

Introduction to Latent Class Analysis

مقاله تئوريك

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$$\{i, j, \dots, k\} \text{ (Manifest variable)}$$

$$i = 1, \dots, I \quad j = 1, \dots, J \quad k = 1, \dots, K$$

Manifest
n

:
$$\{i, j, \dots, k\}$$

$$k=1,2 \quad j=1,2 \dots \dots \dots i=1,2$$

:
$$I \times J \times \dots \times K$$

n
Y
.
$$P(Y = y)$$

:
$$Y = \{I, J, \dots, K\}$$

$$y = \{i, j, \dots, k\}$$

.
Y
i, j, \dots, k

:

latent
.
manifest variable
Y

n
.
manifest variable

Response pattern
.
manifest

manifest
manifest

manifest

k
manifest

:

Probability of Response pattern	Response pattern	Manifest Variables				Frequency
	$Y=\{I,J,...,K\}$	I	J		K	
$P(Y_1 = y_1)$	$Y_1=\{1,1,...,1\}$	1	1		1	n_1
$P(Y_2 = y_2)$	$Y_2=\{1,1,...,2\}$	1	1		2	n_2
...	...	...	...		...	
...	...	...	...		...	
...	...	...	...		...	
...	...	...	...		...	
$P(Y_{I \times J \times ... \times K} = y_{I \times J \times ... \times K})$	$=\{i,j,...,k\} Y_{I \times J \times ... \times K}$	i	j		k	$n_{I \times J \times ... \times K}$
Total						n

Response pattern

Response latent class	Manifest Variables				Frequency
$Y=\{I,J,...,K\}$	I	J		K	
$Y_1=\{1,1,...,1\}$	1	1		1	n_1
$Y_2=\{1,1,...,2\}$	1	1		2	n_2
...	...	...		...	
$=\{i,j,...,k\} Y_c$	i	j		k	$_cn$
Total					n

latent class

manifest $P\{Y = y\}$ C $Y = \{I, J, \dots, K\}$

latent $x = 1, 2, \dots, c$
manifest $P\{X = x\}$
manifest $P\{Y = y | X = x\}$
latent $P(Y = y) = \sum_{x=1}^C P(X = x)P(Y = y | X = x)$
latent n
manifest

$$P\{Y = y | X = x\} = \prod_{l=1}^n P(Y_l = y_l | X = x)$$

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$$P\{Y = y\}$$

$$P(Y = y) = \sum_{x=1}^c P(X = x) \times \prod_{l=1}^n P\{Y_l = y_l | X = x\}$$

$$P(Y = y) = \sum_{c=1}^C \gamma_c \rho_{i|c} \rho_{j|c} \dots \rho_{k|c}$$

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latent class :C
C latent class γ_c
C latent class manifest i $\rho_{i|c}$
C latent class manifest j $\rho_{j|c}$

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. C latent class manifest k : $\rho_{k|c}$

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