

Exercises

1. binomial logit

for the following data (X group variable)

		Y	
		0	1
X	x_1	n_{11}	n_{12}
	\vdots		
	x_J	n_{J1}	n_{J2}

- a) write a binary regression model
 - b) interpret the regression coefficients for the logit model
 - c) write an equivalent log-linear model
 - d) compare the coefficients for the log-linear and for the logit model
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2. continuous regressors multinomial logit

For the following data

case	age($x^{(1)}$)	inc($x^{(2)}$)	cat1($y^{(1)}$)	cat2($y^{(2)}$)	cat3($y^{(3)}$)
1	$x_1^{(1)}$	$x_1^{(2)}$	$y_1^{(1)}$	$y_1^{(2)}$	$y_1^{(3)}$
2	$x_2^{(1)}$	$x_2^{(2)}$	$y_2^{(1)}$	$y_2^{(2)}$	$y_2^{(3)}$
\vdots					
I	$x_I^{(1)}$	$x_I^{(2)}$	$y_I^{(1)}$	$y_I^{(2)}$	$y_I^{(3)}$

- a) specify multinomial reg and interpret the regression coefficients
 - b) write log-likelihood function.
 - c) write likelihood-ratio test for hypothesis of age independence of cat
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3 multinomial for aggregate data (contingency table)

for the following data:

age-group	cat1($y^{(1)}$)	cat2($y^{(2)}$)	cat3($y^{(3)}$)
1	$y_1^{(1)}$	$y_1^{(2)}$	$y_1^{(3)}$
2	$y_2^{(1)}$	$y_2^{(2)}$	$y_2^{(3)}$
\vdots			
I	$y_I^{(1)}$	$y_I^{(2)}$	$y_I^{(3)}$

- specify multinomial reg model and interpret the coefficients:
- write likelihood function
- write likelihood-ratio test for hypothesis of age-group independence of cat

4. multinomial output

Interpreting output from a multinomial logit model according to the data

```
      x
y      A  B  C  D
Y1     9  8  4  4
Y2     4 13  9  3
Y3     7  3 10  5
Y4     5  1  2 13\bigskip
```

obtain estimates

```
multinom(formula = y ~x)
```

Coefficients:

```
(Intercept)   xB   xC   xD
Y2          -0.81  1.30  1.62  0.52
Y3          -0.25 -0.73  1.17  0.47
Y4          -0.59 -1.49 -0.11  1.77
```

Std. Errors:

```
(Intercept)   xB   xC   xD
Y2           0.60  0.75  0.85  0.97
Y3           0.50  0.84  0.78  0.84
Y4           0.56  1.20  1.03  0.80
```