STAT 206
21 Mar 21

extra office hour

①

$$\log\left(\frac{p_i}{1-p_i}\right) = \text{logit}(p_i)$$

as $p_i \to 1$ $\text{logit}(p_i) \to +\infty$

as $p_i \to 0$ $\text{logit}(p_i) \to -\infty$

$(i = 1, \dots, n)$

$$(Y_i \mid p_i\, \beta) \overset{I}{\sim} \text{Bernoulli}(p_i)$$

3065

$$\log\left(\frac{p_i}{1-p_i}\right) = \hat{\beta}_0 + \hat{\beta}_1 x_{i1} + \hat{\beta}_2 x_{i2} + \dots + \hat{\beta}_k x_{ik}$$

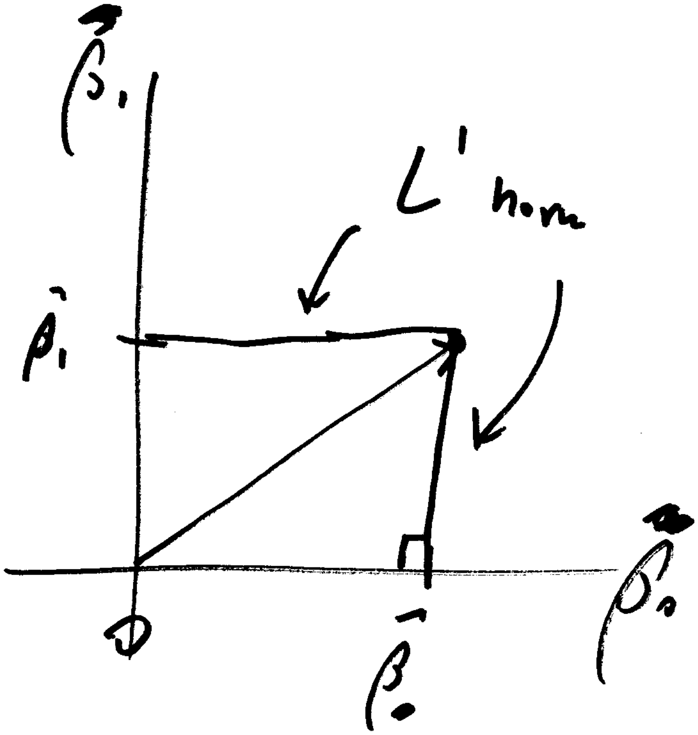
$1 + 57 + \binom{57}{2} =$ 1654

old school rule:

try to avoid k so big that $\frac{n}{k} < 10$

GoF regularization

log(posterior) = log(likelihood) + log(prior)



$$\|\hat{\beta}\|_2 = \sqrt{\hat\beta_0^2 + \hat\beta_1^2}$$

(L^2, L_2) norm of β

$$\beta = (\beta_0, \beta_1)$$

$$\|\hat\beta\|_1 = |\beta_0| + |\beta_1|$$

(L^1, L_1)

$$\|\beta\|_1 > \|\beta\|_2$$

except when $\beta = 0$

$$(Y_i \mid p_i, \beta) \overset{I}{\sim} \text{Bernoulli}(p_i)$$

$$(i = 1, \ldots, n)$$

$$\cancel{\log\left(\frac{p_i}{1-p_i}\right) = \beta_0}$$

$$\log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \beta_1 \boxed{x_{i1}} \quad \begin{cases} 1 & \text{if } \_\_ \\ 0 & \text{else} \end{cases}$$

when $x_{i1} = 0$ $\quad \log\left(\frac{p_i}{1-p_i}\right) = \beta_0$

$1 \quad \log\left(\frac{p_i}{1-p_i}\right) = \beta_0 + \underline{\underline{\beta_1}}$

-3

$$\begin{array}{cc} Y & \hat{Y} \end{array}$$

$$n \left\{ \begin{bmatrix} 0 & \hat{p}_1 \\ \vdots & \\ 0 & \hat{p}_{n_0} \\ 1 & \hat{p}_{n_0+1} \\ \vdots & \vdots \\ 1 & \hat{p}_n \end{bmatrix} \right. \begin{array}{l} \updownarrow n_0 \Big\} \bar{\hat{p}}_0 \\ \\ \updownarrow n_1 \quad \bar{\hat{p}}_1 \end{array}$$

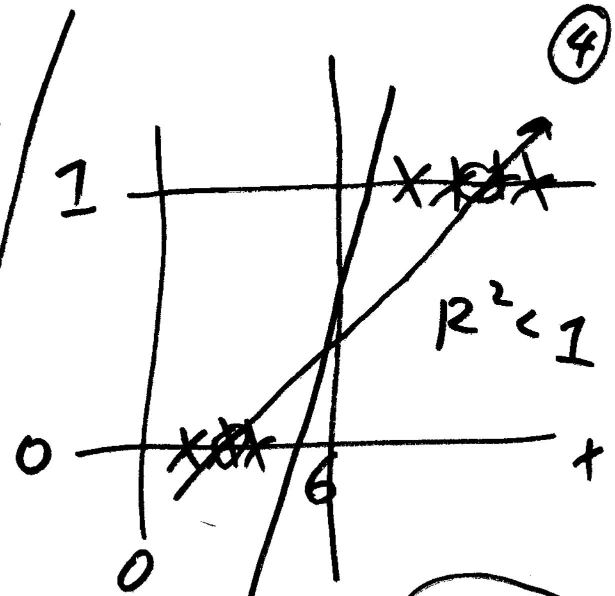
mean $\hat{p}$

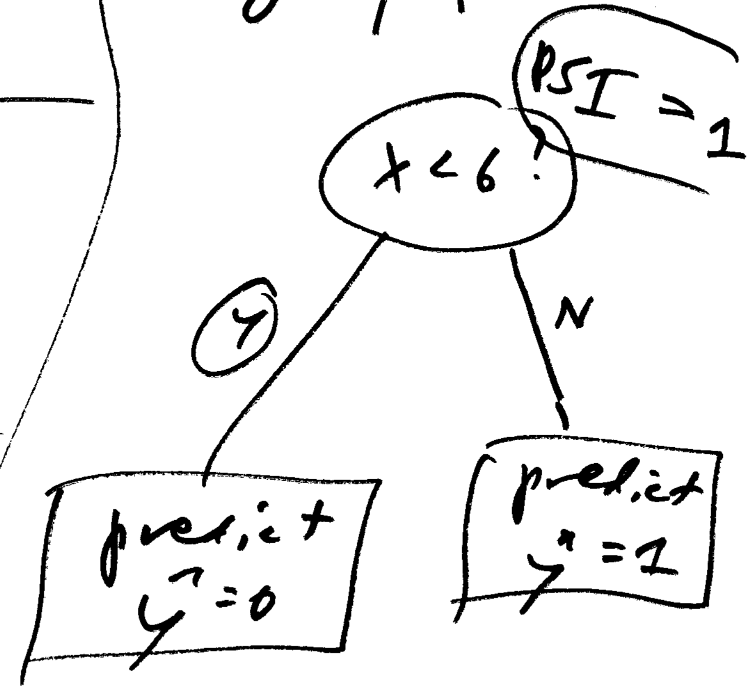
$$PSI = \bar{\hat{p}}_1 - \bar{\hat{p}}_0$$

$$R^2 = \hat{\rho}^2(y, \hat{p})$$

$$\hat{\rho}^2(y, \hat{p}) = \left[\frac{\frac{1}{n}\sum_{i=1}^{n} y_i \hat{p}_i - \left(\frac{1}{n}\sum_{i=1}^{n} y_i\right)\left(\frac{1}{n}\sum_{i=1}^{n} \hat{p}_i\right)}{SD(y) \cdot SD(\hat{p})} \right]^2$$

	R^2	PSI
no predictive signal	0	0
as strength of predictive signal ↑	↑	↑
perfect predictive signal	1	1





$R^2 = \text{PSI}$ if THT 2(A)

① OLS (linear)

② $y = \{1, 0\}$

$y_i = I(x > 6)$