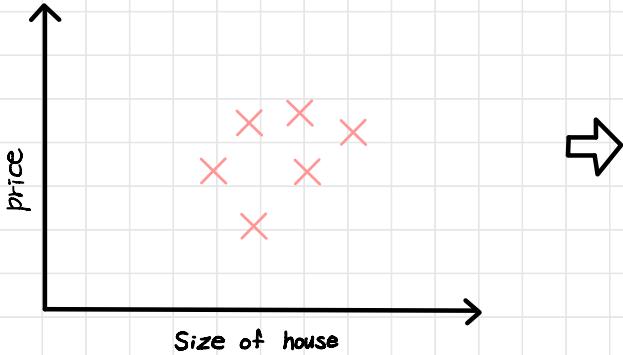
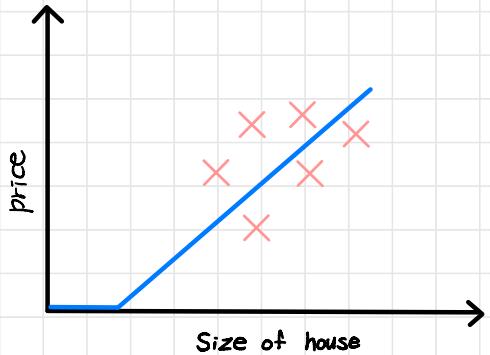


House price prediction

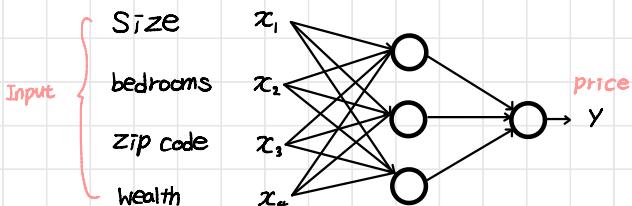


주택가격을 예측하는 그래프로 그린다면?



Q. 주택가격 예측에 이용가능한 변수는?

- 가구원수
- 우편번호
- 재력
- :



Supervised Learning

딥러닝이 성장할 수 있었던 이유

- 1) Data
- 2) Computation
- 3) Algorithms

학습을 위해 사용되는 데이터는 ?

Structured Data

size	bedrooms	...	price
2104	3		400
:	:		:
:			

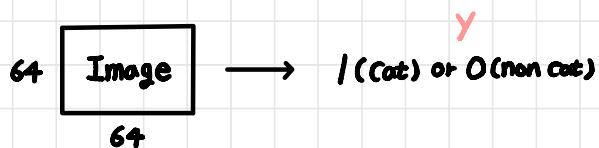
→ 정형화된 데이터

Unstructured Data

- Audio
- Image, Video
- Text

Neural Networks and Logistic Regression

Binary classification



→ 3개의 채널(R, G, B)로 64x64
feature map이 입력으로 사용됨

feature vector
vector

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_m \end{bmatrix} \quad 64 \times 64 \times 3 = 12288$$

$$n = n_x = 12288 \rightarrow X \text{의 차원}$$

표기법

$$(x, y) \rightarrow x \in \mathbb{R}^{n_x}, y \in \{0, 1\}$$

M training example: $\{(x^1, y^1), (x^2, y^2), \dots, (x^M, y^M)\}$

학습 데이터세트: M_{train} , 테스트 데이터세트: M_{test}

$$X = \begin{bmatrix} x_1 & x_2 & \cdots & x_m \end{bmatrix} \quad \begin{matrix} \uparrow \\ n_x \\ \downarrow \\ m \end{matrix}$$

$$\begin{aligned} Y &= [y^1, y^2, \dots, y^M] \\ Y &\in \mathbb{R}^{1 \times M} \end{aligned}$$

$$X \in \mathbb{R}^{n_x \times M}$$

$$\rightarrow X.\text{shape} = (n_x, M)$$

Logistic Regression

→ 확률을 구하는 것

$$X \in \mathbb{R}^n \rightarrow \hat{y} = P(y=1|x)$$

$0 \leq \hat{y} \leq 1$

Parameters : $W \in \mathbb{R}^{n_x}$, $b \in \mathbb{R}$

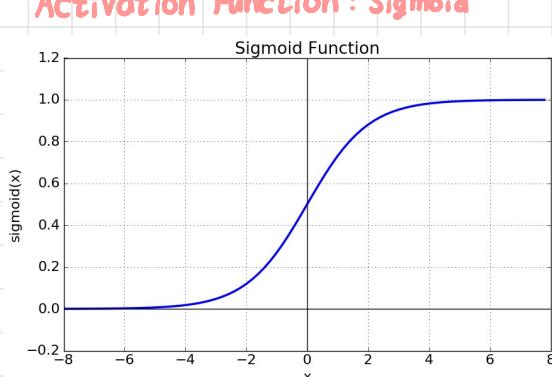
Output $\hat{y} = \frac{\sigma(w^T x + b)}{z}$

[Logistic Regression Cost Function]

$$L(\hat{y}, y) = - (y \log \hat{y} + (1-y) \log(1-\hat{y}))$$

→ If $y=1$, $L(\hat{y}, y) = -\log \hat{y} \rightarrow \log \hat{y}$ large $\rightarrow \hat{y}$ large

→ If $y=0$, $L(\hat{y}, y) = -\log(1-\hat{y}) \rightarrow \log(1-\hat{y})$ large $\rightarrow \hat{y}$ small



$$\sigma(z) = \frac{1}{1+e^{-z}}$$

1) 값이 크다면? 1에 수렴

2) 값이 작다면? 0에 수렴

Cost Function

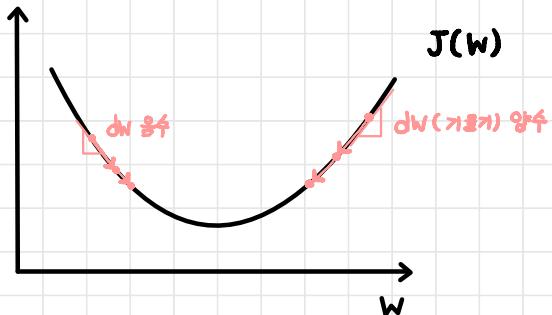
$$J(W, b) = \frac{1}{m} \sum_{i=1}^m L(\hat{y}^i, y^i)$$

$$= -\frac{1}{m} \sum_{i=1}^m [y^i \log \hat{y}^i + (1-y^i) \log(1-\hat{y}^i)]$$

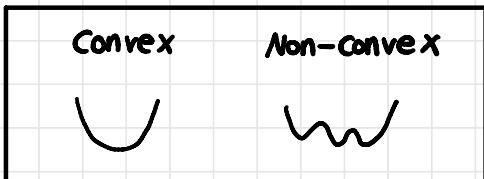
=> 로지스틱 회귀 모델을 학습시키는 것은 손실 함수 J 를

최소화 해주는 매개변수 W 와 b 를 찾는 것이다.

Gradient Descent



→ 해당 그래프의 경우 Convex 하기 때문에
이런 점에서 출발해도 도착지는 동일할 수 밖에 없음



Repeat {

$$w := w - \alpha \frac{dJ(w)}{dw}$$

}

편미분

$$w := w - \alpha \frac{\partial J(w, b)}{\partial w}$$

$$b := b - \alpha \frac{\partial J(w, b)}{\partial b}$$

c → 변수 여러개

d → 변수 한개