

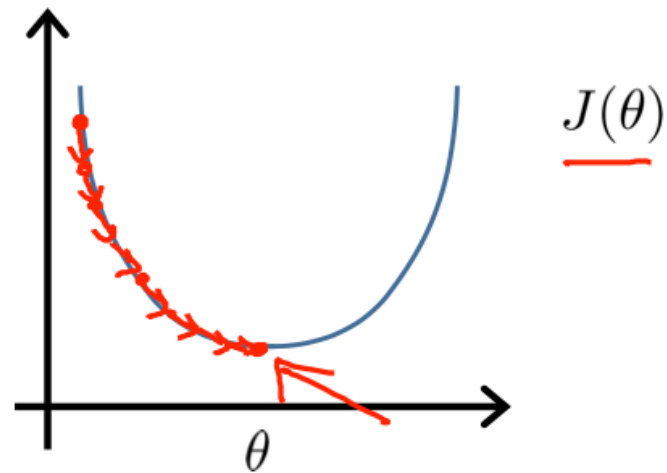
# 기초 3팀

3주차 세미나

170712

# 복습 1

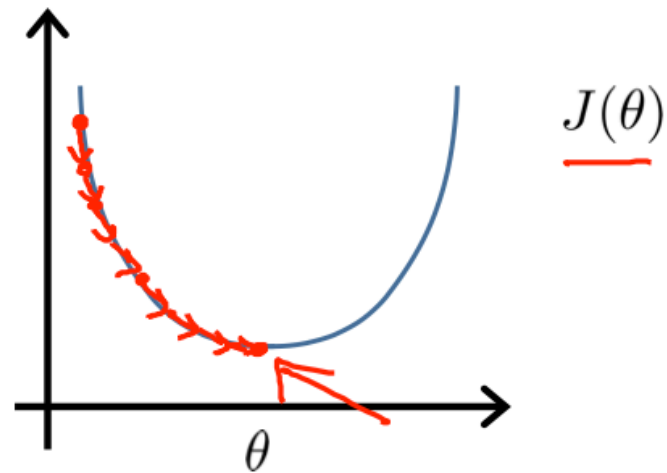
Gradient Descent



Normal equation: Method to solve for  $\theta$   
analytically.

# 복습 1

Gradient Descent

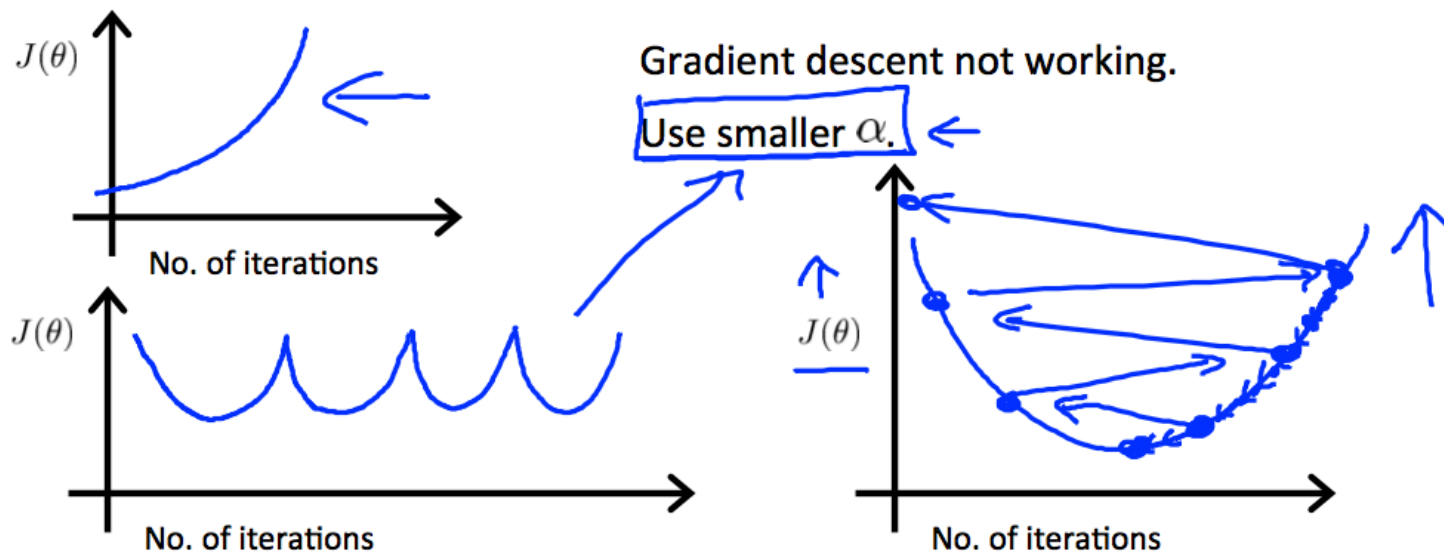


Normal equation: Method to solve for  $\theta$   
analytically.

x축 theta는 정확히는 theta j

# 복습 2

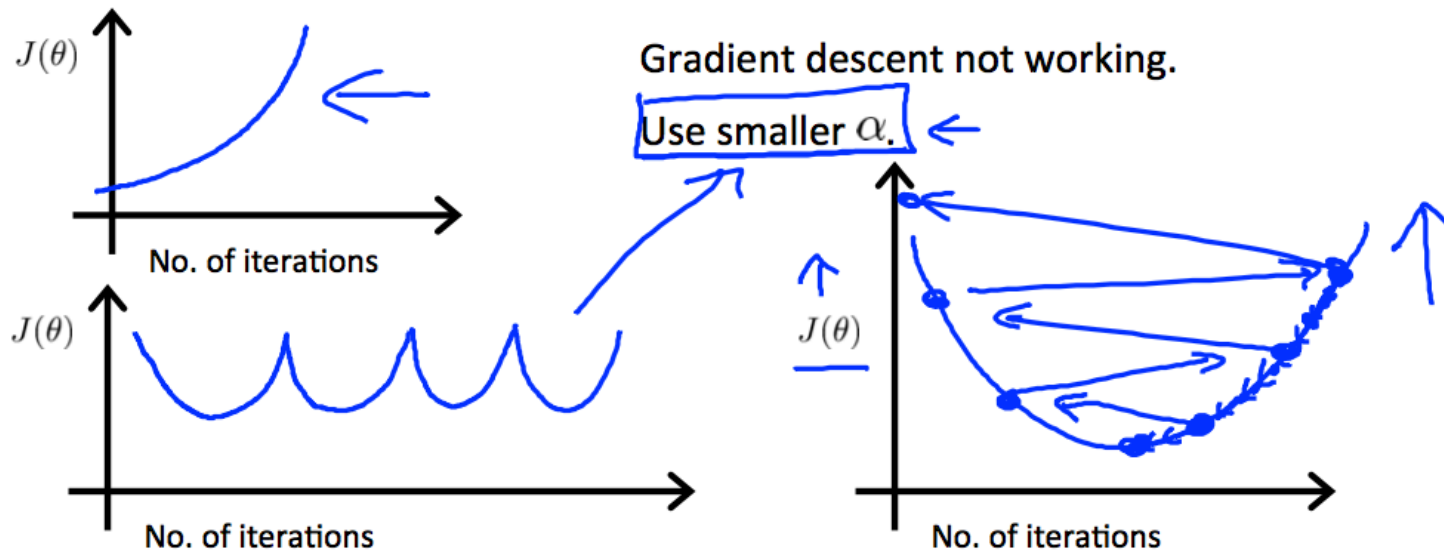
**Making sure gradient descent is working correctly.**



- For sufficiently small  $\alpha$ ,  $J(\theta)$  should decrease on every iteration. ←
- But if  $\alpha$  is too small, gradient descent can be slow to converge.

# 복습 2

**Making sure gradient descent is working correctly.**



- For sufficiently small  $\alpha$ ,  $J(\theta)$  should decrease on every iteration.
- But if  $\alpha$  is too small, gradient descent can be slow to converge.

x 축은 No. of iter가 아니라 theta j이다.

# 복습 3

Normal equation

$$\theta = \underline{(X^T X)^{-1} X^T y}$$

$X^T X$

- What if  $X^T X$  is non-invertible? (singular/  
degenerate)

- Octave: `pinv(X' * X) * X' * y`

$\theta$

`pinv`  
`inv`

cosf function의 도함수가 0이 될 때 paramters가 위와 같다.  
이를 Normal Eq.라 한다.

# 복습 3

Normal equation

$$\theta = \underline{(X^T X)^{-1} X^T y}$$

$X^T X$

- What if  $X^T X$  is non-invertible? (singular/degenerate)

- Octave:  $\text{pinv}(X' * X) * X' * y$

$\theta$

pinv  
inv

$$X \text{ is } m * (n+1)$$


# 복습 3

Normal equation

$$\theta = \underline{(X^T X)^{-1} X^T y}$$

$X^T X$

- What if  $X^T X$  is non-invertible? (singular/  
degenerate)

- Octave:  $\text{pinv}(X' * X) * X' * y$
- 

역행렬은 정사각행렬에서만 정의되므로  $X'$ 를 왼쪽에 곱해서  
그의 역행렬을 곱한것이다.  
 $X'X$ 는  $(n+1) * (n+1)$ 이다.



# 복습 4

$m$  training examples,  $n$  features.

## Gradient Descent

- • Need to choose  $\alpha$ .
- • Needs many iterations.
- Works well even when  $n$  is large.

↗  
 $n = 10^6$

## Normal Equation

- • No need to choose  $\alpha$ .
- • Don't need to iterate.
- Need to compute
- •  $(\boxed{X^T X})^{-1}$   $\overset{n \times n}{\text{}} \quad \underline{O(n^3)}$
- Slow if  $n$  is very large.

$n = 100$   
 $n = 1000$

← - - -  $n = 10000$

# 질문 1

- Training set에서 주어지는 feature들 중 사용할 feature를 어떻게 고르는가? 갯수를 어떻게 줄이는가?
- Andrew Ng교수는 순 제공항만 남기고 조합된 항은 취하지 않는 방식을 예로 들었다.

# 질문 2

- Linear Regression과 Logistic Regression의 편미분 꼴이 같다
- 정확히 같아지길래 신기해했는데 그 수학적 배경을 아시는 분?

# 질문 3

- learning rate 값을 정하는 방법이 직접 노가다 해보는 방법뿐인가?
- 얼핏 듣기로는 어렵다고 들었다.

# 질문 4

- overfitting을 막기 위해서 Regularization을 하는데, 이 때 0번째 파라미터를 제외한 모든 파라미터를 전부 똑같은  $\lambda$ 값으로 regularization하는데 그게 의미가 있는가?
- 경험적으로 큰 문제가 없다고 추측

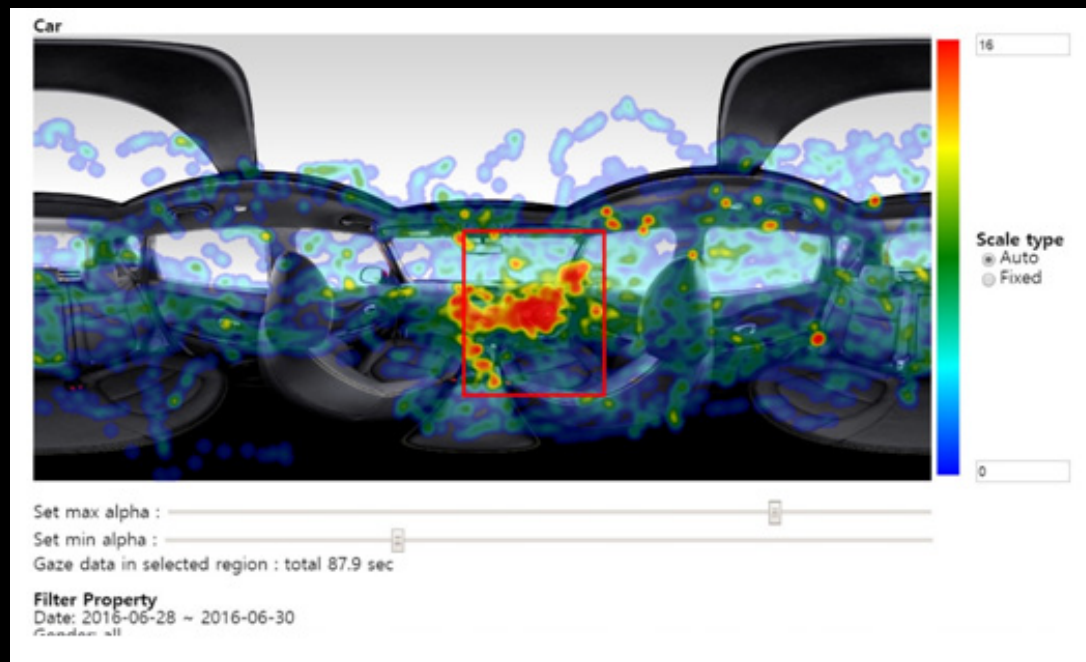
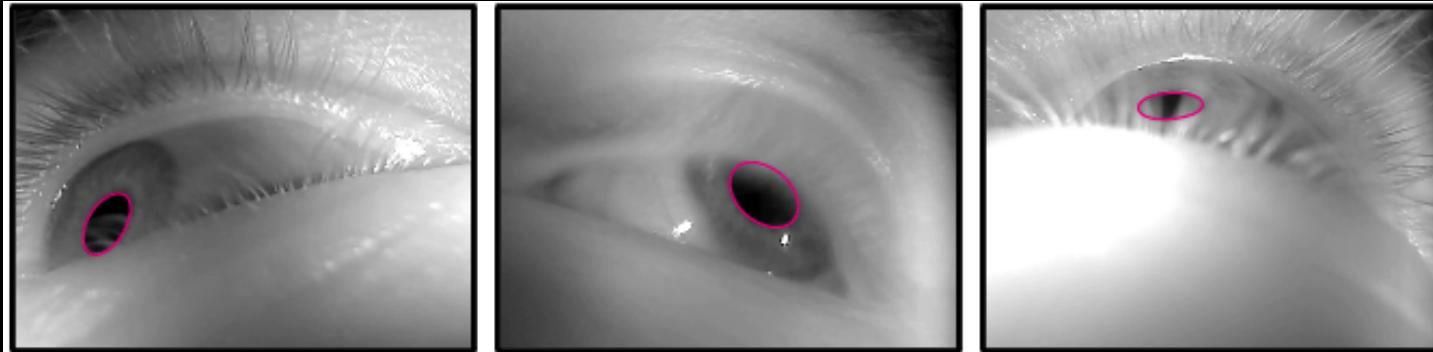
# 안중요한 질문들

- pseudo inverse의 수학적 정의
- $X'X + \lambda L$ 은 왜 항상 invertible한가?

# ML 실무 사용 사례

- VisualCamp
- HyperConnect

# VisualCamp





POTTERY BARN

DESIGN TIPS | 1.888.PTBARN | MY ACCOUNT | SHOP CARD  
Account ID: 87654321

HOMESIDE | KITCHEN & DINING | LIVING ROOMS | BEDROOMS | OFFICES & STUDIOS | CHILDREN'S & PLAYSETS | FURNITURE | ART | GIFTS | WEDDING & CELEBRATION

### FURNITURE

#### Family Room

Dining Room  
Bedroom  
Office & Accent Tables  
Media & TV Storage  
Chairs & Ottomans  
Family Room Ideas  
Family Room Collections

#### Dining Room & Kitchen

Kitchen  
Bar & Seating  
Chairs & Benches  
Dining Room Ideas  
Dining Collections

#### Bedroom

Beds & Headboards  
Bedside Tables & Dressers  
Accent Furniture  
Bedroom Ideas  
Bedroom Collections

#### Home Office

Desks  
Chair  
Desk Chair  
Storage

#### Bookcases & Shelves

Home Office Ideas  
Home Office Collections

#### Living Room

Entertainment Centers  
Seating  
Small Living Spaces

#### Miscellaneous

What's New  
Customer Favorites  
Quality & Care  
Picks  
Gifts

#### Great Deals

Affordable Designs  
Exclusive Discounts  
**Sale**

#### OUR COMPANY

About Us  
Store Locations  
Environmental Commitment  
Employment  
Partners & Suppliers  
Privacy Policy

#### NEED HELP?

Customer Service  
Order Tracking  
Shipping Information  
Catalog Request  
Contact Customer Service  
International Orders  
**Helpful Hand**  
Customer Service  
Return Process  
Gift Certificates

#### SHOP

New Furniture & Upholstery  
Cushions  
Rugs & Rugs  
Decorative Lighting  
Bath & Bath Towels  
Linen & Linens  
Accessories & Home Decor  
Seasonal & Holiday  
Sale & Clearance

Spring-friendly Products  
The Morgan Shop  
Creating Good Hope  
Business Cards  
Design Trade Shows  
Gift Card Card  
J&J Gift Card  
Hobby, Sport Kids  
Hobby

Design Tips  
Videos  
Room Ideas  
What's New  
Customer Favorites  
Be the First to Know  
New Arrivals  
Online Catalog

#### JOIN OUR COMMUNITY

Facebook  
Twitter  
Pinterest  
Sign up for emails!  
sign up for emails!

Don't miss our feedback about your site.

### TOP CUSTOMER PICKS

Pottery Barn Dining Room | Lighting | Bath Accessories | Dining Room Furniture | Executive Accessories  
Pottery Barn Kids Baby Nursery Bedding | Changing Tables | Girls Bedding | Girls Toys  
PBteen Bedding | Shelf Decor | Case Dishes | Lounge Furniture | Bedside Sets

© 2015 Williams Sonoma Inc. All Rights Reserved

© Williams Sonoma Inc. All Rights Reserved

[illegible]

# HyperConnect

- 가짜 프로필 걸러내는데 사용
- 매칭 이후 화상으로 자신의 신체의 일부를 보여주려는 유저들이 많다.
- 이런 변태들을 잡는데 사용

# HyperConnect

- 구체적인 내용은 대외비라서 관련일을 하는 직원이 아니면 모름