Package ‘mnlogit’

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Choice of Fishing Mode

Description

A data.frame containing data on choices of recreational fishing mode. Data may depend on both the individual and the alternative.

number of observations : 1182

country : United States

Usage

data(Fish)

Format

A dataframe containing:

mode - recreation mode choice, one of: beach, pier, boat and charter

price - price for a mode for an individual

catch - fish catch rate for a mode for an individual

income - monthly income of an individual

chid - chooser ID: serial number of the individual

Source

Data taken from the R package mlogit by Yves Croissant, which lists the source as:


References

Hypothesis Testing

Hypothesis testing for multinomial logit models

Description

Three hypothesis tests applicable to any MLE (Likelihood ratio test, Wald test, Rao score test) and the Hausman-McFadden test for IIA (independence of irrelevant alternatives) are provided.

Usage

lrtest(object, ...)  
waldtest(object, ...)  
scoretest(object, ...)  
## S3 method for class 'mnlogit'
lrtest(object, ...)  
## S3 method for class 'mnlogit'
scoretest(object, ...)  
## S3 method for class 'mnlogit'
waldtest(object, ...)  

hmftest(x, ...)  
## S3 method for class 'formula'
hmftest(x, alt.subset, ...)  
## S3 method for class 'mnlogit'
hmftest(x, z, ...)

Arguments

object  
...  
x  
z  
alt.subset  

An fitted model which is an object of class mnlogit.

For lrtest and waldtest a fitted mnlogit object or a formula object maybe given. However for scoretest ONLY an fitted mnlogit is accepted. For hmftest either a subset of alternatives or an mnlogit object estimated using a subset of alternatives must be given.

A fitted object of class mnlogit or a formula object.

An object of class mnlogit or a subset of alternatives for the hmftest.mnlogit method. Must be the same model as x estimated on a subset of alternatives.

A subset of alternatives to do testing on.

Value

An object of class htest, with elements:

statistic  
parameter  
data.name  

The value of the test statistic.

the value of the underlying test distribution’s parameter. In this case, the number of degrees of freedom of chi-squared distribution.

The data frame used.
mnlogit

p.value Probability for accepting the null hypothesis.
method The name of the hypothesis test.
alternative Alternative hypothesis.

Author(s)
Asad Hasan, Wang Zhiyu, Alireza S. Mahani

References
Code for the last two tests (Score and IIA test) is gratefully adapted from the CRAN package mnlogit, while the first 2 tests are performed by functions in the CRAN package inttest.

Examples
library(mnlogit)
data(Fish, package = "mnlogit")

# Unconstrained model
fm <- formula(mode ~ price | income | catch)
fit <- mnlogit(fm, Fish)
# Constrained model - intercept dropped
fm.c <- formula(mode ~ price | income - 1 | catch)
fit.c <- mnlogit(fm.c, Fish)

## MLE hypothesis tests
lrtest(fit, fit.c)
waldtest(fit, fit.c)
scoretest(fit, fit.c)

## IIA test
alt.subset <- c("beach", "boat", "charter")
hmftest(fit, alt.subset)

mnlogit Fast estimation of multinomial logit models

Description
Usage

```r
mnlogit(formula, data, choiceVar=NULL, maxiter = 50, ftol = 1e-6,
gtol = 1e-6, weights = NULL, ncores = 1, na.rm = TRUE,
print.level=0, linDepTol = 1e-6, start=NULL, alt.subset=NULL, ...)
```

```
# S3 method for class 'mnlogit'
fitted(object, outcome=TRUE, ...)
# S3 method for class 'mnlogit'
residuals(object, outcome=TRUE, ...)
# S3 method for class 'mnlogit'
df.residual(object, ...)
# S3 method for class 'mnlogit'
terms(x, ...)
# S3 method for class 'mnlogit'
update(object, new, ...)
# S3 method for class 'mnlogit'
print(x, digits = max(3,getOption("digits") - 2),
       width = getOption("width"),
       what = c("obj", "eststat", "modsize"), ...)
# S3 method for class 'mnlogit'
vcov(object, ...)
# S3 method for class 'mnlogit'
logLik(object, ...)
# S3 method for class 'mnlogit'
summary(object, ...)
# S3 method for class 'mnlogit'
print.summary(x, digits = max(3,getOption("digits") - 2),
               width = getOption("width"), ...)
# S3 method for class 'mnlogit'
index(object, ...)
# S3 method for class 'mnlogit'
predict(object, newdata = NULL, probability = TRUE,
         returnData=FALSE, choiceVar=NULL, ...)
# S3 method for class 'mnlogit'
coef(object, order=FALSE, as.list = FALSE, ...)
```

Arguments

- `formula` formula object or string specifying the model to be estimated (see Note).
- `data, newdata` A `data.frame` object with data organized in the 'long' format (see Note). This can also be a `mlogit.data` class object. `newdata` is used in the `predict` method.
- `choiceVar` A string naming the column in `data` which has the list of choices. *Note:* This argument is not used if `data` or `newdata` is a `mlogit.data` data object.
- `maxiter` An integer indicating maximum number of Newton's iterations. If `maxiter <= 0`, then only Hessian, gradient and the loglikelihood are calculated at initial point.
- `ftol` A real number indicating tolerance on the difference of two subsequent loglikelihood values.
- `gtol` A real number indicating tolerance on norm of the gradient.
weights Optional vector of (positive) frequency weights, one for each observation.
ncores An integer indicating number of processors allowed for Hessian calculations.
na.rm a logical variable which indicates whether rows of the data frame containing NAs will be removed.
print.level An integer which controls the amount of information to be printed during execution.
linDepTol Tolerance for detecting linear dependence between columns in input data. Dependent columns are removed from the estimation.
start Named vector of coefficients to use as initial guess. Use naming convention as given by names(coefit()), where fit is a mnlogit class object.
alt.subset Subset of alternatives to perform estimation on.
... Currently unused.
object, x An object of class mnlogit.
outcome a boolean which indicates, for the fitted and the residuals methods whether a matrix (for each choice, one value for each alternative) or a vector (for each choice, only a value for the alternative chosen) should be returned.
new An formula for the update method. It must obey all rules specified for the formula argument.
digits Number of digits to print.
width The width of printing.
what Specifies what to print. Default option is 'obj' is the print function for mnlogit objects. Option 'eststat' prints estimation stats and option 'mdsize' prints model size information.
probability If TRUE predict output the probability matrix, otherwise the choice with the highest probability for each observation is returned.
returnData If TRUE a data attribute is added to the returned object.
order If TRUE coefficients are ordered by variable name.
as.list Returns estimated model coefficients grouped by variable type.

Value
An object of class mnlogit, with elements:

- coefficients the named vector of coefficients.
- logLik the value of the log-likelihood function at exit.
- gradient the gradient of the log-likelihood function at exit.
- hessian the Hessian of the log-likelihood function at exit.
- est.stat Newton Raphson stats.
- fitted.values Estimated probabilities of the alternative selected in each observation.
- probabilities the probability matrix: (i, j) entry denotes the probability of the jth alternative being chosen in the ith observation.
residuals The residual. Has attribute outcome which is the probability of not choosing the selected alternative.
df The number of estimated coefficients in the model.
AIC The AIC value of the fitted model.
choices The vector of alternatives’s names.
model.size Information about number of parameters in model.
ordered.coeff Vector of coefficients ordered by variable name.
model The data.frame used in model estimation.
freq The relative frequency of each choice in input data.
formula The formula specifying the model.
call The mnlogit function call that user made,

Note
1. The data must be in the 'long' format. This means that for each observation there must be as many rows as there are alternatives (which should be grouped together).
2. The formula should be specified in the format: responseVar ~ choice specific variables with generic coefficients | individual specific variables | choice specific variables with choice specific coefficients. These are the 3 available variable types.
3. Any type of variables may be omitted. To omit use "1" as a placeholder.
4. An alternative specific intercept is included by default in the estimation. To omit it, use a '-1' or '0' anywhere in the formula.

Author(s)
Asad Hasan, Wang Zhiyu, Alireza S. Mahani

References
Croissant, Yves. Estimation of multinomial logit models in R: The mlogit Packages. https://cran.r-project.org/package=mlogit

Examples

library(mnlogit)
data(Fish, package = "mnlogit")fm <- formula(mode ~ price | income | catch)

fit <- mnlogit(fm, Fish, ncores = 2)

### Not run:
fit <- mnlogit(fm, Fish, choiceVar="alt", ncores = 2) # same effect as previous
summary(fit)
print(fit)
predict(fit)
print(fit, what = "eststat")
print(fit, what = "modsize")

# Formula examples (see also Note)
fm <- formula(mode ~ 1 | income)  # Only type-2 with intercept
fm <- formula(mode ~ price - 1)  # Only type-1, no intercept
fm <- formula(mode ~ 1 | 1 | catch) # Only type-3, including intercept

## End(Not run)
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