House price prediction

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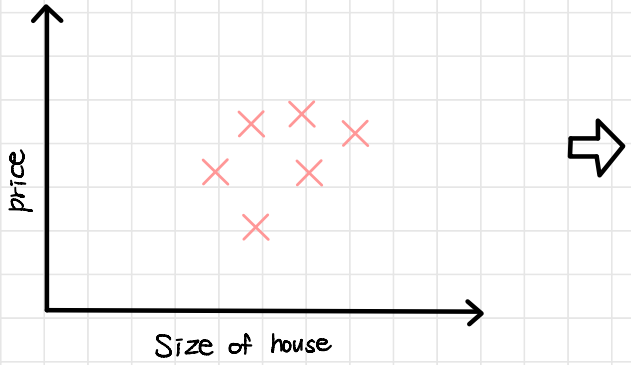
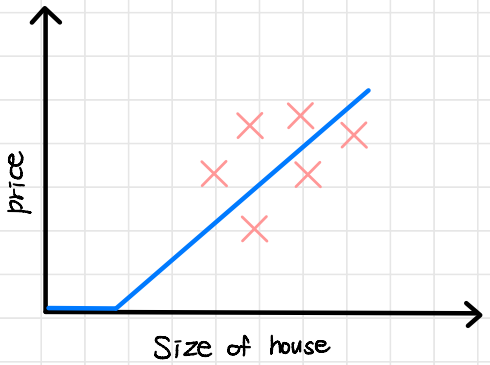


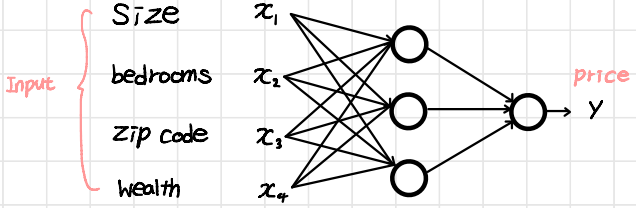
주택가격을 예측하는 그래프로 그린다면?



Q. 주택가격 예측에 이용가능한 변수는?

- 가구원 수
- 우편번호
- 재력
- ⋮

신경망을 구축해보면?



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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

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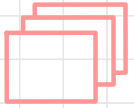
Binary classification

y

1 (cat) or 0 (non cat)

→ 3개의 채널(R,G,B)로 64X64 feature map이 입력으로 사용됨



feature vector

$$x = \begin{bmatrix} 255 \\ 231 \\ \vdots \\ \end{bmatrix} \quad 64 \times 64 \times 3 = 12288$$

$n = n_x = 12288$ → X의 차원

표기법

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

m training example: $\{(x^{(1)}, y^{(1)}), (x^{(2)}, y^{(2)}), \cdots, (x^{(m)}, y^{(m)})\}$

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

$$X = \begin{bmatrix} | & | & & | \\ X^{1} & X^{2} & \cdots & X^{m} \\ | & | & & | \end{bmatrix} \; n_x \quad (\leftarrow m \rightarrow)$$

$$Y = [\, y^{1} \; y^{2} \; \cdots \; y^{m} \,]$$

$Y \in \mathbb{R}^{1 \times m}$

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

→ X. Shape = (n_x, m)

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Logistic Regression → 확률을 구하는 것

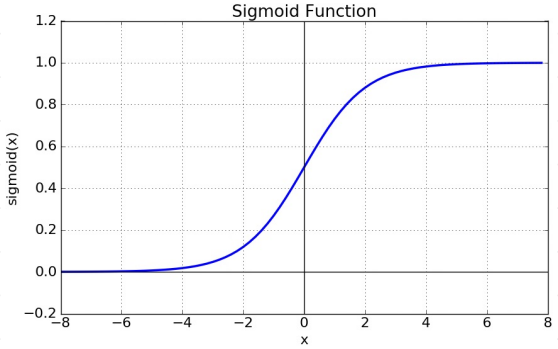
$X \in \mathbb{R}^{n_x} \rightarrow \hat{y} = P(y=1|x)$

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

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

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

Activation Function : Sigmoid



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

1) z값이 크다면? 1에 수렴

2) z값이 작다면? 0에 수렴

[Logistic Regression Cost Function]

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

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

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

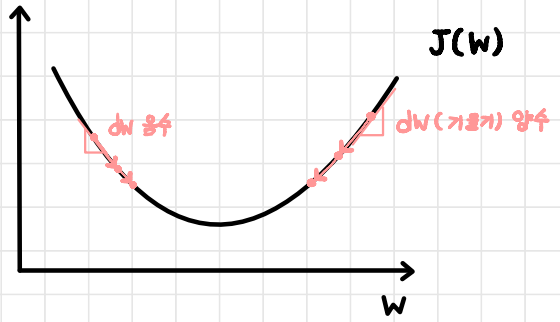
Cost Function

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

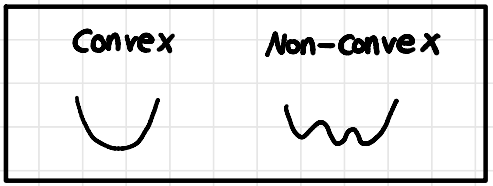
$$= -\frac{1}{m}\sum_{i=1}^{n}[y^i \log\hat{y}^i + (1-y^i)\log(1-\hat{y}^i)]$$

=> 로지스틱 회귀모델을 학습시키는 것은 손실함수 J를 최소화 해주는 매개변수 w와 b를 찾는 것이다.

Gradient Descent



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



Repeat {

$$W := W - \alpha \frac{dJ(W)}{dW}$$

}

편미분

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

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

∂ → 변수 여러개
d → 변수 한개

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