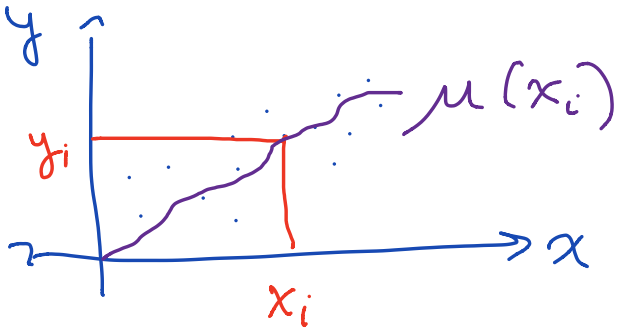
Overview

Office Hrs: 10-12 a.m.

Ex: Linear regression

$\{(y_i, \vec{x}_i) : 1 \le i \le n\}$

response, covariates



$\mathbb{E}(Y_i | X_i) = \mu(x_i)$ general regression

For a linear regression model we assume that this mean function is linear

$\mathbb{E}[Y_i | \ldots] = x_i \beta$

$\sim [y_i | x_i] - x\beta$

Well studied solution

OLS Estimator: $\hat{\beta} = (X^T X)^{-1} X^T Y$

We can show that $\hat{\beta}$ is good

(MSE, Unbiased, MLE, Consistent, ...)

But...

1. How do we compute $\hat{\beta}$
   - We don't need to calculate $X^T X$ or even the inverse
   - Just solve $(X^T X)\hat{\beta} = X^T Y$
   - If X has a special structure we can use it in computations.
   - What if we have missing data?
2. What if $p >> n$?

- Regularization
- Prior knowledge
- We can also select a subset of predictors to be included
- Dist. properties of $\vec{\beta}$
  - ↳ Bootstrap, mcmc

Topics

1. Intro, prob/Stat
2. Numerical Computing/LA
3. Basic Optimization & EM
4. Sampling & Monte Carlo

Stat Comp.

5. Graphical Models
6. mcmc
7. Bootstrap

Comp. Stat.

8. [illegible]

0. Data Partioning & Density