Transaction detection: legitimate/fraud

좋아요 클릭한 피드들

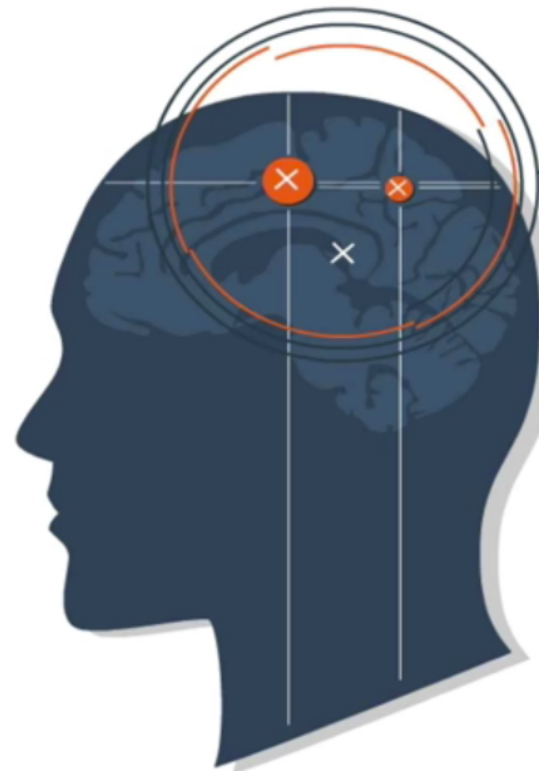
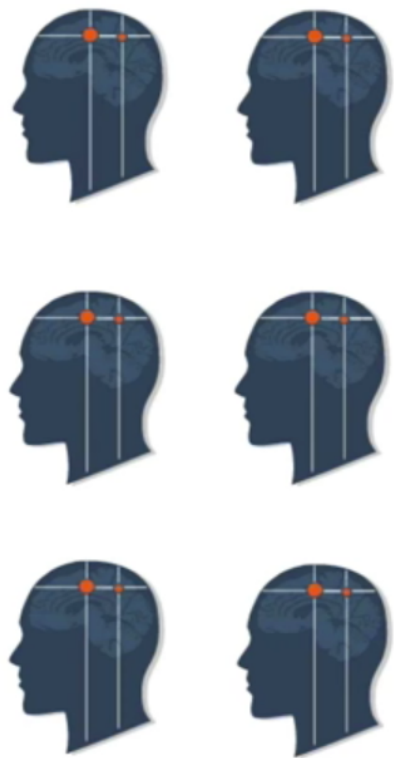
학습

분류를 통과한 애들만 보여준다

0, 1 encoding

- Spam Detection: Spam (1) or Ham (0)
- Facebook feed: show(1) or hide(0)
- Credit Card Fraudulent Transaction detection: legitimate(0) or fraud (1)

Radiology



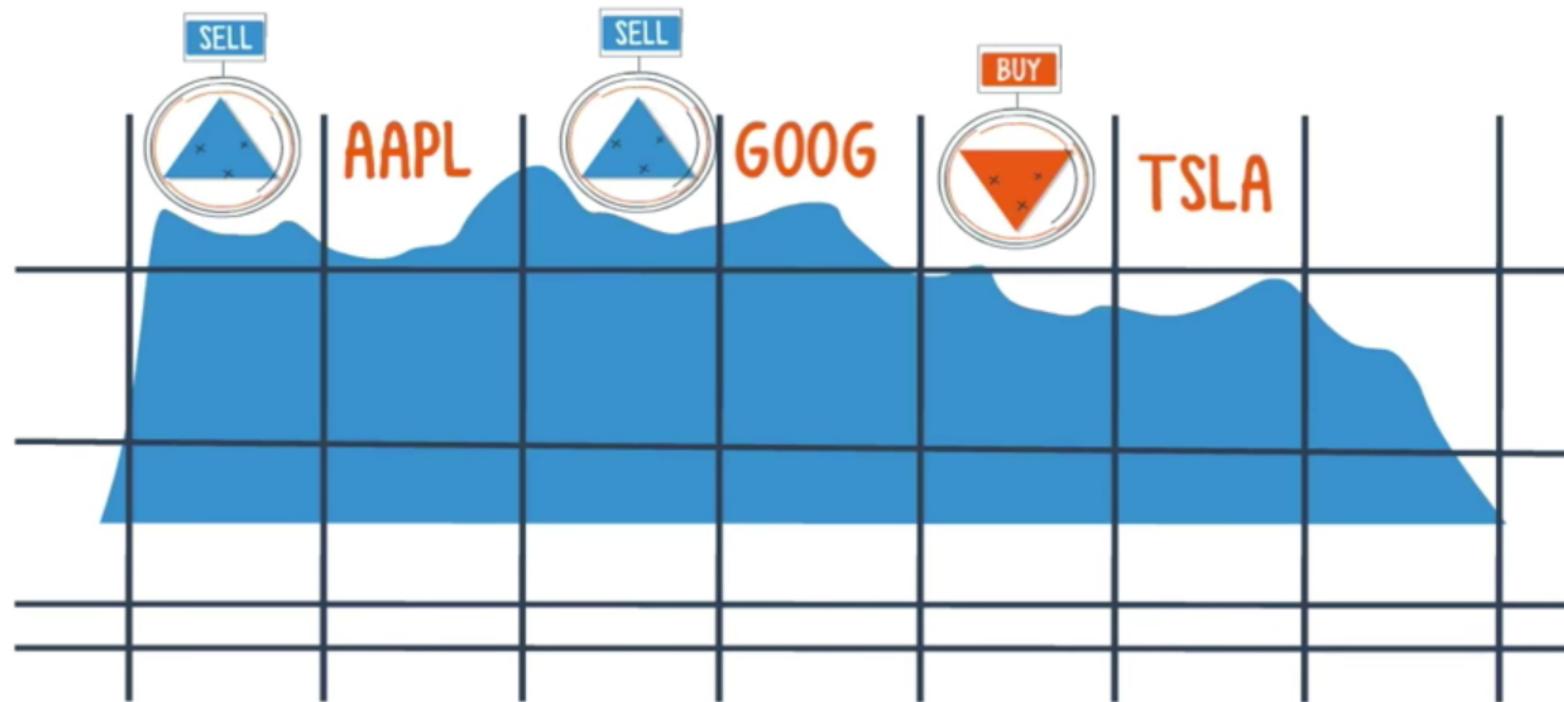
Malignant
tumor



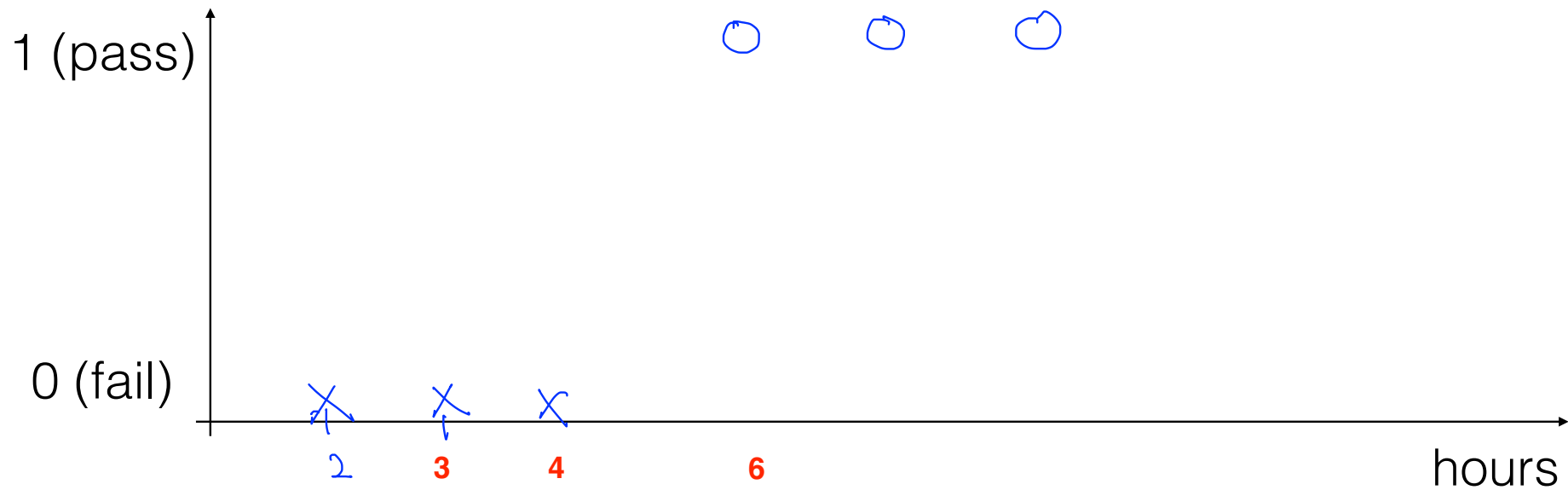
Benign
tumor

Finance

DWJI	17,499.10	▼
SP500	2,025.51	▼
NASDAQ	4,976.9	▲
AAPL	107.71	▲
GOOG	750.06	▲
TSLA	234.24	▼



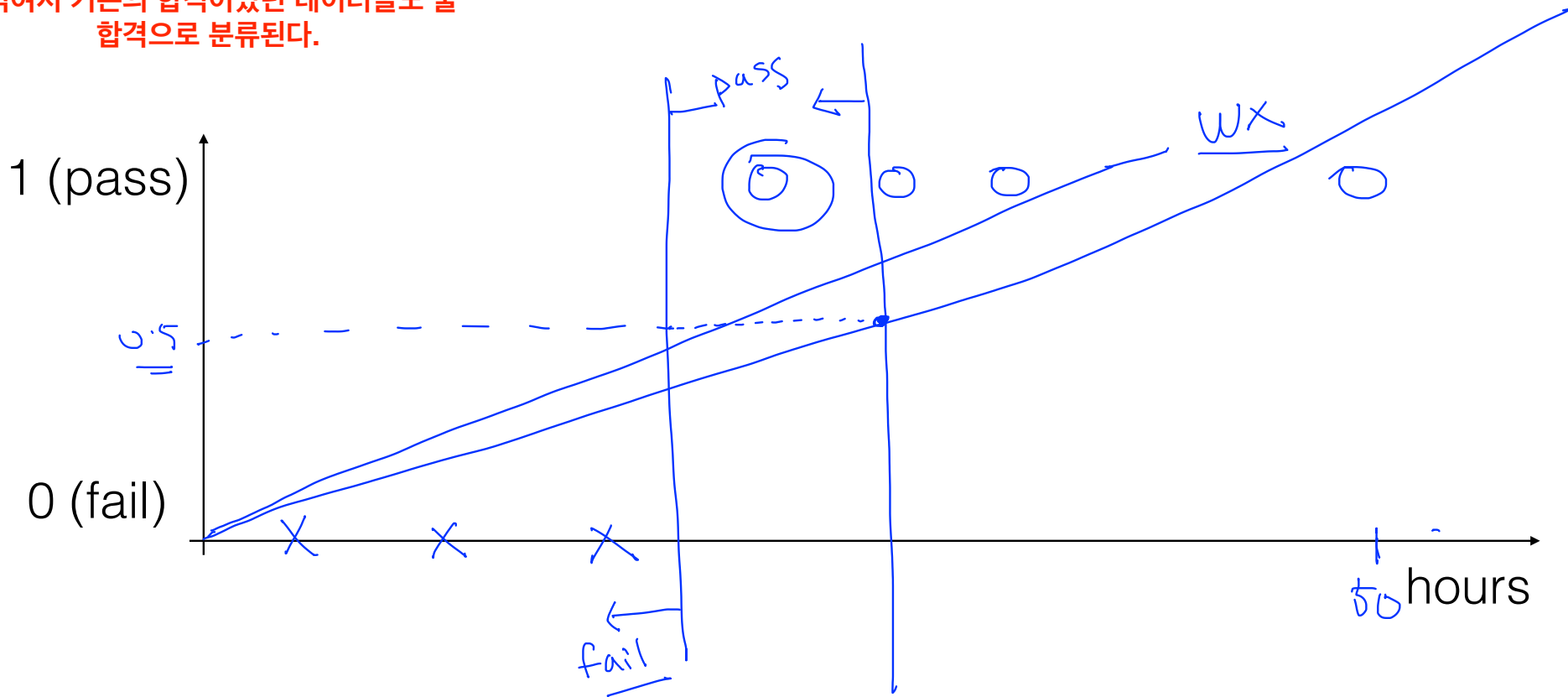
Pass(1)/Fail(0) based on study hours



문제점. 1.

1. 기존에 데이터가 6개일 때, 합불을 가르는 기준은 데이터를 잘 분류했다.
2. 그런데, 시간이 50인 데이터가 추가되었을 경우, 그 분류(합격)의 기준 선이 더 뒤로 움직여서 기존의 합격이었던 데이터들도 불합격으로 분류된다.

Linear Regression?



문제점 2.

가설의 값이 1보다 훨씬 크거나 0보다 작을 수 있다

Linear regression

- We know Y is 0 or 1

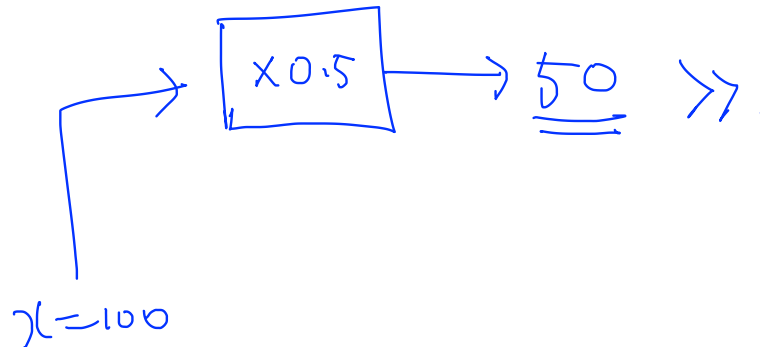
$$\underline{H(x) = Wx + b}$$

- Hypothesis can give values large than 1 or less than 0

$$x = \begin{bmatrix} 1 \\ 2 \\ 5 \\ 10 \\ 11 \end{bmatrix}$$

$$w = 0.5, \quad b = 0$$

$$0 < \sim 1$$

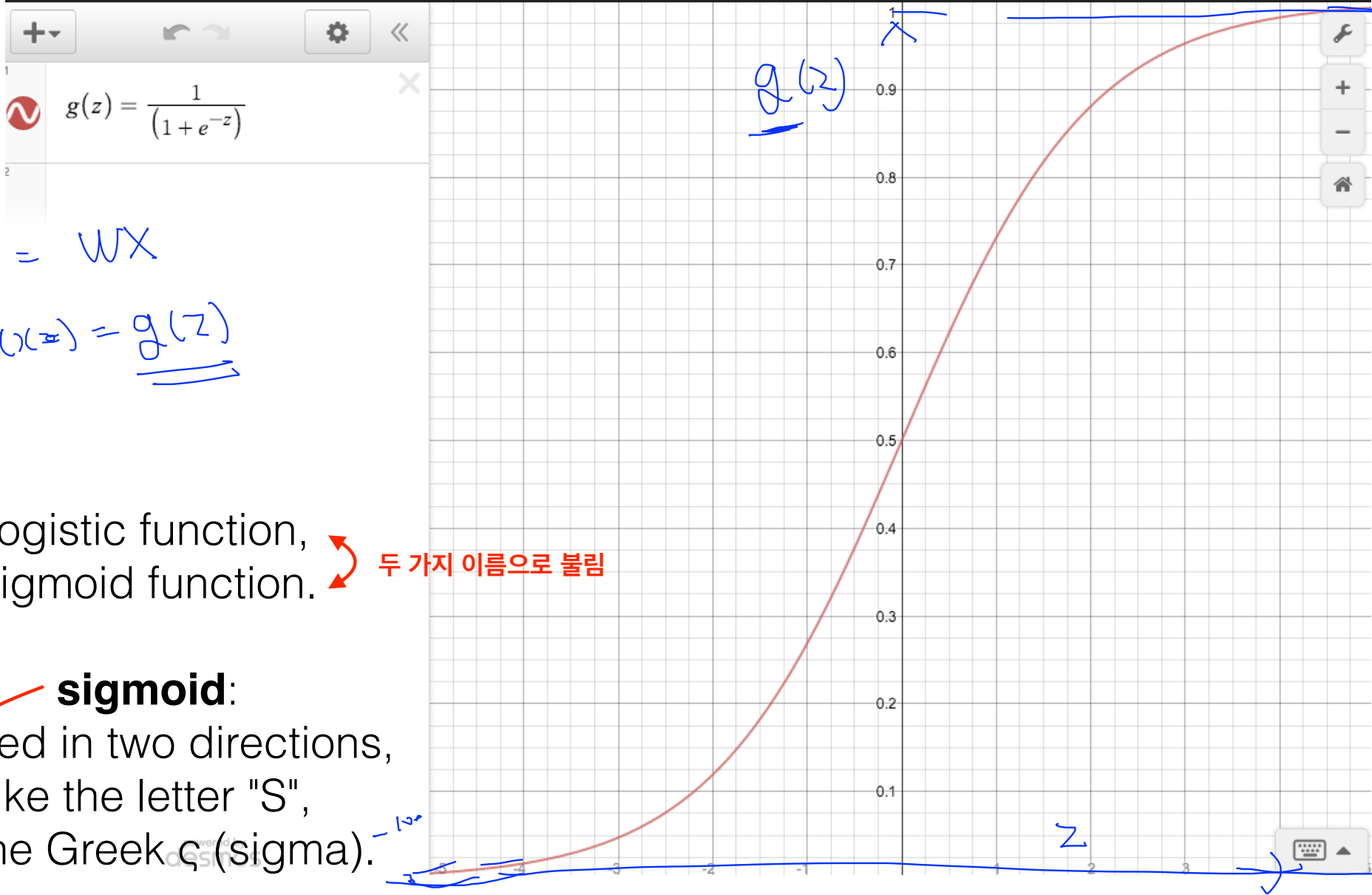


Logistic Hypothesis

그래서 linear regression을 0과 1의 값으로 바꿔주는 함수가 필요할 것 같다고 생각하게 됐다.

$$z \quad \cancel{H(x)} = \underline{Wx + b}$$

$$g(z) \rightarrow 0 \sim 1$$



logistic function,
sigmoid function. 두 가지 이름으로 불림

sigmoid:

Curved in two directions,
like the letter "S",
or the Greek ς (sigma).

뜻, S자 모양의

Logistic Hypothesis

$$H(X) = \frac{1}{1 + e^{-\underbrace{(W^T X)}_{WX}}}$$

WX