(1)

$\hat{p}_S = 8/70 \quad \hat{p}_F = 9/70 \quad \hat{p}_P = 53/70$

$H_0: \quad p_P = 2p_S \quad p_P = 3p_F \quad (\sum p = 1)$

$p_S = 3/11 \quad , \quad p_F = 2/11 \quad , \quad p_P = 6/11$

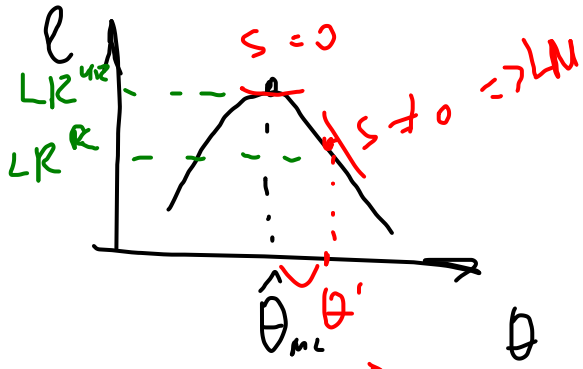
$\| \qquad \| \qquad \|$

$\left[p_S = p_P/2\right] + \left[p_F = p_P/3\right] + \quad p_P = 1$

$LR = 2\left(\ln L_{UR} - \ln L_R\right)$

$\Rightarrow \frac{3p}{6} + \frac{2p}{6} + \frac{6p}{6} = 1 \Rightarrow p = \frac{6}{11}$

$$L = M \cdot p_S^{8} \cdot p_\pi^{9} \cdot p_p^{53}$$



$$\ln L = \ln M + 8 p_S + 9 p_\pi + 53 p_p$$

Wald

$$LR = 2\Big(8\left(\ln {}^{8}/_{70} - \ln {}^{3}/_{11}\right) + 9\left(\ln {}^{9}/_{70} - \ln {}^{2}/_{11}\right) + 53\left(\ln {}^{53}/_{70} - \ln {}^{6}/_{11}\right)\Big)$$

$$= 14{,}6 \sim \chi^2_{q=2}$$

$$\chi^2_{crit} = \chi^2_{2,\,0{,}95} = 9{,}2$$

$$Dij = \begin{array}{c} \\ A \\ B \\ C \\ D \\ E \end{array} \begin{array}{c} \begin{array}{ccccc} A & B & C & D & E \end{array} \\ \begin{bmatrix} 0 & & & & \\ 6,5 & 0 & & & \\ 6 & 7 & 0 & & \\ 3 & 4 & 5 & 0 & \\ 23 & 28 & 28 & 26 & 0 \end{bmatrix} \end{array}$$

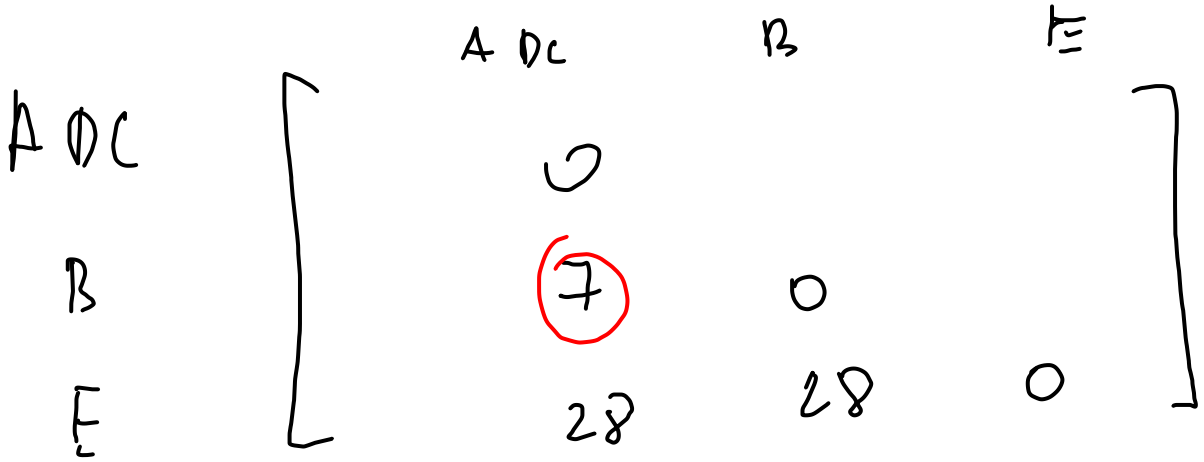
single link
- ~~min~~

→ complete link
- max

1) min Dij

	AD	B	C	E
AD	0			
B	6,5	0		
C	6	7	0	
E	26	28	28	0

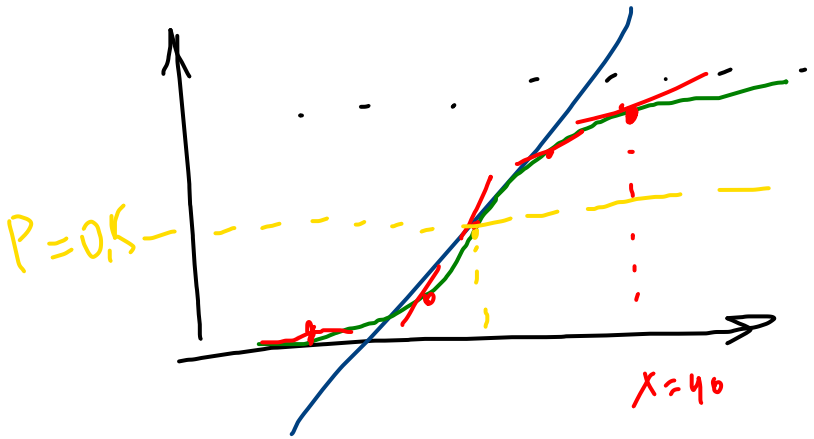
{AB vs DB}


A D C
B
E
A D C
B
E
0
7
28
0
28
0

③ $(X - \bar{X}) \cdot \lambda^T = \begin{pmatrix} -0,1 \\ 1,4 \\ 0,5 \end{pmatrix} \cdot (-0,3 \quad 0,7 \quad 0,6)$

$= 1,59$

④ $\Lambda(X'\beta) = \frac{1}{1 + e^{-x'\beta}}$



$\Lambda'_{x_1} = \frac{e^{-x\beta}}{(1 + e^{-x'\beta})^2} \cdot \beta_1$

$Y = \alpha + \beta X + \varepsilon$

$dy/dx = \beta$

$x'\beta\big|_{x_1, x_2} = -2,4 \rightarrow ME = -0,0009$

$dy = dx \cdot \beta = 1 \cdot \beta = \beta$

(5)

$$\Lambda = \frac{1}{1+0,12} \cdot \frac{1}{1+0,14} = \dots$$

$$\ln \Lambda = 0,25$$

$$\chi^2_{obs} = -\left(50 - \frac{3+3}{2} - 1\right) \cdot 0,25 = 11,46 \sim \chi^2_6$$

$$\chi^2_{6;0,95} = 12,59 \Rightarrow H_0 \text{ is not rej}$$

(6)

	M	F	
D	22	91	21
I	56	64	22
	C_1	C_2	N

$$E_{ij} = C_1 \cdot \frac{r_1}{N}$$

$$E_{ij} = \frac{n_2 n_c}{n}$$

$$\chi^2_{obs} = \sum_j \sum_i \frac{(O_{ij} - E_{ij})^2}{E_{ij}} = 19,3$$

$$C = \sqrt{\frac{\chi^2}{n + \chi^2}} = 0,27$$

$3 \times 3 \times 3 \times 2 = 54$

Conjoint analysis:

Attributes:

- Location
- Type
- Cost
- Brand

Levels:

C, DT, M

FF, Ch, I

L, M, H

F, NF

+

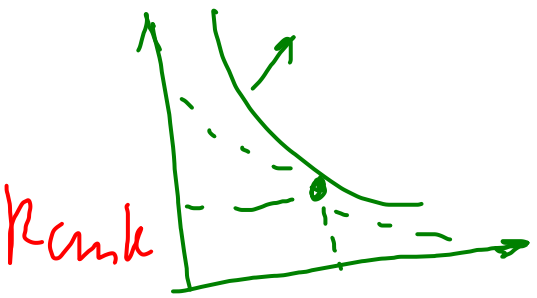
Cois

=> 8 coef.

$$U(x) = \sum\sum \alpha_{ij} X_{ij}$$

↑ utility

↑ part-worth coef



i	Att	Rank
Option 1 :	- NF, CL, L, C	4
Option 2:	- F, FF, L, C	2
⋮		⋮
Option 10		

att. #1 level #2

$$Rank_i = \beta_0 + \beta_{12} \cdot X_{12i} + \beta_{13} \cdot X_{13i} + \ldots + \epsilon_i$$

β_0 → const (ref. group)

$X_{11}, X_{21}, X_{31}, X_{41}$

$$\left.\begin{aligned} \hat{\beta}_{12} &= \hat{\alpha}_{12} - \hat{\alpha}_{11} \\ \hat{\beta}_{13} &= \hat{\alpha}_{13} - \hat{\alpha}_{11} \\ \hat{\alpha}_{11} + \hat{\alpha}_{12} + \hat{\alpha}_{13} &= 0 \end{aligned}\right\} \Rightarrow \hat{\alpha}_{11}, \hat{\alpha}_{12}, \hat{\alpha}_{13}$$

b)

$$I_i = \max_j \alpha_{ij} - \min_j \alpha_{ij} = \text{range}(\alpha_i)$$

$$W_i = \frac{I_i}{\sum_{i=1}^{m} I_i}$$